Ngululu Resources (Pty) Ltd

Environmental Management Programme

Locality: Portion 26, 46 & 47 of the Farm Droogefontein 241 IR, Delmas, Mpumalanga Province

Departmental Ref No: MP 30/5/1/1/2/10076 MR

SHANGONI
Management Services (Pty) Ltd

ENVIRONMENTAL MANAGEMENT PROGRAMME

Ngululu Resources (Pty) Ltd

Environmental Management Programme

Locality: Portion 26 46 & 47 of the Farm Droogefontein 242 IR, Delmas, Mpumalanga Province

Departmental Ref No: MP 30/5/1/1/2/10076 MR

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SHANGONI
Management Services (Pty) Ltd

ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME

SUBMITTED
IN TERMS OF SECTION 39
OF THE MINERAL
AND PETROLEUM RESOURCES DEVELOPMENT
ACT, 2002,
(ACT NO. 28 OF 2002) (the Act)

mineral resources
Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

STANDARD DIRECTIVE

All applicants for mining rights are herewith, in terms of the provisions of Section 29 (a) and in terms of Section 39 (5) of the MPRDA, directed to submit an Environmental Impact Assessment, and an Environmental Management Programme strictly in accordance with the subject headings herein, and to compile the content according to all the sub items to the said subject headings referred to in the guideline published on the Departments website, within 30 days of notification by the Regional Manager of the acceptance of such application.

PROJECT DETAILS

Department of Mineral Resources

Reference No.: MP 30/5/1/1/2/10076 MR

Project Title: Restigen Ngululu Resources (Pty) Ltd - Environmental Management Programme

Project Number: RES-NGU-13-07-24_EMPR

Compiled by: Salome Beeslaar

Khosi Mohlahlo

Date: January 2014

Location: Portion 26, 46 & 47 of the Farm Droogefontein 242 IR, Delmas, Mpumalanga Province

Technical Reviewer: Brian Hayes

RB Hayes (Pr.Eng.)

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DEFINITIONS

Acid base accounting

Acid-base accounting (ABA) is an analytical procedure that provides values to help assess the acid-producing and acid-neutralizing potential of overburden, waste rock and / or ore stockpiles.

Acid rock drainage

Acid rock drainage (ARD), also known as acid mine drainage (AMD), is the generation of sulphate and acidity as a result of the oxidation of pyrite when exposed to water and oxygen, producing sulphuric acid (H2SO4). AMD is a major cause of the contamination of groundwater in areas where coal and gold mining takes place.

Acid Rain leach

This procedure indicates which chemical constituents may be solubilised by an inorganic acid (dilute carbonic acid). This also simulates a “worst case” scenario. This test is a modification of the TCLP procedure, as recommended by the Department of Water Affairs (DWA). The Acid Rain procedure is based on the fact that carbon dioxide dissolves in rain water, to form carbonic acid. The carbonic acid could mobilise organics and/or inorganics in the waste.

Aquifer vulnerability

The tendency or likelihood for contaminants to reach a specified position in the groundwater system after introduction at some location above the uppermost aquifer. Sedimentary rocks composed of or derived from sand or sand-like particles

Baseflow

Stormflow and baseflow are non-process related terms to signify high amplitude low frequency flow in a river during and immediately after a precipitation event and low amplitude high frequency flow in a river during dry or fair weather periods. Baseflow is not a measure of the volume of groundwater discharged into a river or wetland, but it is recognised that groundwater makes a contribution to the baseflow component of river flow. The term groundwater contribution to baseflow should be used.

Darcy Flux

The Darcy flux (or velocity) is the hydraulic conductivity (K) times the gradient of the water/piezometric level (i.e. q=Ki). Velocity an indication of the rate at which groundwater and groundwater contamination are moving.

Expanded Durov diagram

The Durov diagram defines water in terms of the hydrochemical processes occurring within different hydrogeological systems. The Durov diagram was designed by Durov (1948) and expanded by Lloyd (1965). The Expanded diagram allows for hydrochemical data representation including plausible hydrochemical processes dominating the groundwater chemistry.

Environment

The surroundings (biophysical, social and economic) within which humans exist and that are made up of:

- The land, water and atmosphere of the earth;
- Micro organisms, plant and animal life;
- Any part or combination of (i) and (ii) and the interrelationships among and between them; and
- The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental aspects

Environmental aspects are elements of an organisation's activities, products or services that can interact with the environment.

Environmental degradation

Refers to pollution, disturbance, resource depletion, loss of biodiversity, and other kinds of environmental damage; usually refers to damage occurring accidentally or intentionally as a result of human activities.

Environmental impacts

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services.

Environmental impact assessment

An EIA is a study of the environmental consequences of a proposed course of action.

Environmental impact report

A report assessing the potential significant impacts as identified during the environmental impact assessment.

Hydraulic conductivity

Measure of the ease with which water will pass through the earth's material; defined as the rate of flow through a cross-section of one square metre under a unit hydraulic gradient at right angles to the direction of flow (m/d).

Hydraulic head

Hydraulic head is the height above a datum plane such as sea level of the column of water that can be supported by the hydraulic pressure at a given point in a groundwater system. Hydraulic heads provide an indication of the direction of groundwater flow and are used to determine hydraulic gradients.

Kriging interpolation

Kriging is a method of interpolation named after a South African mining engineer named D. G. Krige who developed the technique in an attempt to more accurately predict ore reserves. Over the past several decades kriging has become a fundamental tool in the field of geostatistics.

Land use

Land use is the various ways in which land may be employed or occupied. Planners compile, classify, study and analyse land use data for many purposes, including the identification of trends, the forecasting of space and infrastructure requirements, the provision of adequate land area for necessary types of land use, and the development or revision of comprehensive plans and land use regulations.

Latent impacts

Latent impacts are defined as impacts that result after closure. These impacts are in other words impacts that were not foreseen prior to closure. .

Pollution prevention

This is any activity that reduces or eliminates pollutants prior to recycling, treatment, control or disposal.

Public participation process

A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development.

Residual impacts

Residual impacts are defined as those environmental impacts that remain subsequent to the issuing of a closure certificate. All management actions are launched to limit the potential for residual environmental impacts. Various actions such as rehabilitation of the areas, assessing appropriate land uses and identifying practical closure objectives all work towards minimising this risk. The real risk will only be determined once a closure risk assessment had been conducted. In the meantime the actions as stipulated in the EMP all work towards minimising the potential environmental impacts after closure.

Topography

Topography is a term in geography, referring to the "lay of the land" or the physio-geographic characteristics of land in terms of elevation, slope and orientation.

Vegetation

Vegetation is all of the plants growing in and characterising a specific area or region; the combination of different plant communities found there.

Waste

Waste is unwanted or undesired material left over after the completion of a process. "Waste" is a human concept: in natural processes there is no waste, only inert end products.

Porosity

It is the percentage of the bulk volume of a soil of rock that is occupied by interstices, whether isolated or connected.

Shale

Shale is a fine-grained sedimentary rock whose original constituents were clay minerals or muds. It is characterised by thin laminae breaking with an irregular curving fracture, often splintery and usually parallel to the often-indistinguishable bedding plane.

Static geochemical testing

Static geochemical tests provide information on bulk geochemical characteristics of materials, for example, the total concentration of carbonate species in a tailings sample. They do not provide information on rates of processes or rates of release of weathering products.

Stiff diagram

A Stiff diagram is an elongate polygon, the precise shape of which is determined by "joining the dots" corresponding to the milli-equivalents per litre (meq/l) concentrations of each major ion on a template.

Storativity

It is a volume of water per volume of aquifer released as a result of a change in head. For a confined aquifer, the storage coefficient is equal to the product of the specific storage and aquifer thickness. It measures the volume of water stored and released in an aquifer and is used to quantify the safe yield of an aquifer system.

Transmissivity

Transmissivity is the rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient. It is expressed as the product of the average hydraulic conductivity (K) and thickness (b) of the saturated portion of an aquifer (T = Kb).

Seepage velocity

The seepage velocity is defined as the Darcy flux divided by the effective porosity. This is also referred to as the average linear velocity.

Waste rock characterisation

Characterisation of mine waste-rock piles, tailings dams, and naturally exposed alteration areas is important 1) to establish pre-mining background conditions, 2) to characterise and predict stability, weathering, and erosion, 3) to predict acid-rock drainage and other chemical releases, 4) to properly dispose of and manage mine wastes, and 5) to develop mine closure plans.

Zone of influence / cone of depression

The cone-shaped area around a borehole that results from the lowering of the water table or piezometric surface by abstraction.

ABBREVIATIONS

ABA	Acid Base Counting
AMD	Acid Mine Drainage
AP	Acid Potential
AR	Asbestos Regulations (2002) GN 155 i.t.o OHSA
A_r	Aquifer media rating
ARD	Acid rock drainage
A_w	Aquifer media weight
CARA	Conservation of Agricultural Resources Act, Act No 43 of 1983
CARR	Conservation of Agricultural Resources Regulations (1984) GN. 1048 i.t.o CARA
Cl_{GW}	Chloride concentration in groundwater
Cl_P	Chloride concentration in precipitation
CMB	Chloride mass balance method
C_r	Hydraulic conductivity rating
C_w	Hydraulic conductivity weight
DMR	Department of Mineral Resources
D_r	Depth to water table rating
D_w	Depth to water table weight
DWA	Department of Water Affairs
EA	Explosives Act, Act No.15 of 2003
EC	Electrical conductivity
ECA	Environment Conservation Act, Act No. 73 of 1989
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
EMPr	Environmental Management Programme Report
FFFARSRA	Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, Act No. 1947 of 1974
GN	Government Notice
GRDM	Groundwater Resource Directed Measures
HCSR	Hazardous Chemical Substances Regulations (1995) GN 1179 i.t.o OHSA
HH	Hydraulic head
HPA	Highveld Priority Area i.t.o NEMAQA
HPAAQMP	Highveld Priority Area Air Quality Management Plan (2012) GN 144 i.t.o NEMAQA
HSA	Hazardous Substances Act, Act No. 15 of 1973
I&APs	Interested and affected parties
ICP-OES	Inductively coupled plasma optical emission spectrometer
IDP	Integrated development plan
I_r	Impact of vadose zone rating
I_w	Impact of vadose zone weight
LoM	Life of Mine
MHSA	Mine Health and Safety Act, Act No. 29 of 1996
MHSR	Mine Health and Safety Regulations (1997) GN 93 i.t.o MHSA
MPRDA	Minerals and Petroleum Resources Development Act, Act No. 28 of 2002

MPRDR	Minerals and Petroleum Resources Development Regulations (2004) GN 527 i.t.o MPRDA
MSDS	Material safety data sheet
MWP	Mining works programme
GNCR	Gauteng Noise Control Regulations (1999) GN 5479 i.t.o ECA
NDCR	Draft National Dust Control Regulations (2012) GN 1007 i.t.o NEMAQA
NDM	Nkangala District Municipality
NEA	National Energy Act, Act No. 34 of 2008
NEMA	National Environmental Management Act, Act No. 107 of 1998
NEMAQA	National Environment Management: Air Quality Act, Act No. 39 of 2004
NEMBA	National Environmental Management: Biodiversity Act, Act No. 10 of 2004.
NEMWA	National Environmental Management: Waste Act, Act No. 59 of 2008
NFAQM	National Framework for Air Quality Management in South Africa (2007) i.t.o NEMAQA
NGA	National Groundwater Archive
NHA	National Heritage Act, Act No. 25 of 1999
NNP	Net Neutralisation Potential
NNR	National Nuclear Regulator
NNRA	National Nuclear Regulator Act No 47 of 1999
NP	Neutralisation Potential
NPR	Neutralising Potential Ratio
NRTA	National Road Traffic Act, Act No. 93 of 1996
NuEA	Nuclear Energy Act, Act No. 131 of 1993
NVFFA	National Veld and Forest Fire Act, Act No. 101 of 1998
NWA	National Water Act, Act No. 36 of 1998
OHSA	Occupational Health and Safety Act, Act No. 85 of 1993
PCD	Pollution Control Dam
PCOR	Pest Control Operator Regulations (2011) GN 98 i.t.o FFFARSRA
PPP	Public Participation Process
Rd	Relative density
RoM	Run of Mine
R_r	Recharge rating
R_w	Recharge weight
SaClLm	Sandy-clay-loam
SANS	South African National Standard
SLP	Social and Labour Plan
S_r	Soil type rating
S_w	Soil type weight
SWMP	Stormwater Management Plan
T-Alk	Total Alkalinity
TDS	Total Dissolved Solids
T_r	Topography aspect rating
T_w	Topography aspect weight
VKLM	Victor Khanye Local Municipality
WISH	Windows Interpretation System for the Hydrogeologist

WL_m	Borehole water level in meters
WRD	Waste Rock Dump
WSA	Water Services Act, Act No. 108 of 1997
WTR	Waste Tyres Regulations (2009) GN 149 i.t.o ECA
Z_m	Topography in meters

EXECUTIVE SUMMARY

Ngululu Resources, a proposed opencast coal mine with an estimated Life of Mine (LoM) of 20 years is planned on portion 26, 46 and 47 of the farm Droogenfontein 242 IR. The proposed site with corresponding farm portions is approximately 15km south-west of Delmas Town in the Victor Kanye Local Municipality (VKLM), as part of the Nkangala District Municipality (NDM) in the Mpumalanga Province. Portion 26 is situated further east, about 15km south-west of Delmas. Portion 46 and 47 comprise about 8ha, while portion 26 comprises approximately 130ha. The portions are situated in the quarter degree square 2628BA.

Currently there are no mining activities taking place on the proposed site, but with prospecting permits registered to Ngululu Resources. These prospecting permits are as follow: MP 11645 PR, for coal, on portions 26, 46 and 47 of the Farm Droogenfontein 242 IR; MP 5128 PR, for coal, on portion 7 of the farm Rietfontein 314 JS; and MP 5490 PR, for clay and attapulgite, on various portions of the farm Droogenfontein 242 IR. Ngululu Resources does not currently own the surface right of these portions.

The proposed project includes exploitation of the whole of portion 26 through an opencast boxcut to gain access to the coal seams. The roll-over mining method will be used. No mining shall take place on portion 46 and 47 of Droogefontein 242IR. Due to size constraints on portion 26, Ngululu Resources have decided not to establish a beneficiation plant but to approach and agree with the surrounding mines in the area to wash and screen the coal. It is not known at this stage where ore processing will take place.

There will be no permanent general and hazardous non-mineral waste disposal facilities. General non-mineral waste will be stored temporary in a waste container and disposed at a licensed disposal facility. Hazardous non-mineral waste generated by the proposed mine will be collected by a waste contractor and disposed of at appropriately licensed hazardous waste disposal facility. Mineral waste will include mine residue deposits such as waste rock and spoils which will be stockpiled separately on site.

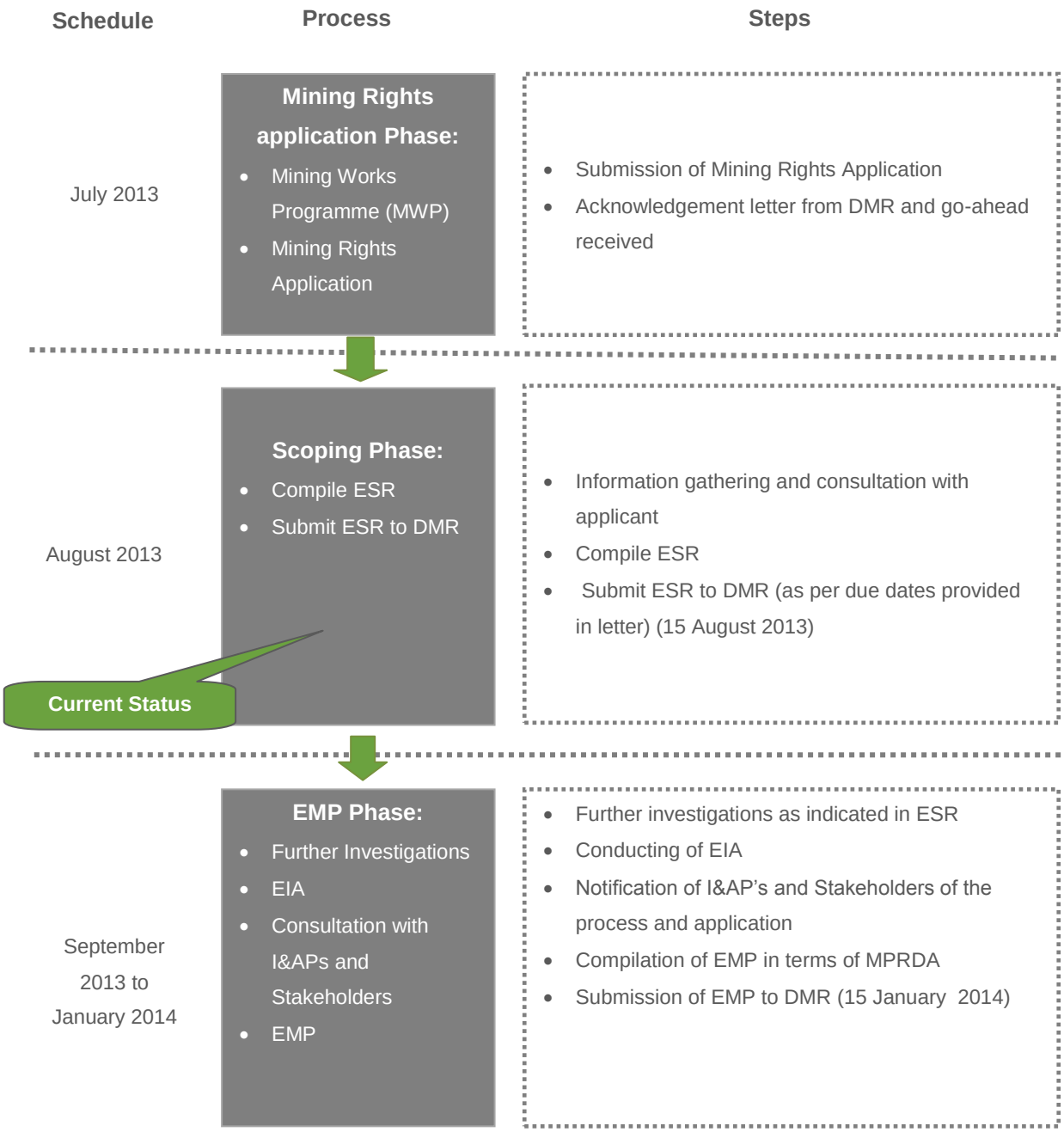
There is an existing access road to the proposed site and internal roads will be constructed between the open pit, and support services. There will be a waste rock dump during operational phase adjacent to the open pit.

There are sensitive sites of significance found in the proposed mining area that includes two wetland areas; an Unchannelled Valley Bottom Wetland with extensive associated Hillslope seepage wetlands and a Pan. Furthermore, the moist grassland provides habitat to the Declining *Crinum bulbispermum* and is potential habitat to the Near Threatened *Kniphofia typhoides*. An informal graveyard containing at least 80 graves as well as settlement remains is also present on site.

A mining right application for portion 26, 46 and 47 of the farm Droogefontein 242 IR, was lodged with the Department of Mineral Resources (DMR) and the DMR issued a letter to the mine to indicate acceptance of the mining rights application. A Scoping Report was submitted to DMR in August 2013, where after this EMP commenced. The following requirements were set out in the mentioned letter:

- The submission of an Environmental Scoping Report (ESR) to the DMR on or before 15 August 2013;
- The submission of an EMP to the DMR on 15 January 2014; and
- To notify in writing, and consult with the landowners or lawful occupiers and any other interested and affected party (I&AP), and to submit such consultation to the DMR on or before January 2014.

This ESR was compiled to fulfil the requirements as set out in Section 37 and 38 of the MPRDA and regulations 48 and 49 of the Mineral and Petroleum Resources Development Regulations, GNR 527 of 2004 (MPRDR) in terms of the MPRDA. The ESR was submitted to the DMR. This Environmental Impact Assessment (EIA) and EMP phase (in terms of the MPRDA, 2002) followed subsequent to the submission of the ESR to the DMR. The diagram below indicates the schedule that is being followed as part of the EMP phase.



Layout of this document

This document comprises of an Environmental Impact Assessment (EIA) section and an Environmental Management Plan (EMP) section. Section 1 (EIA) is divided into sixteen (16) paragraphs in accordance with Regulation 50(a) to Regulation 50(i) of the MPRDA. Section 2 (EMP) is divided into fourteen (14) paragraphs in accordance with Regulation 51(a), Regulation 51(b) and Section 39 of the MPRDA.

Sub-section 1 of Section 1 (EIA) is a description of the present environmental background. Sub-section 2 is a description of all proposed mining operations. Sub-section 3 is a list of all potential impacts including cumulative impacts. These three sub-sections are in accordance with Regulation 50(a) of the MPRDA. Sub-section 4 considers alternative land uses or developments that may be affected and sub-section 5 lists the potential impacts in the case of alternative land use or developments taking place. This sub-section also includes the cumulative impacts of such land use or development. These two sub-sections are in accordance with Regulation 50(b) of the MPRDA.

Sub-section 6 is an identification of potential social and cultural impacts. This sub-section includes the quantification of the impacts on the socio-economic conditions. Sub-section 7 is a combination of sub-section 3 and 6 with the significance rating included, and also describes the method for significance rating as well as the impact phases associated with the mine. These two sub-sections are in accordance with Regulation 50(c) of the MPRDA. Sub-section 8 is an identification of alternative land uses that will be impacted upon and sub-section 9 indicates any results from a specialist on comparative land use assessment. These two sub-sections are in accordance with Regulation 50(d) of the MPRDA. Sub-section 10 is a list of all significant impacts identified in sub-section 7, which is in accordance with Regulation 50(e) of the MPRDA.

Sub-section 11, 12 and 13 is a detailed discussion of public participation that has taken place. These three sub-sections are in accordance with Regulation 50(f). Sub-section 14 is a description of the appropriateness of the assessment. This includes the adequacy of the predictive methods, underlying assumptions and any uncertainties in the information. This sub-section is in accordance with Regulation 50(g) of the MPRDA. Sub-section 15 is a detailed description of monitoring and in accordance with Regulation 50(h). Sub-section 16 is a list of additional information relevant to Section 1 (EIA) attached to this document.

Sub-sections 1 to 4 of Section 2 (EMP) are descriptions of environmental objectives and specific goals for mine closure, management of identified impacts, socio-economic conditions and historical and cultural aspect. These four sub-sections are in accordance with Regulation 51(a) of the MPRDA. Sub-section 5 is a complete description of the mitigation and management measures, sub-section 6 lists all action plans to achieve the objectives and specific goals, sub-section 7 lists all emergency procedures, sub-section 8 is a description of monitoring and environmental performance assessment, and sub-section 9 gives detail on the financial provision related to the impacts and mitigations assessment. These five sub-sections are in accordance with Regulation 51(b).

Sub-section 10 is a description of the environmental awareness plan, and sub-section 12 is the capacity of the mine to manage and rehabilitate. These two sub-sections are in accordance with Section 39 of the MPRDA. Sub-section 11 is a list of additional information relevant to Section 2 (EMP) attached to this document, sub-section 13 is the undertaking and sub-section 14 is an identification of the report.

Applicant

Name of Applicant	Ngululu Resources(Pty) Ltd
Postal Address	PO Box 67347 Highveld X11 0169
Telephone No.	+27 (0)12 663 2257
Fax No.	+27 (0)12 663 1018
Farm name and portion on which the activities take place	Portion 26 46 & 47 of the farm Droogenfontein 242 IR
Co-ordinates of operation	S 26.22605 and E 28.55864

Appointed environmental assessment practitioner (EAP)

Name of firm	Shangoni Management Services	
Postal address	PO Box 74726 Lynnwood Ridge 0040	
Telephone No.	(012) 807 7036	
Fax	(012) 807 1014	
E-mail	info@shangoni.co.za	
Team of Environmental Assessment Practitioners on project		
Name	Qualifications	Responsibility
Brian Hayes	Registered professional engineer (Chemical) with a master degree in Environmental Engineering	Director
Salome Beeslaar	B.Sc. Hons Geography	Consultant
Khosi Mohlahlo	B.Sc. Hons Environmental Management	Consultant

Section 1: Environmental impact assessment

Regulation 50 (a)

1 Description of the baseline environment

1.1 Concise description of the environment on-site relative to the environment in the surrounding area

1.1.1 Regional background

The project site is located in the Victor Khanye Local Municipality (MP311), as part of the Nkangala District Municipality (M062), in the Mpumalanga Province, and is some 15km south-west of the town of Delmas via the R555 (Refer to Figure 1 below for a locality map). The region, within which the project site is situated, is strategically located close to the metropolitan areas of Tshwane and Ekurhuleni to the west. The proposed project site is located on the periphery between the Mpumalanga and Gauteng Provinces. The town of Springs, as part of the Gauteng Province, is located some 12km to the west of the project site.

Two national routes, the N12 and N17 pass north and south of the project site, respectively. These roads are accessible via lower-class access routes. In terms of District priorities, the N12 freeway has been classified as a development corridor as it links the Nkangala District with the industrial core of South Africa (Ekurhuleni Metro and Oliver Tambo International Airport) as well as the financial and commercial capital of South Africa – Johannesburg.

The project site is located in a relatively rural setting between residential smallholdings and enclaves associated with the Administrative town of Delmas. The latter representing a small farming town which was laid out in 1907 on the farm Witklip. The farm was owned by a Frenchman Frank Dumat, who decided to call the town ‘de le mas’ (of the small farm).

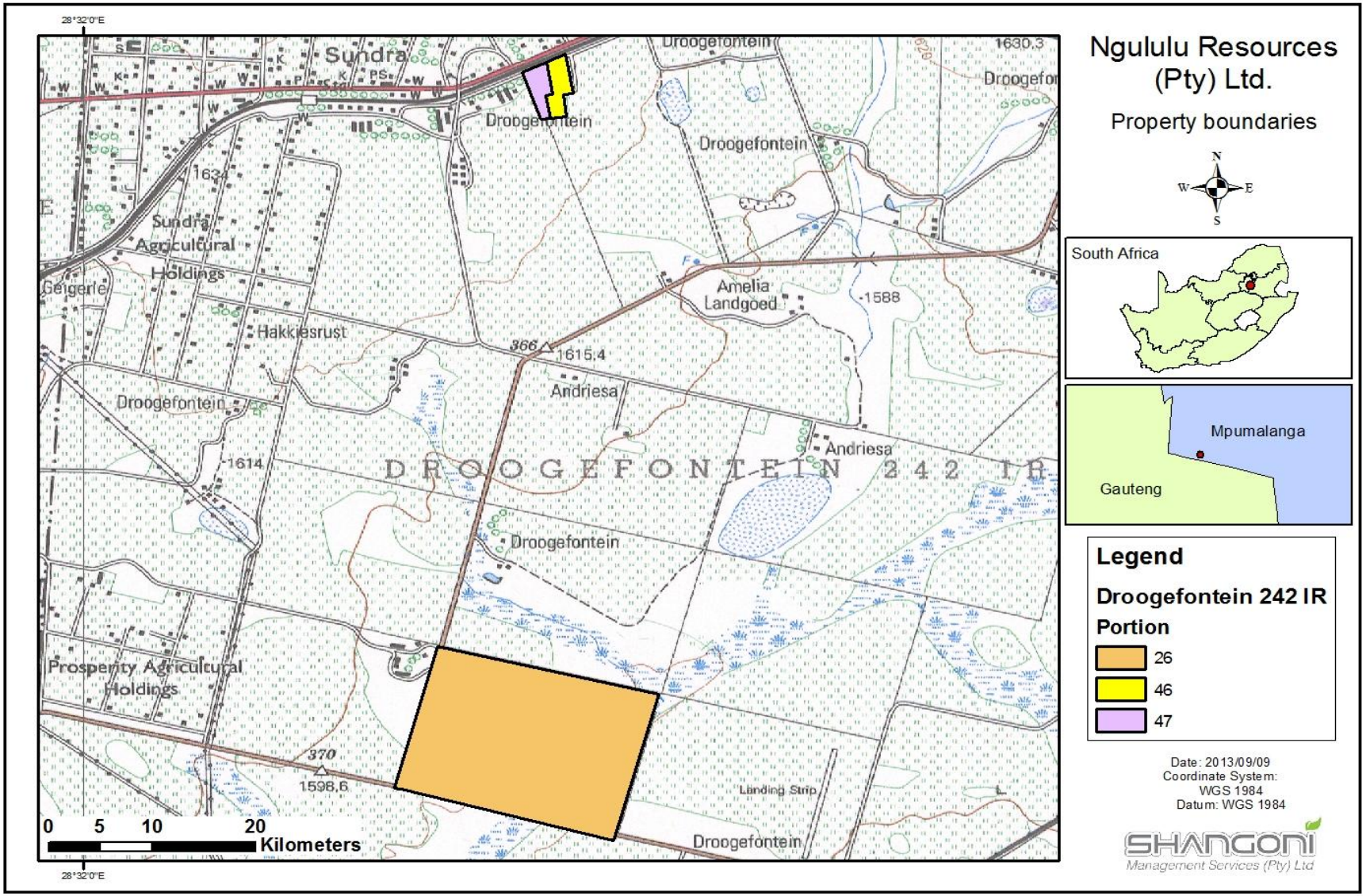


Figure 1: Locality map

1.1.1.1 Land tenure and use of immediately adjacent land

Portion 26 is bordered by a commercial chicken farm to the north-west (on Farm No. 242/39). Most of portion 26 and its surrounds are used for maize cultivation. The area not currently ploughed comprises of wetland areas that show signs of grazing. Historic aerial imagery indicates that parts of the larger wetland area was also ploughed in the past – probably during dry years when the area was not too saturated to plough. A small cemetery is situated in the northern eastern corner of the site. The dirt roads forming the western and southern boundary of portion 26 were recently upgraded and soil berms and culverts constructed, likely to aid drainage of the roads due to the wetland conditions

Portion 46 and 47 comprise small holdings. Both portions contain houses and outbuildings. The northern section of portion 46 was ploughed in the past and now contains secondary grassland used for grazing. An artificial dam is also situated on this section of portion 46. The southern part of portion 46 as well as open land on portion 47 is also used for grazing. The grass was grazed short and included numerous weedy species. These two portions are surrounded by cultivated maize fields.

1.1.1.2 Distance to nearest towns

Table 1 below gives an indication of the distance and directions to the nearest towns.

Table 1: Direction and distance to nearest towns

Town	Distance(km)	Direction
Prosperity AH	±2	Northwest
Aston Lake	±4	Southwest
Sundra AH	±4	Northwest
Sundale AH	±5	North
Delmas	±9	Northeast
Vischkuil	±7	Southeast
Grootvaly AH	±6	Southwest

1.1.2 Geology

1.1.2.1 Site specific geology

The Mining Works Programme (refer to Appendix F1) compiled by Ngululu Resources (Pty) Ltd, dated April 2013, describes the Geology of the proposed site as follows:

The farms are underlain by rocks of the Karoo Supergroup and more specifically the lower parts of the Ecca group belonging to the Madzaringwe Formation. The rocks underlying the farms will be characterised by sandstone, shale and coal and various intrusions of Dolerite dykes and sills. The area predominantly lies on a rift related subsistence basin associated with Mafic and Ultra Mafic volcanic rock, Transvaal Supergroup, Karoo Dolerite and Felsic rock. The area also has the Caronite rocks on the non-rift basin Forland basin and this forms part of the Malmani Supergroup of the

Chuniespoort group. The area applied for is underlain by sedimentary and volcanic units of the Karoo Supergroup and surficial sediments. Within the area applied for the boundary fault to the southern basin trends east west through the centre. The southern downthrown block is underlain by from North West to South West Lebombo lava, Clarens sandstone, Irrigasie mudstone, siltstone, shale, sandstone and conglomerate, and lastly Ecca shales, mudstones, carbonaceous sediments including coal measures and subordinate sandstone. The entire area is covered with variable thicknesses of reddish to khaki sandy soil and outcrop of Karoo strata is very rare. The mineralisation of interest occurs within the lower most Karoo formation, where the coal seams occur within a coal zone consisting of carbonaceous shale and coal bands with minor silt, sand and mud intercalations. Refer to Figure 2 below for a geological map.

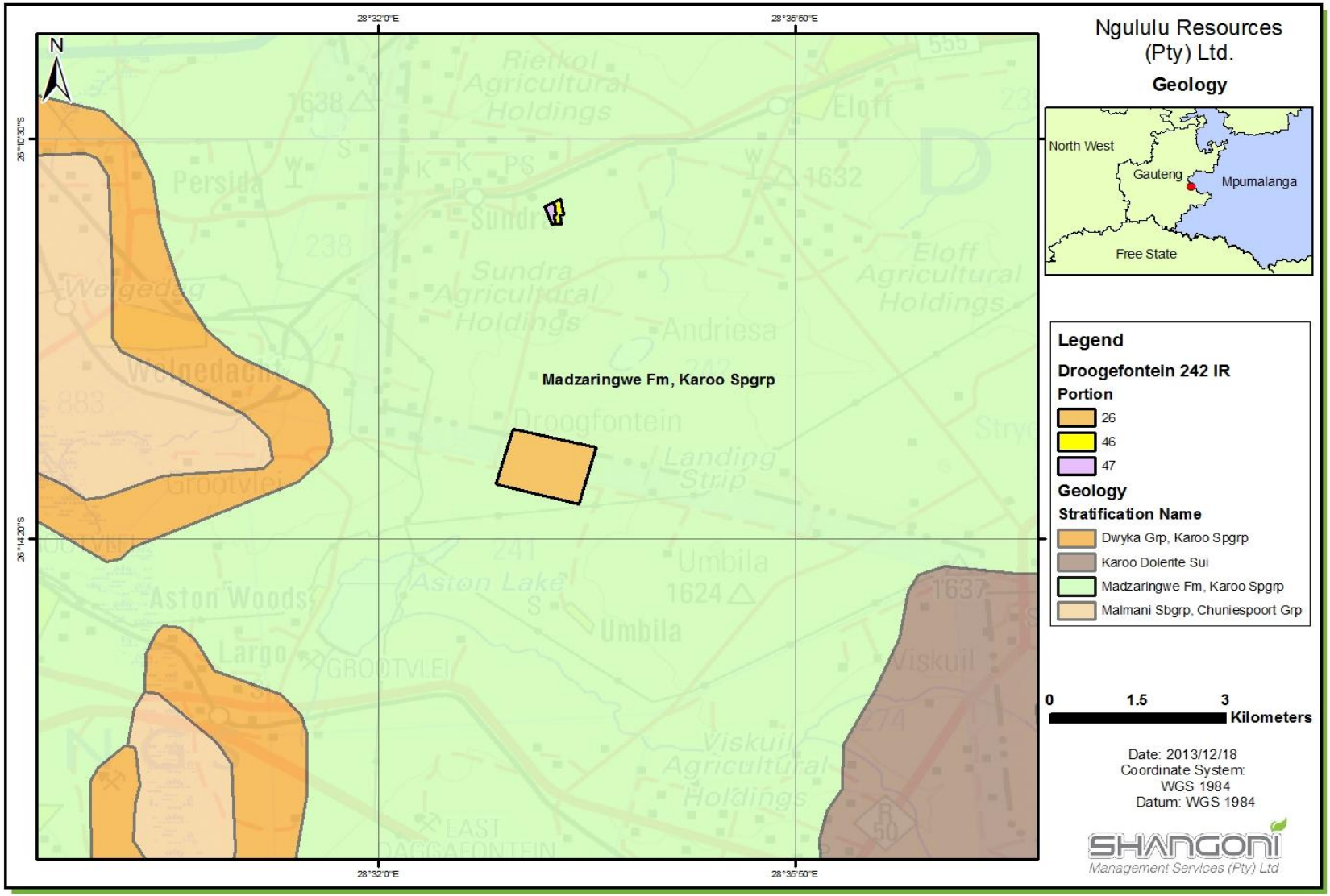


Figure 2: Geological Map

1.1.3 Climate

The following information on climate was sourced from the MPRDA Scoping Report, dated August 2013, compiled by Shangoni Management Services.

1.1.3.1 Brief description of the climate

The climate of the region as a whole is temperate with warm summers and very cold dry winter. Most of the rainfall occurs in the summer months in the form of thundershowers. Frost occurs regularly in the winter and snow can be expected occasionally. The mean annual rainfall is 825mm per annum. Average mean maximum temperature ranges between 18°C and 27°C and the mean minimal temperature between 3°C and 14.O°C.

1.1.3.2 Mean monthly and annual rainfall

The average rainfall on the farm Droogefontein is 800-900mm per year. Table 2 below indicates the mean monthly precipitation for the proposed site. The average precipitation ranges between 1mm to 151mm. The minimum average precipitation is observed in July with a precipitation of 1mm and the maximum precipitation is observed in December with a precipitation of 151mm.

Table 2: Mean monthly precipitation

MONTH	PRECIPITATION(mm)
January	128 4
February	143.5
March	102
April	39.6
May	5
June	3
July	1
August	3
September	5
October	78.9
November	18
December	151
Mean	45.8

1.1.3.3 Mean monthly maximum and minimum temperatures

Table 3 below indicates the mean monthly maximum and minimum temperatures for the proposed site. January is generally the warmest month of the year with a mean temperature of 27ºC and June and July are generally the coldest months of the year with a mean temperature of 3ºC.

Table 3: Minimum and maximum monthly temperatures (°C)

MONTH	MAX	MIN
January	27	14
February	26	14
March	25	13
April	23	10
May	20	6
June	18	3
July	18	3
August	21	5
September	25	9
October	26	11
November	26	12
December	26	14
Mean	23.4	9.5

1.1.3.4 Mean annual evaporation

The mean evaporation for the proposed site is approximately 1,400mm per annum.

1.1.4 Topography

The landscape on portion 46 and 47 is relatively flat, with an artificial dam situated in the northern section of portion 46. Portion 26 slopes gently towards the south-west to where the wetland area is situated (Figure 3).

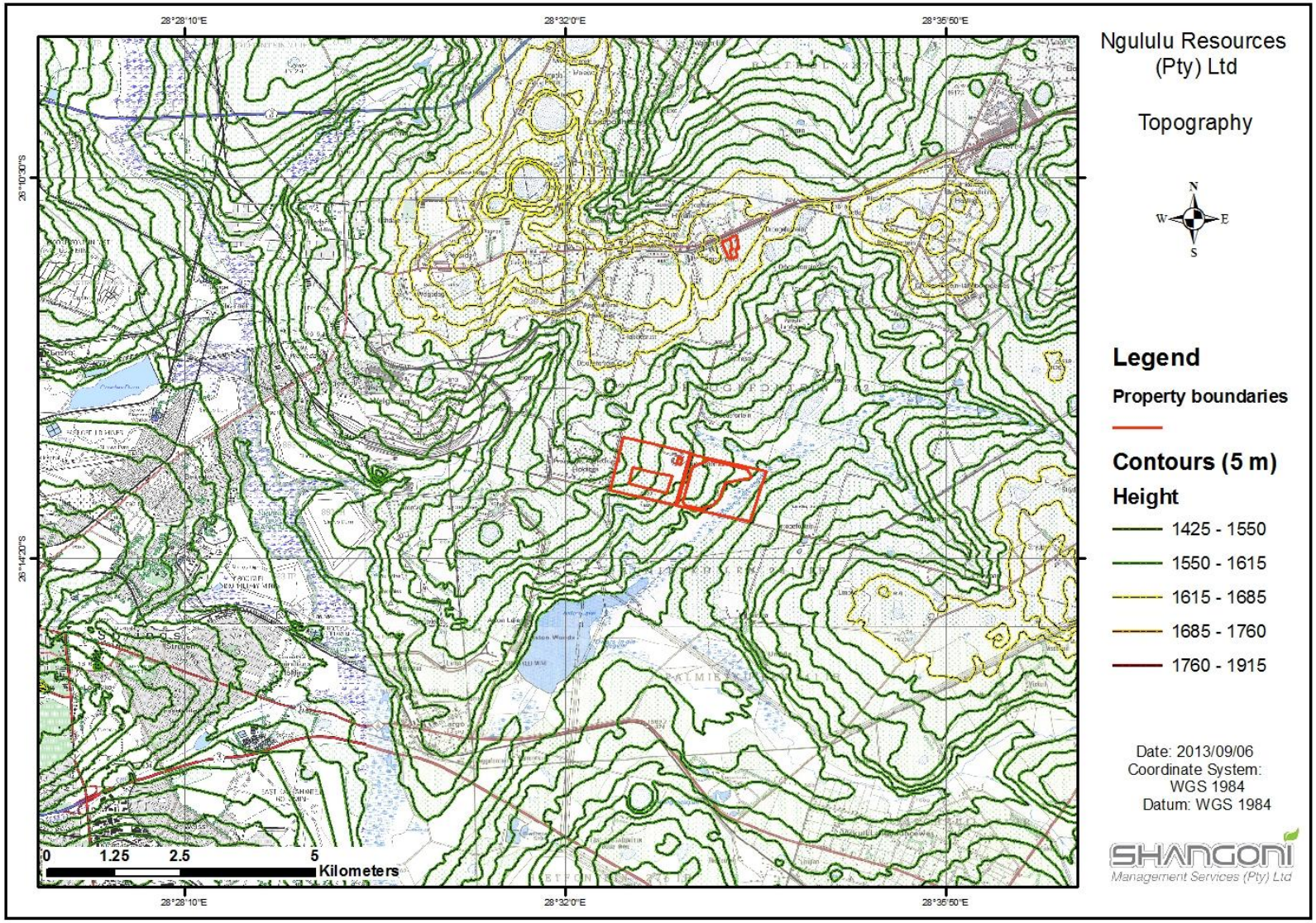


Figure 3: A map showing the topography for Portions 26, 46 and 47 of the farm Droogefontein 242 IR.

1.1.5 Soil

According to the report titled "*EIA Agricultural Impact Assessment, dated October 2013, compiled by Zone land Solutions"* ;(Appendix C1), the soil in the Mpumalanga is of the Ecca Group, a stratum of the Karoo Supergroup. During the field visit conducted as part of the Agricultural Impact Assessment study, the soil on top (0-300mm) was sampled from dominating soil forms on Portion 26 of the farm Droogefontein. Samples 1, 2, and 4 were sampled from arable land and sample 3 was sampled from the wetland. The soil samples were analysed for physical and chemical properties as follows:

- pH (water);
- Extractable cations and Na, K, Ca, Mg
- Contain Exchange Capacity;
- Carbon content;
- Phosphorus (Bray 1)
- Soil texture namely sand, silt and clay were also determined.

Bray 1 Phosphorus is a soil testing procedure that is used to determine the level of plant-available phosphorus in soils with a pH of 7.0 or less. Phosphorus (P) status as shown in Table 4 indicates that the Phosphorus status of the soil is good. Phosphorus is a major macronutrient essential for plant growth. The uncultivated wetland area has a Phosphorus content of 9 mg/ kg, lower than the cultivated soils because no fertiliser is added to the uncultivated wetland area. Organic carbon (C) ranges from 0.34 – 0.73% for the cultivated soils.

The arable soil pH is 4.9 to 5.2. More acidic soil is often found in areas of high rainfall. High rainfall leaches base cations from the soil, increasing the percentage of Al^{3+} and H^{+} relative to other cations. This pH is suitable for the cultivation of maize, for which the soil is currently utilised. The soil pH is very important in arable farming because plant nutrition, and therefore yield, is influenced by soil pH.

The texture properties are described as sandy soil. Sandy soil is easily cultivated using normal agricultural equipment. The wetland soil is clay. Refer to Figure 4 below for soil properties of the proposed site

Table 4: Soil Physical and Chemical Properties.

Sample	Soil	pH	Resistance.	H^{+}	Stone	P Bray 1	K	Exchangeable cations (cmol(+)/kg)				C
		(KCl)	(Ohm)	(cmol/ kg)	(Vol %)	mg/kg		Na	K	Ca	Mg	%
S1	Sand	5.2	840	0.55	1	33	186	0.04	0.48	2.96	1.36	0.56
S2	Sand	4.9	880	0.64	4	30	179	0.07	0.46	2.93	1.13	0.34
S3	Clay	4.7	350	1.14	9	9	278	1.42	0.71	15.04	12.15	0.62
S4	Sand	5.1	850	0.50	1	22	187	0.05	0.48	4.34	1.50	0.73

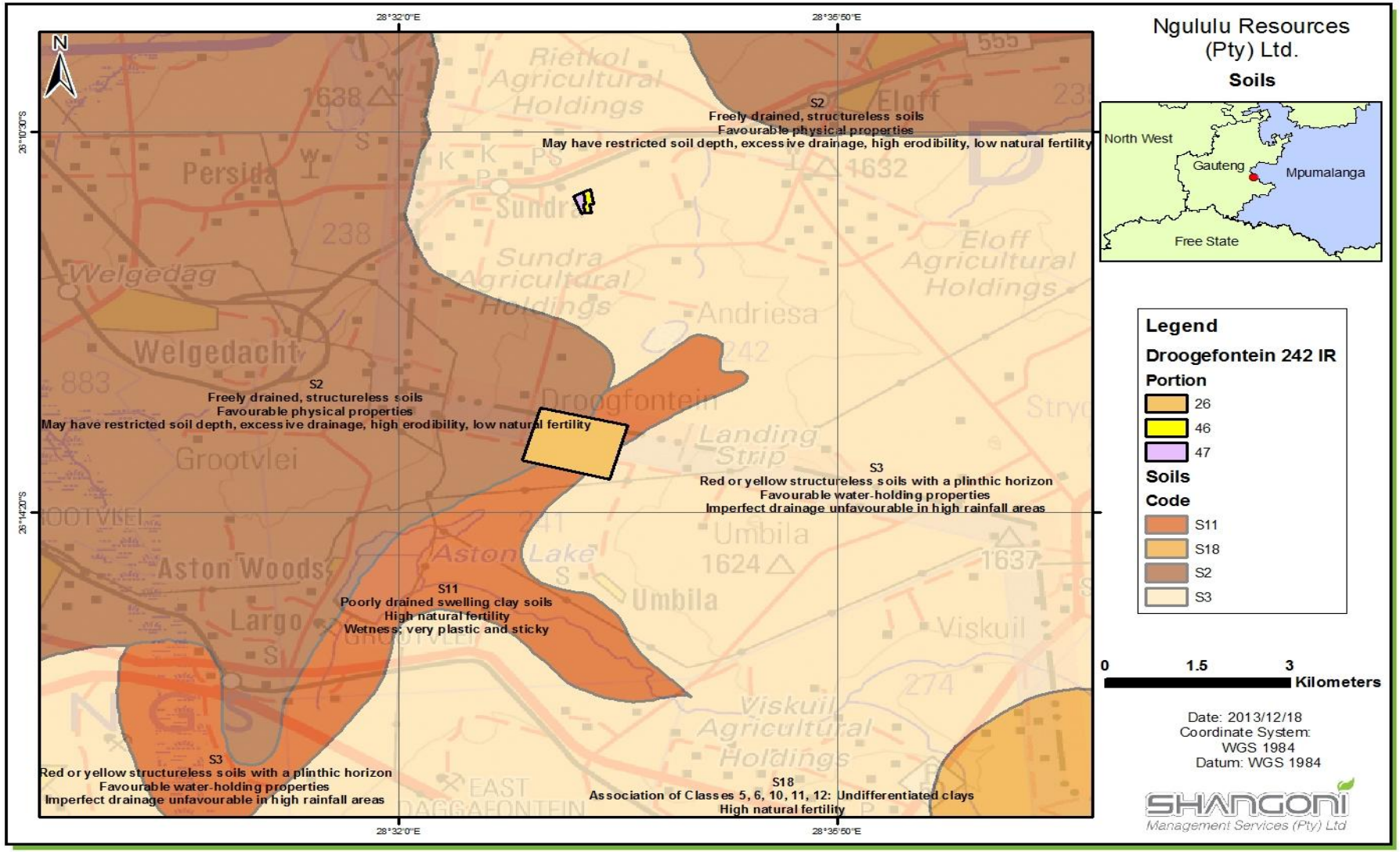


Figure 4: Soil properties of the proposed site

1.1.6 Land use and land capability

The following information was extracted from the report titled "*Vegetation Assessment: Proposed Coal Mine on the Farm Droogenfontein 241 IR Portions 26, 46 and 47, Delmas, Mpumalanga, compiled by Dimela Eco Consulting, dated October 2013*" (Appendix C9). According to this report, portion 46 and 47 comprise of small holdings. Both portions contain houses and outbuildings. The northern section of portion 46 was ploughed in the past and now contains secondary grassland used for grazing. An artificial dam is also situated on this section of portion 46. The southern part of portion 46 as well as open land on portion 47 is used also used for grazing. The grass was grazed short and included numerous weedy species. These two portions are surrounded by cultivated maize fields.

Most of portion 26 and its surrounds are used for maize cultivation. The area not currently ploughed comprises of wetland areas that show signs of grazing. Historic aerial imagery indicates that parts of the larger wetland area was also ploughed in the past – probably during dry years when the area was not too saturated to plough. A small cemetery is situated in the northern eastern corner of the site. The dirt roads forming the western and southern boundary of portion 26 were recently upgraded and soil berms and culverts constructed, likely to aid drainage of the roads due to the wetland conditions.

1.1.7 Vegetation

1.1.7.1 Site specific

A vegetation assessment (Appendix C9) was conducted on the Portions 26, 46 and 47 of the farm Droogefontein 242 IR, Delmas, Mpumalanga; by Classic Environmental Management Services (CEMS) in October 2013. This assessment identified three vegetation types namely Soweto Highveld Grassland, Eastern Highveld Grassland and Andesite Bushveld; all converging in the area of the sites assessed. The two Grassland types are nationally classified as Endangered due to cultivation, mining and urbanisation within the grassland. The extent of vegetation on the proposed site is geographically represented in Figure 5 below.

The study found that the vegetation sensitivities on site comprised the vegetation associated with wetland conditions as well as the adjacent portion of secondary grassland with seepages on portion 26. No primary Soweto Highveld or Eastern Highveld grassland was observed. A protected plant species, the 'Declining' *Crinum bulbispermum* was observed in a large population occurring within the wetland, which adds to the sensitivity of this portion of the site assessed. The vegetation on portion 46 and 47 was degraded and classified as transformed with no plants of conservation concern occurring.

Due to the site being largely transformed by agricultural activities, the natural vegetation is limited to the perceived wetland areas on portion 26. The vegetation on site can be grouped as follows:

1. Transformed grassland and cultivated areas;
2. Secondary grassland with seepage areas; and
3. Moist grasslands / vegetation associated with watercourses.

1.1.7.1.1 Transformed grassland and cultivated areas

The transformed land is characterised by vegetation that no longer comprises of the natural species diversity and includes the cultivated lands, the small holdings as well as the grazed grassland on portion 46 and 47 of the small holdings. Within these areas the natural grassland species composition has been transformed and includes monocultures (maize), pasture and planted alien invasive plant species such as *Pinus* species (Pine).

Although the grazed areas were burnt or grazed short, grasses such as *Eragrostis curvula* (Weeping Love Grass) and *Cynodon dactylon* (Couch Grass) were recognised but that the species diversity is assumed to be low. No natural vegetation remains and no plants of conservation concern occur within transformed land.

1.1.7.1.2 Secondary grassland with seepage areas

Portion 26 includes a portion of secondary grassland. Secondary grasslands develop where the original, primary (undisturbed) grassland vegetation was removed (e.g. by cultivation). After such disturbances cease, pioneer grassland species colonise the disturbed areas leading to a secondary grassland state as opposed to the primary (climax) state prior to any disturbances. In the absence of any further disturbances, continuous succession should theoretically lead to the development of the original climax (or primary) state of the grassland. However, primary grasslands are species rich ecosystems, which once disturbed, are difficult, if not impossible to restore. Although grasslands can be re-created to comprise a number of grass species, the diversity of forbs and geophytes are not easy to attain.

From historic aerial images it is evident that the south-western corner of portion 26 was ploughed at some stage. At the time of the survey, the secondary grassland was grazed and partially burnt. Although the grass species was not recognisable, it was thought that as a minimum the following grass species would be present: *Themeda triandra* (Red Grass), *Aristida congestus* (Three-awn), *Setaria spachelata* and *Erogrostis curvula* (Weeping Love Grass). The grass *Cynodon dactylon* (Couch Grass) was positively identified as well as *Imperata cylindrica* (Cotton Wool Grass). Cotton Wool Grass favours moist soils and can be indicative of wetland conditions. Within the secondary grassland, the patchy occurrence of this grass coincided with seepage areas possibly linked to the wetland area directly west thereof (Limosella, 2013).

The herbaceous layer included *Hermannia depressa* (Rooi-opslag) which in large numbers could be indicative of overgrazing and trampling (Van Wyk & Malan, 1997). Other species were *Helichrysum nudifolium*, *Berkheya setifera, Jamesbrittenia aurantiaca* (Cape Saffron) and *Bulbine narcissifolia.*

Although secondary grassland is not expected to host large species diversity, the species diversity was low. However, it is possible that some species were still dormant at the time of the field survey and therefore this should be seen as the minimum and not exact species diversity.

1.1.7.1.3 Moist grasslands / vegetation associated with watercourses

As per the National Water Act (Act No 36 of 1998), a wetland means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil. Vegetation indicative of wetland conditions was also observed on portion 26. A large wetland area stretched from the mid southern boundary of portion 26 to the north-eastern corner and beyond. This vegetation was burnt at the time of the field survey. The grass layer was not recognisable but the following specie was thought to occur: *Sporobulus* species*, Erarostis plana* (Tough Love Grass), *Aristida aequiglumis, Andropogon appendiculatus, Paspalam dilatatum* and *Setaria* species. In addition, sedges such as *Typha capensis* and *Schoenoplectus* species also likely occur. However, the fire stimulated a number of herbaceous species to flower. The species observed include *Falkia oblanga. Hermannia erodioides, Hypoxis filiformis* and *Arctotis arctotoides.*

Although not yet in flower, a population of the bulb *Crinum bulbispermum* (River Lily) was found within the wetland area. This species is a protected plant species as its medicinal use is leading to a decline in numbers nationally. Although the species diversity is likely not high, the vegetation remains functional to prevent soil erosion, regulate water flow and to provide habitat to numerous fauna and flora species. A smaller portion of moist grassland was found on the south-western corner of the site. While *Crinum bulbispermum* was not observed here, the bulbs might still have been dormant. Some dumping and excavation (likely from the recent road works) as well as alien invasive plant species were observed at the edge of the moist grassland, while the small wetland area on the northern boundary was encroached by the maize cultivation.

1.1.7.2 Plants of conservation importance

Plants of conservation concern are those plants that are important for South Africa's conservation decision making processes and include all plants that are Threatened, Extinct in the wild, Data deficient, Near-threatened, Critically rare, Rare and Declining. These plants are also referred to as Red Listed plants. Of these, suitable habitat for 2 species was present on the studied site, of which one, *Crinum bulbipsermum* was confirmed to occur. This species is classified as "declining". If the decline continues, these plants will become threatened.

The other species that could potentially occur is *Kniphofia typhoides*. This species is classified as near threatened and are thus on the verge of becoming extinct. During the vegetation assessment, this species was observed in historically ploughed and areas disturbed before. The clayey nature of soil within parts of the wetland could be suitable habitat for this species. At the time of the vegetation

assessment, the vegetation was burnt and therefore the likelihood of the plant occurring cannot be ruled out.

1.1.7.3 Alien Invasive Plant Species

Portion 46 and 47 contain numerous exotic species usually planted as ornamentals. Most of these species are not invasive. Categorised species on portion 46 and 47 include *Pinus patula* (Pine) and *Opuntia species* (Prickly Pear).

The wetland area on portion 26 contained annual and biannual invasive species such as Verbena Brasilliensis and *Crisium vulgare* (Scotch Thistle) as well as large specimens of *Eucalyptus cf camaldulensis* (Red River Gum).

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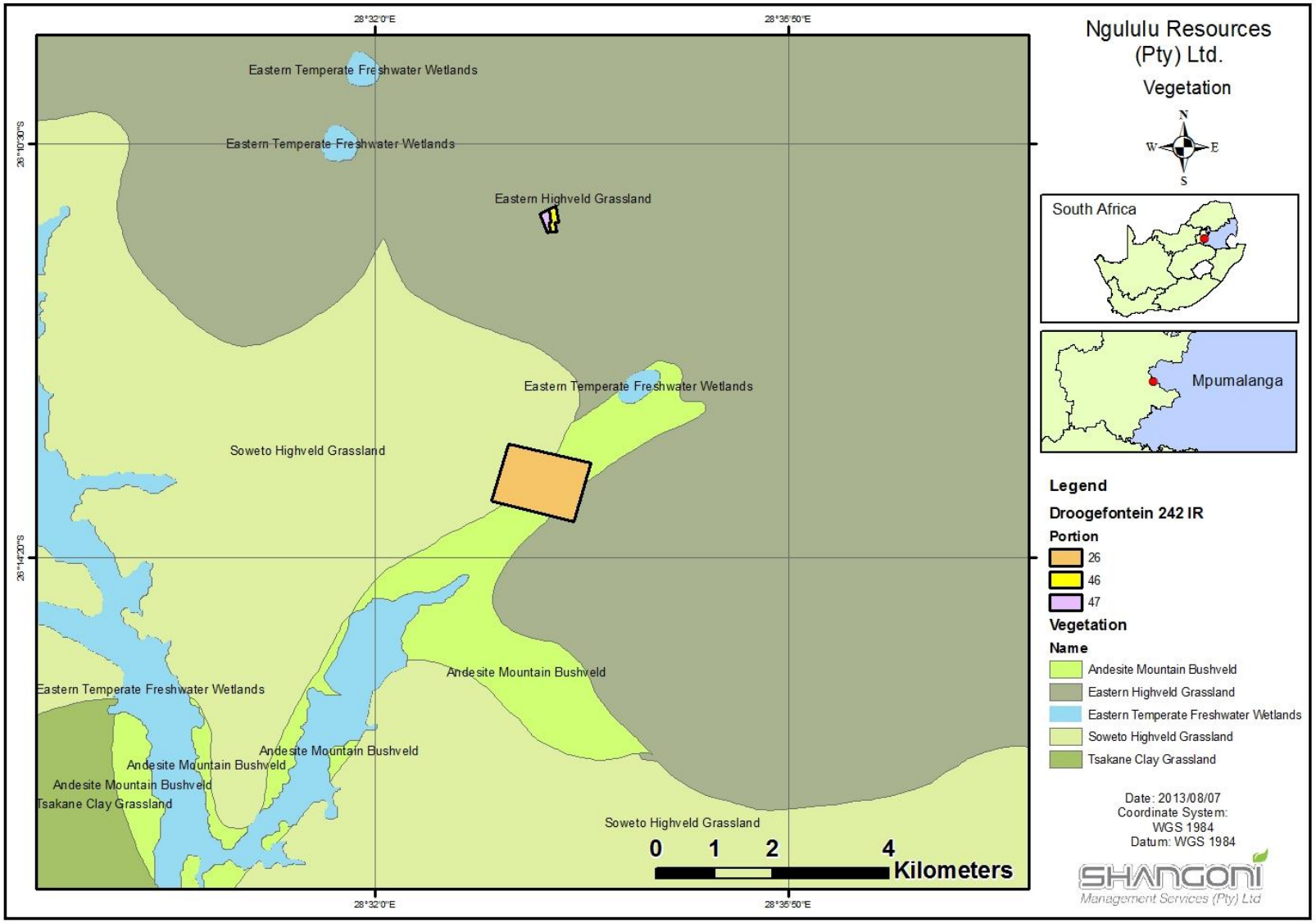

Figure 5: Site specific vegetation

1.1.8 Animal life

The following information on animal life was extracted from a faunal assessment report (Refer to Appendix C4) for the proposed coal mine on the farm Droogenfontein 242 IR portions 26, 46 and 47, Delmas, Mpumalanga, compiled by Classical Environmental Management Services, dated November 2013.

1.1.8.1 Site specific

1.1.8.1.1 Mammals

A walk through of the site was done during the site survey whereby mammal species were identified by visual sightings as well as by means of spoor, droppings and roosting sights and available habitat. Mammals were identified using Field Guide to Mammals of Southern Africa (Stuart and Stuart; 2001) and The Mammals of the Southern African Sub region (Skinners and Chimimba; 2005).

The identification of possible mammal species present on the site relied upon assessment of the vegetation on site and supplemented by spoors or droppings. During the site assessment, signs of mammal presence were seen and included burrows, droppings and spoor.

Portion 46, 47 and 26 are capable of supporting opportunistic mammal species particularly small mammals (hares, mongoose, jackals, small buck) and rodents (mice and rats etc.) which will forage in the areas assessed and the surrounds. The transformed nature of the site is only suitable for opportunistic species due to the uniform habitat structure, limited diversity and constant anthropologic disturbance in the form of agriculture and housing.

A significant proportion of Portion 26 is comprised of wetlands and moist grassland areas which offer the most suitable habitat for natural mammal assemblages in terms of providing foraging habitat and shelter. Although previously disturbed, the wetlands and associated grasslands are considered a migratory corridor for small and large mammal species. No mammal species of conservation concern are considered to be present within the study area or surrounds.

The rough haired golden mole (*Chrysospalax villosus*) which is considered critically endangered has been recorded within the vicinity of the study area but is unlikely to occur within the area as it prefers using dry ground on the edges of marshes or vleis which is undisturbed. The study area, although likely to have been comprised of such areas has been altered and the effects of ploughing the wetland areas has rendered not suitable habitat for this species.

1.1.8.1.2 Avifauna

Data regarding the distribution of bird species was obtained for the quarter degree grid using the information available from the South African Bird Atlas Project and the Mpumalanga Parks and

Tourism Authority and isolated to species of conservation concern. Species of conservation concern were described using the Eskom Red Data Book of Birds of Southern Africa, Lesotho and Swaziland (Barnes, 2000). The avifauna assessment concentrated on identifying the possible occurrence of red data listed birds. Birds were identified using *Sasol Birds of Southern Africa* (Sinclair, I., Hockey, P. & Tarboton, W.; 2002).

The presence of bird species on and around the site relied upon a vegetation assessment, direct sightings, bird calls and the presence of nests. During the site survey, relatively few avifaunal species that are common and widespread were identified visually and there was a distinct lack of roosting sites. The assessment therefore relied heavily upon previous data available and the vegetation and geological features present on site. A list of bird species which may be present within the study area was obtained from the South African Bird Atlas Project, Quarter Degree Grid 2628BA. Due to the high levels of human disturbances within the grassland and wetland areas, the site offers limited suitable habitat for any large terrestrial birds such as the secretary bird or large / small raptor species. Continuing pressure on wetlands and surrounding moist grassland habitat are largely responsible for the decline of the avifaunal species. Wetland areas are important as foraging and migratory corridors for avifauna species and as such these areas should be maintained. By nature, birds are mobile fauna assemblages that are able to adapt and relocate rapidly. They are able to change their location rapidly and considering the transformed nature of the farm portions it is unlikely for the proposed mining development to have a significant negative impact on avifauna species of conservation concern.

1.1.8.1.3 Amphibians

Comprehensive amphibian surveys can only be undertaken by nocturnal surveys throughout the duration of the wet season. This was beyond the current scope of the assessment and the area was surveyed diurnally for possible habitat for amphibian species. Based on available habitat observed during the field survey, amphibians were identified through a literature review, by use of the Frog Atlas (developed by the Animal Demography Unit, Cape Town University) and the field guide Frogs and Frogging in Southern Africa (Carruthers, 2001). Reptiles were identified through a literature review and using The Field Guide to Snakes and Other Reptiles of Southern Africa (Branch, 1998) based on the habitat observed during the field survey.

The species listed in Table 5 are likely to be present within the area (Quarter Degree 2628BA) and have been confirmed by the Mpumalanga Parks and Tourism Authority and the Frog Atlas. Extensive habitat transformation and high levels of human activities within a study area often results in low amphibian diversity as they are very sensitive to environmental stressors. Portion 46 and 47 did not display wetland areas although a man-made dam is found on Portion 47 and a pan area is located in the vicinity of Portion 47. It is not expected for amphibian species to utilise Portion 46 and 47 considering the degraded and transformed nature of these portions and the lack of water resources.

On Portion 26, a large wetland area and associated moist grassland and seeps are present. However, this wetland area and associated grasslands have undergone previous disturbance in the form of ploughing and have therefore been transformed and possibly, in drier seasons, utilised for agriculture. Portion 26 has been significantly altered by agricultural practices in close proximity to the wetland areas and as such the anthropological impacts in the area are high. No species were confirmed during the survey period and it is not expected for the amphibian diversity to be significantly high. It is expected for the more common species to occur within the study area although in small populations. It is likely that mining practices will impact on the remaining amphibian populations.

Table 5: Amphibian species likely to occur within the quarter degree grid 2628BA

Scientific Name	Conservation Status
Bufo gutturalis	Least Concern
Cacosternum boettgeri	Least Concern
Phrynobatrachus natalensis	Least Concern
Afrana fuscigula	Least Concern
Tomopterna cryptotis	Least Concern
Xenopus laevis	Least Concern
Bufo gutturalis	Least Concern
Cacosternum boettgeri	Least Concern
Phrynobatrachus natalensis	Least Concern
Afrana fuscigula	Least Concern
Tomopterna cryptotis	Least Concern
Xenopus laevis	Least Concern

1.1.8.1.4 Reptiles

South Africa has a high diversity of reptile species, with more endemic reptile species than mammal species. Reptiles are generally shy and extremely sensitive to habitat destruction and transformation (Branch, 1998). As such a comprehensive species list specific to the study area could not be determined. Reptiles are extremely secretive and difficult to observe during field surveys and therefore the identification of reptile species relied upon an assessment of the vegetation and surrounding areas to the site.

Considering the use of the portions as residential small holdings and agricultural areas, the resultant habitat destruction has caused the alteration of reptile assemblages occurring on and around the site. In addition, the lack of trees, stumps and rocky outcrops (for shelter/habitat) and termite/ant mounts (for foraging and roosting) within the study area further contributes to the lack of reptile assemblages. The site had also recently been burnt. Frequent burning of a site will impact the reptile species by reducing refuge areas and increasing predation as well as likely killing any species that cannot out run the flames. It is not expected for arboreal reptiles to be present within the study areas although

ground dwelling reptiles such as snakes may occur within the study area in small numbers. In addition, reptile species such as geckos and small lizards which have become accustomed to anthropogenic change are likely to occur especially on portion 46 and 47.

The striped harlequin snake (*Homoroselaps dorsalis*) is classified as rare and of conservation concern but requires old termite mounds or scattered loose rocks according to its habitat requirements. As such, no suitable habitat exists for this species and it is not expected to occur within the study area. None of the reptile species likely to occur within the study area are considered to be of conservation concern.

1.1.8.1.5 Invertebrates

No detailed assessment of invertebrate species was undertaken. The invertebrate assemblages are likely to be unnatural due to the agricultural practises on portion 26 and the anthropological practises utilised and housing on portion 46 and 7. In addition these species are mobile in nature and are not likely to be affected by the proposed development.

1.1.9 Sensitive landscapes

1.1.9.1 Wetlands

A wetland delineation and functional assessment conducted by Limosella Consulting on the proposed site indentified two (2) wetland areas; an Unchannelled Valley Bottom Wetland with extensive associated Hillslope seepage wetlands and a Pan, both located on Portion 26. On portion 46 and 47 no wetlands were identified to be present although a Pan is located within 500m east of portion 46 and 47.

The Unchannelled Valley Bottom Wetland with seepage elements on portion 26 flows from north east to south west and ultimately flows into the Ashton Dam which is located south west of the study site. The Depression Wetland is located close to the Unchannelled Valley Bottom Wetland and is likely hydrologically connected. During the time of the study the vegetation was burnt, accurate functionality assessments could therefore not be conducted. The soil of the area was also disturbed by ploughing. Estimates of the Present Ecological State and Ecological Integrity and Sensitivity for preliminary wetlands is presented in Table 6 below:

Table 6: Ecological state, ecological integrity and sensitivity for preliminary wetlands

Wetland Unit	Estimated PES Score	Description	EIS Score

Unchannelled Valley Bottom	C	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.	1.2 (Moderate)
Pan	C	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.	0.7 (Low/Marginal)

Although the secondary grassland found on portion 26 is expected to have a moderate to low species diversity, seepage areas are embedded in the secondary grassland. Seepage areas indicate wetland conditions and are therefore protected by national legislation. In addition, the vegetation also plays a role as catchment to the larger wetland area and is important to maintain ecological corridors for the movement and survival of species within a landscape fragmented by agriculture. The secondary grasslands also fall within the recommended 200m protective buffer of the *Crinum bulbispermum* population.

All watercourses are protected environments in South Africa (National Water Act) and subsequently the plant species within and around watercourses that contribute to the health and functioning of the watercourses (Limosella Consulting, 2013). This vegetation should also be protected and rehabilitated where needed. Furthermore, the moist grassland provides habitat to the Declining *Crinum bulbispermum* and is potential habitat to the Near Threatened *Kniphofia typhoides*.

1.1.9.2 Graveyards

A heritage impact assessment conducted by Pelser Archaeological Consulting identified an informal graveyard containing at least 80 graves as well as settlement remains on portion 26.

1.1.10 Surface water

1.1.10.1 Surface water quantity

Portions 26, 46 and 47 are situated in the C21E quaternary catchment of the Upper Vaal Water Management Area and the South-eastern Highveld groundwater region. The proposed open-cast coal mine is planned on portion 26 of the farm Droogefontein in the Delmas district of Mpumalanga (central coordinates S26.22605 and E28.55864). The major surface water drainage system in the C21E catchment is the Blesbokspruit that flows in a southern direction and is situated approximately 7 km southwest of the mining operations (Refer to Figure 6 below for a Quaternary catchment map). A natural drainage line and intermittent stream and seasonal wetland, namely '*Dwars-in-die-Wegvlei'*, is located on the eastern perimeter of portion 26. This intermittent and seasonal stream drains towards the Aston Lake to the southwest, which in turn feeds the Blesbokspruit.

No envisaged mining activities are planned for portions 46 and 47. Relevant information pertaining to water management for the C21E quaternary is shown in Table 7 (GRDM) below.

Table 7: Quaternary catchment information (GRDM)

Attribute	C21E
Area	628.2 km2
Mean annual rainfall	691 mm/a
Mean annual runoff	35 mm/a
Baseflow	6 mm/a
Population (Thaba Chweu, 2001)	133 707 Count
Mean annual evaporation (C2E007)	1400 - 1700 mm/a
Total groundwater use	0.22 Mm3/a
Present Eco Status Category	D Category
Recharge	~35 mm/a
	~5%
Exploitation potential	10 Mm3/a
Vegetation type	Moist Cool Highveld Grassland
Ecoregion	Highveld
Land use	Farming
Groundwater General Authorisation	75 m3/ha/a

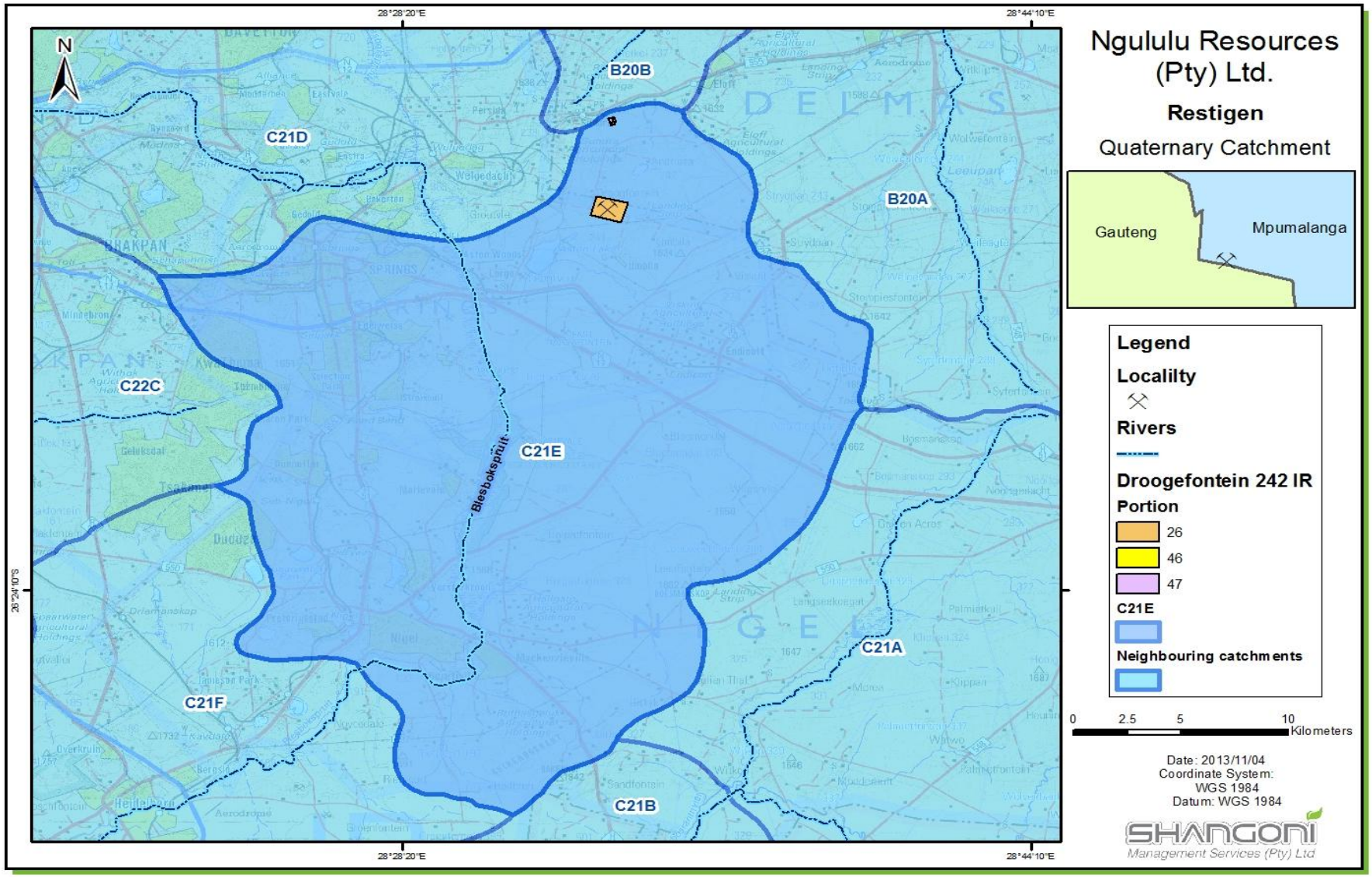

Figure 6: Quaternary catchment map in vicinity of Droogefontein

1.1.10.1.1 Mean Annual Runoff (MAR)

The Mean Annual Runoff (MAR) for the catchment area was calculated as 35mm per annum.

1.1.10.1.2 Surface water use

The main water uses in the vicinity of the mine are domestic and agricultural, while the nearby "*Dwars-in-die-Wegvlei*" is a sensitive water course and classified as a Type C wetland.

1.1.10.2 Surface water quality

There are no surface water quality results for the proposed mine. This will be recorded as part of the surface water monitoring program to be implemented at the proposed mine.

1.1.11 Groundwater

The following information was extracted from the report titled: Geohydrological investigation on the farm Droogefontein portions 26, 46 and 47**,** dated November 2013, prepared by Shangoni Management Services (Pty) Ltd, which is attached hereto in Appendix C5.

1.1.11.1 Aquifer classification

The aquifer classification system used to classify South African aquifers is the National Aquifer Classification System developed by Parsons (1995). This system has a certain amount of flexibility and can be linked to second classifications such as a vulnerability or usage classification. Parsons suggests that aquifer classification forms a very useful planning tool that can be used to guide the management of groundwater issues. He also suggests that some level of flexibility should be incorporated when using a classification system.

The South African Aquifer System Management Classification is presented by five major classes:

- Sole Source Aquifer System
- Major Aquifer System
- Minor Aquifer System
- Non-Aquifer System
- Special Aquifer System

The definitions in Table 8 are taken from Parsons (1995) and applied as an aquifer classification system:

Table 8: **Aquifer classification scheme (Parsons, 1995)**

Aquifer system	Defined by Parsons (1995)	Defined by DWA minimum requirements (DWAF, 1998)
Sole source	An aquifer that is used to supply 50% or more of	An aquifer, which is used to supply

Aquifer system	Defined by Parsons (1995)	Defined by DWA minimum requirements (DWAF, 1998)
aquifer	domestic water for a given area, and for which there are no reasonable alternative sources should the aquifer become depleted or impacted upon. Aquifer yields and natural water quality are immaterial.	50% or more of urban domestic water for a given area for which there are no reasonably available alternative sources should this aquifer be impacted upon or depleted.
Major aquifer	Highly permeable formations, usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good.	High yielding aquifer (5-20 L/s) of acceptable water quality.
Minor aquifer	These can be fractured or potentially fractured rocks that do not have a high primary hydraulic conductivity, or other formations of variable hydraulic conductivity. Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large quantities of water, they are both important for local supplies and in supplying base flow for rivers.	Moderately yielding aquifer (1-5 L/s) of acceptable quality or high yielding aquifer (5-20 L/s) of poor quality water.
Non-aquifer	These are formations with negligible hydraulic conductivity that are generally regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer unusable. However, groundwater flow through such rocks does occur, although imperceptible, and needs to be considered when assessing risk associated with persistent pollutants.	Insignificantly yielding aquifer (< 1 L/s) of good quality water or moderately yielding aquifer (1-5 L/s) of poor quality or aquifer which will never be utilised for water supply and which will not contaminate other aquifers.
Special aquifer	An aquifer designated as such by the Minister of Water Affairs, after due process.	

According to the regional aquifer classification map of South Africa, the dolomite aquifer located at Delmas has been identified as a sole source aquifer system with good groundwater quality (<300 mg/l TDS) with a high vulnerability and high susceptibility to contamination. The surrounding Karoo aquifer has been identified as a minor aquifer also with good groundwater quality (<300 mg/l TDS) with a moderate vulnerability and a medium susceptibility to contamination.

Based on the underlying hydrogeology of the project area, and the corresponding aquifer test results and analyses, the aquifers have been classified according to Parsons and system as follows:

- Shallow Aquifer – Non-aquifer
- Fractured Karoo Aquifer - Minor Aquifer
- Dwyka Tillite Aquifer - Non Aquifer
- Basement Karst Aquifer - Major Aquifer

Due to the depth of the final open pit, only the shallow and fractured Karoo aquifer has been evaluated.

1.1.11.2 Aquifer types, thickness and yields

An aquifer is comprised of a geological formation, or group of geological formations, or part of a formation that contains sufficient saturated permeable material to store and transmit water and to yield economical quantities of water to boreholes or springs. It is the storage medium from which groundwater is abstracted. *It should be managed properly and at all times be protected from over-exploitation and contamination.* The thickness and extent of an aquifer is influenced by fracture extent, orientation, aperture, as well as the thickness of the geological layers.

From studying the borehole logs of the exploration boreholes and aquifer tests, three aquifers can be distinguished within the study area:

i) Perched unconfined/semi-confined aquifer
ii) Weathered and fractured semi-confined sandstone aquifer
iii) Dolomitic confined aquifer

1.1.11.3 Shallow unconfined/perched aquifer

A shallow unconfined aquifer occurs within the soil horizon above the weathered bedrock zone. This unconfined or semi-confined aquifer is formed as a result of vertical seepage of water through the soil profile where it reaches the relatively impermeable clayey layer occurring at approximately 5 mbgl. The water will then seep horizontally in a downgradient direction on this contact zone. This layer is sometimes referred to as a perched aquifer. Usually this layer is poorly developed and is generally not considered as an aquifer given its inability to sustain reasonable or useful quantities of groundwater.

Slug tests were performed on three of the exploration boreholes to determine the aquifer parameters of this upper aquifer zone. With the slug test the hydraulic conductivity and transmissivity of this zone was determined from the rate of recovery of the water level in the boreholes after a 'slug' of water was displaced in the boreholes. Figure 7 illustrates the hydraulic data of the tests captured vs. time. The slug test data was interpreted using the Bouwer and Rice method (Bouwer and Rice, 1976) and the software package Flow Characteristic Method (FC_Excel) developed by the Institute of Groundwater Studies for the determination of aquifer parameters and sustainable yields in fractured rock environments.

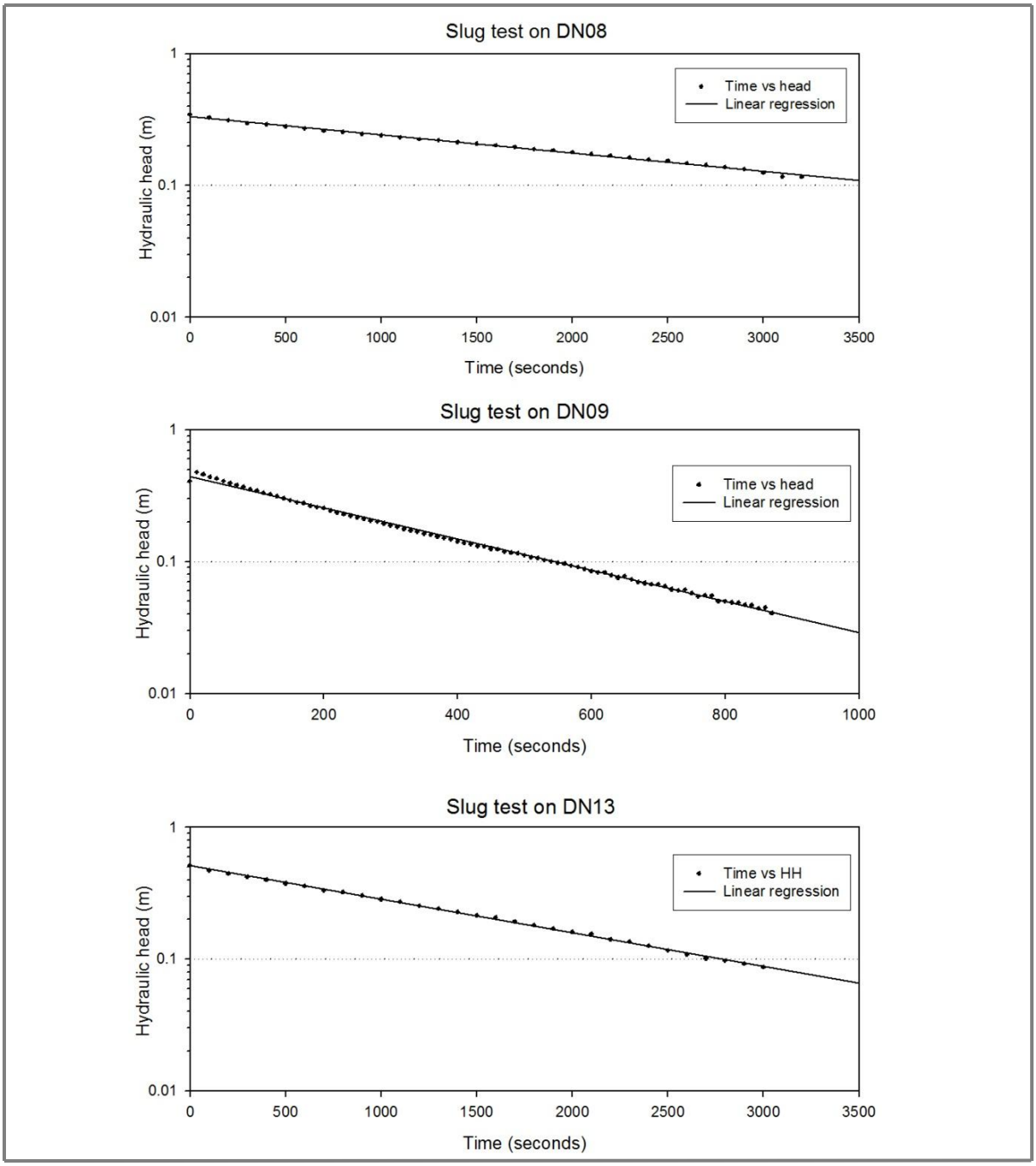

Figure 7: **Time series graphs for hydraulic head recovery following slug tests on exploration boreholes**

This shallow unconfined system has very low hydraulic conductivities and transmissivities and will therefore yield very little groundwater and can as a result not be regarded as an aquifer or be exploited as such. Table 9 illustrates the hydraulic conductivities and transmissivities calculated for this zone. The transmissivities were calculated using the Cooper and Jacob method using an aquifer thickness of 5 m. Average values for hydraulic conductivity and transmissivity were calculated to be 0.023 m/d and 0.115 m^2/d with probable groundwater yields of <0.05 l/s.

Table 9: Hydraulic parameters for the shallow unconfined zone

Borehole ID	Hydraulic conductivity (m/d)	Transmissivity (m^2/d)	Probable yield (l/s)
DN08	0.009	0.045	<0.05
DN09	0.05	0.25	<0.05
DN13	0.01	0.05	<0.05
Average	**0.023**	**0.115**	**<0.05**

1.1.11.4 Fractured semi-confined Karoo aquifer

The second aquifer system is an intergranular and fractured, semi-confined Karoo type aquifer of Ecca (shale/sandstone/tillite) origins occurring between 10 and 15mbgl and with a thickness of approximately 80-100m. Groundwater is confined to joints and fractures and flow in the matrix rock and usually has very low hydraulic conductivity and low yields. However, high yields do occasionally occur especially where dolerite intrusions (of Karoo age) have resulted in significant fracturing of the host rock. Of all un-weathered sediments in the fractured aquifer, the coal seam often has the highest hydraulic conductivity.

The Ecca overlies the Dwyka tillite which may form a separate aquifer but because of its negligible aquifer forming properties it is generally discussed as one with the Ecca aquifer. The aquifer permeability of the Dwyka tillite is estimated to be between 0.0002 and 0.0148m/d (Hodgson and Krantz, 1998). The thickness of this aquifer varies from 0.5 to 30m thick averaging at 8m.

A constant rate pumping test was performed on the farm borehole DN21 (Figure 8) which intersects the Karoo Ecca and possibly the Dwyka aquifer. The transmissivity of the borehole was calculated using the Cooper and Jacob method (Cooper and Jacob, 1946) and the software package FC_Excel. The borehole was pumped at a low rate of 0.1 l/s for 130 min with maximum drawdown of 2.14m achieved.

The aquifer can be regarded as heterogeneous having a good fracture network formed in the consolidated and mostly impervious matrix as a result of tectonic and depositional stresses. Movement of groundwater is mostly restricted to fracture and aperture flow although the sandstone/shale matrix may also contribute to the aquifer albeit very little. The transmissivity for the Karoo fractured aquifer is relatively low with a value of 3.9 m^2/d and a yield of approximately 0.5 – 1.0 l/s. The hydraulic conductivity (K) of the borehole was calculated using the transmissivity calculated and using an aquifer thickness (b) of 80m by substituting the equation for calculating transmissivity, i.e. T = Kb to read K = T/b (refer to equations 2 & 3).

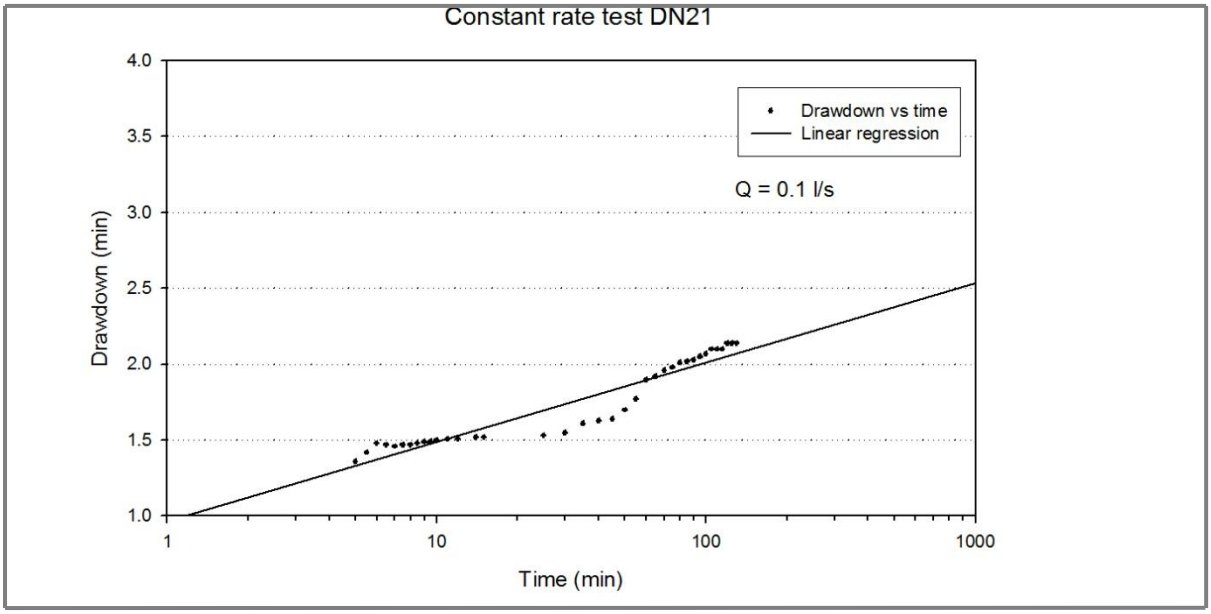

Figure 8: Drawdown data vs. time for the constant rate pumping test for DN21

The fractured rock aquifer is considered to be a more reliable source of groundwater compared to the weathered zone aquifer. The yield from this borehole/aquifer would be sufficient to supply drinking, sanitation and irrigation (small scale) water for a household but would not be sufficient to be exploited for mining related process water. The hydraulic parameters and proposed yield is summarised in Table 10 below.

Table 10: **Hydraulic parameters for DN21 and the weathered and fractured Karoo aquifer**

Borehole ID	Hydraulic conductivity (m/d)	Transmissivity (m^2/d)	Yield (l/s)
DN21	0.049	3.9	0.5 – 1.0

1.1.11.5 Dolomitic confined aquifer

Although no dolomite was intersected during the exploration phase, dolomite is expected to be present at approximately 80 – 100 mbgl. This assumption is made based upon the fact that boreholes drilled in similar and nearby environments did intersect dolomite at approximately 80 – 100 mbgl.

The aquifer is comprised of dolomite which forms part of the basement rocks of the Transvaal Supergroup and the Chuniespoort Group (Malmani subgroup) of rocks which is located directly below the Dwyka Group tillites. The Dwyka tillite forms a hydraulic barrier between the overlying mining activities and the basement aquifer, due to its low hydraulic conductivity. The continuity of the dolomite aquifer is interrupted by vertical to sub-vertical geological structures such as dykes which create low permeability to impermeable compartmental barriers.

The dolomites of the Chuniespoort Group represent the most important aquifers in South Africa. This is generally due to the exceptionally high storage capacity (storativity) and often high permeable

characteristics of weathered dolomite. Dolomitic groundwater storage mostly occurs in dolomitic compartments and fractures derived from dolomitic dissolution/chemical weathering, which in extreme cases, result in the development of open cavities and caves (karstification). The continuity of the dolomite sequence is often interrupted by geological structures in the form of vertical and sub-vertical intrusive dykes resulting in significant fracturing of non-karstified dolomite. Boreholes intersecting these compartments (or fractures) often yield significant quantities of groundwater.

The chemical weathering of dolomitic rock is generally associated with weakly acidic rainwater which results from carbon dioxide diffusion forming carbonic acid. The carbonic acid dissolves the dolomite as it percolates through planes of weakness such as faults, fractures and joints associated with deformation. The dolomite dissolves according to the following chemical reaction:

$$3CaCO_3.2MgCO_3 + 5H_2CO_3 \longrightarrow 3Ca(HCO_3)_2 + 2Mg(HCO_3)_2$$

dolomite + carbonic acid $\longrightarrow$ calcium-bicarbonate + magnesium bicarbonate

The borehole is approximately 150 m deep believed to have intersected dolomite. The pump test data and can be viewed in Figure 9. A high transmissivity value of 372 m^2/d was calculated from the drawdown data which is typical for dolomitic aquifers. Yields will typically in range between 10 – 20 l/s.

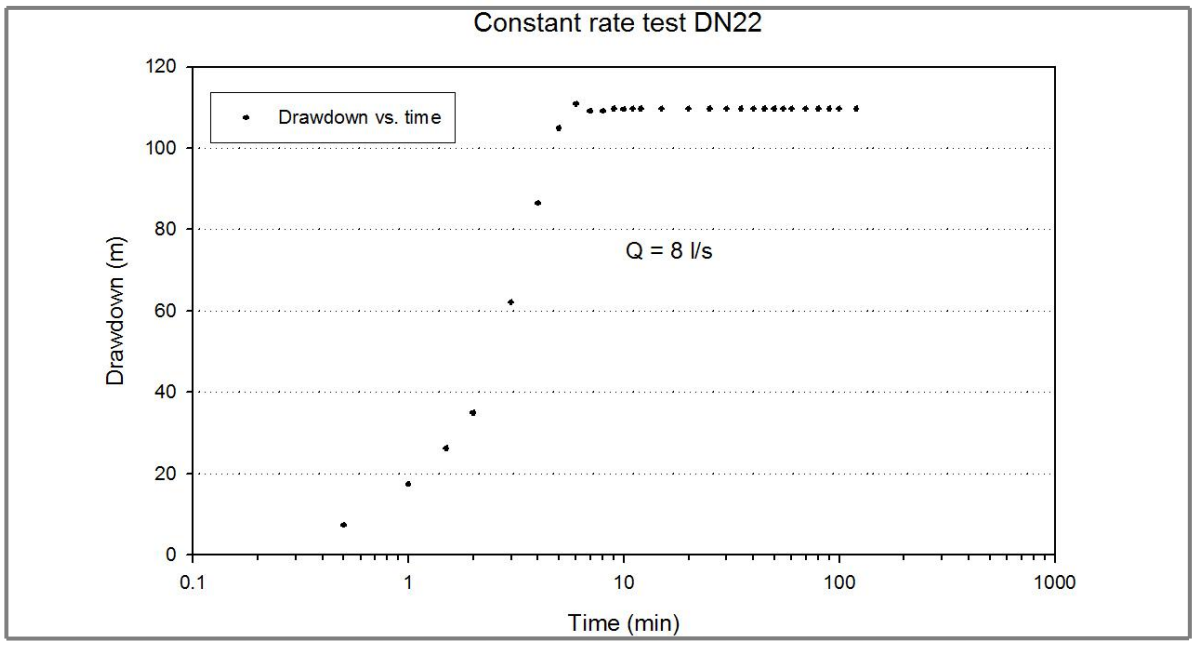

Figure 9: Drawdown data vs. time for the constant rate pumping test for DN22

1.1.11.6 Summary of aquifers present

Three (3) aquifers are present in vicinity of the study area composed of with differing lithologies and therefore differing in aquifer properties and hydraulic parameters. The types and characteristics are summarised in Table 11.

Table 11: Aquifer types present at Droogefontein

Aquifer	Type	Geology	K (m/d)	T (m^2/d)	S*	Yield (l/s)
Shallow perched	Unconfined (primary)	Quaternary Soil/clay	0.023	0.115	-	~0.05
Weathered/fractured	Semi-confined	Karoo sandstone (Ecca)	0.049	3.9	0.0005	0.5 – 1.0
Karstic/fractured	Confined	Malmani dolomite	0.1-10	372	0.01	~10 l/s

* Storativity cannot be accurately determined from a single borehole without making use of observation boreholes. The values given are based on typically encountered for the specific formations.

1.1.11.7 Boreholes and springs

1.1.11.7.1 Portion 26

A detailed hydrocensus was conducted in 2km radius on and around portion 26 to obtain a representative population of the boreholes and springs on the properties of adjacent land owners. A total of 38 boreholes were surveyed in a 2 km radius around portion 26 where the open pit coal mine is proposed. The results from the hydrocensus are summarised in Table 12 and a map showing their positions relative to the mining infrastructure in Figure 10 below. The hydrocensus and water user survey revealed that groundwater abstracted from these boreholes is mainly used for domestic supply, livestock watering and watering of gardens at farmsteads. *The landowners included in the Portion 26 hydrocensus rely solely on the groundwater for their water supply since municipal water is not available.* The Karoo aquifers present poor aquifers and typically yield less than 2 l/s. However, deeper boreholes >150 m may intersect the dolomitic aquifer which could yield in excess of 5 l/s.

Water levels could not be obtained from seven (7) boreholes as a result of no access to water levels while 19 of the surveyed boreholes were either pumping or recovering from pumping during the hydrocensus. Static unaffected water levels ranged between 3.55 mbgl and 18.54 mbgl.

Static water level elevations, excluding pumping or recovering boreholes and water levels obtained from the dolomitic aquifer, were plotted against surface elevation/topography. This was done to assess whether a Bayesian correlation exists between the water level and surface topography. A relatively good Bayesian correlation of 83% exists between the surface topography and groundwater level elevation. An assumption that groundwater flow paths will mimic surface topography can therefore be inferred.

Table 12: Portion 26 hydrocensus results

Borehole ID	Coordinates	Property	Owner	Collar WL (m)	pH	EC (mS/m)	Application	Aquifer	Equipped	Approx yield (l/s)
DN08	S26.23204 E28.55963	Droogefontein 242 Ir/26	SM Boerdery Thinus van Dyk	3.5	8.47	27.6	Exploration	Karoo	No	0.1-0.5
DN09	S26.23282 E28.56392			5.4	7.89	22.2			No	0.1-0.5
DN13	S26.22874 E28.56518			4.88	8.08	44.7			No	0.1-0.5
DN20	S26.21735 E28.55457	Droogefontein 242 Ir/39		NAWL	7.45	51.4	Livestock watering, domestic*	Malmani dolomite	Yes	10
DN21	S26.22248 E28.55331	Droogefontein 242 Ir/31		12.78	7.25	40.2	Irrigation (small scale)	Karoo	Yes	0.1-0.5
DN22	S26.21609 E28.54211	Droogefontein 242 Ir/33		NAWL	7.91	52.3	Livestock watering, domestic*	Malmani dolomite	Yes	5
DN23	S26.20759 E28.54143			10.18	7.4	21.1	Irrigation (small scale), domestic*	Karoo	Yes	0.1-0.5
DN24	S26.21214 E28.54075			20.54	7.5	47.9	Domestic*		Yes	0.1-0.5
DN25	S26.21516 E28.55783	Droogefontein 242 Ir/21	Dan Retief. Schoemans Boerdery	5.79	7.92	33.7	Domestic*		Yes	0.1-0.5
DN26	S26.23536 E28.57491	Droogefontein 242 Ir/25	SM Boerdery Thinus van Dyk	8.28	6.82	28.1	Domestic*, irrigation (small scale)		Yes	0.1-0.5
DN27	S26.25051 E28.56248	Palmietkuilen 241	Dan Retief. Schoemans Boerdery	12.07			None		No	0.5
DN28	S26.25150 E28.56246			11.94	6.52	19.5	None		No	0.1-0.5
DN29	S26.24358 E28.57785			8.55	6.81	36.3	Domestic*, irrigation (small scale		Yes	0.1-0.5
DN43	S26.20796 E28.57349	Droogefontein ptn 25	Steven Victor	31.0	7.42	35.9	Domestic*, livestock	Karoo	Yes	~1.0

Borehole ID	Coordinates	Property	Owner	Collar WL (m)	pH	EC (mS/m)	Application	Aquifer	Equipped	Approx yield (l/s)
DN44	S26.20845 E28.57610			NAWL			None	Karoo	No	-
DN45	S26.20414 E28.56024	Droogefontein ptn 20	JC Du Plessis	25.55	7.05	36.4	Domestic*, irrigation (small scale)	Karoo	Yes	~1.0
DN46	S26.22152 E28.54140	Plot 40 Prosperity	Jan Hattingh	±100	7.7	55.2	Domestic*, irrigation (small scale)	Dolomite/karst	Yes	>5
DN47	S26.22303 E28.53882	Plot 51 Prosperity	Rudi Kocks	34.5	7.28	25.0	Domestic*, irrigation, livestock	Karoo	Yes	~1.0
DN48	S26.22267 E28.53817	Plot 35 Prosperity	Annemarie Bendelberg	34.33	7.01	98.2	Domestic*, irrigation (small scale)	Karoo	Yes	~1.0
DN49	S26.22091 E28.53925	Plot 40 Prosperity	Jan Hattingh	16.55	6.08	34.0	None	Unknown	No	-
DN50	S26.22416 E28.54096	Plot 54 Prosperity	Rodney Craukamp	33.78	7.13	41.4	Domestic*, irrigation	Karoo	Yes	~1.5
DN51	S26.22518 E28.54018	Plot 54;56 Prosperity	FJ Prinsloo	17.32	7.12	37.6	Domestic*, irrigation (small scale)	Karoo	Yes	~1.0
DN53	S26.22529 E28.53105	Plot 12 Prosperity	Neurita Gort	16.6	7.23	49.9	None	Unknown	No	-
DN54	S26.22592 E28.53719	Plot 42 Prosperity	Paul Marnevick	20.40	6.88	36.5	None	Unknown	No	-
DN55	S26.22539 E28.53676			29.03	7.49	31.5	Domestic*	Karoo	Yes	Unknown
DN56	S26.22535 E28.53732			10.2	6.9	51.8	Domestic*	Karoo	Yes	Unknown
DN57	S26.22548 E28.53729			100.52	7.5	51.8	Domestic*	Karoo/Dolomite	No	Unknown
DN58	S26.22188 E28.53834	Plot 33 Prosperity	Nico Venter	-	7.9	78.3	Domestic*	Karoo/Dolomite	Yes	Unknown
DN59	S26.21802 E28.53913	Plot 27 Prosperity	Roy Atkins	32.05	7.72	57.3	Domestic*, irrigation (small scale)	Karoo	Yes	~1.0

Borehole ID	Coordinates	Property	Owner	Collar WL (m)	pH	EC (mS/m)	Application	Aquifer	Equipped	Approx yield (l/s)
DN60	S26.21832 E28.53650	Plot 11 Prosperity	Sindiso Giqwa	NAWL	7.60	163.6	Domestic*, livestock	Unknown	Yes	Unknown
DN61	S26.22128 E28.53552	Plot 17 Prosperity	Jaco Labuschagne	49.69	7.65	49.5	Domestic*, livestock	Karoo	Yes	~1.0
DN62	S26.22013 E28.53472			22.33	7.71	34.6	None	Karoo	No	Unknown
DN63	S26.22000 E28.53653	Plot 30 Prosperity	Hennie Nagel	56.95	7.28	72.2	Domestic*, irrigation, livestock	Karoo	Yes	~1.0
DN64	S26.22515 E28.53294	Plot 25 Prosperity	Hannes Nagel	18.54	7.88	37.7	Domestic*, irrigation, livestock	Karoo	Yes	~4.0
DN65	S26.22427 E28.53266			19.77	7.88	26.1	Domestic*, irrigation, livestock	Karoo	Yes	~3.0
DN66	S26.22544 E28.53456	Plot 41 Prosperity	Dewald Geldenhuys	48.24	7.97	24.6	Domestic*, irrigation, livestock	Karoo	Yes	~3.0
DN67	S26.22285 E28.53264	Plot 20 Prosperity	Wollie Wolmarans	25.58	6.7	34.6	Domestic*, irrigation, livestock	Karoo	Yes	~1.5
DN68	S26.22116 E28.53293			16.38	-	21.0	Domestic*	Karoo	Yes	~1.0
DN69	S26.21906 E28.53153	Plot 5 Prosperity	Gert Greyvenstein	NAWL	7.39	49.8	Domestic*, livestock	Karoo	Yes	~1.0
DN70	S26.21933 E28.53155			66.35	-	70.2	Domestic*, livestock	Karoo	Yes	~1.0
DN71	S26.21761 E28.53399	Prosperity	Naas Swanepoel	11.60	7.3	40.2	Domestic*	Karoo	Yes	~1.0
DN72	S26.22615 E28.53908	Plot 58 Prosperity	Hannes Van der Westhuizen	28.0	7.38	40.5	Domestic*, irrigation	Karoo	Yes	~1.5

**Pumping at time of water level measurement*

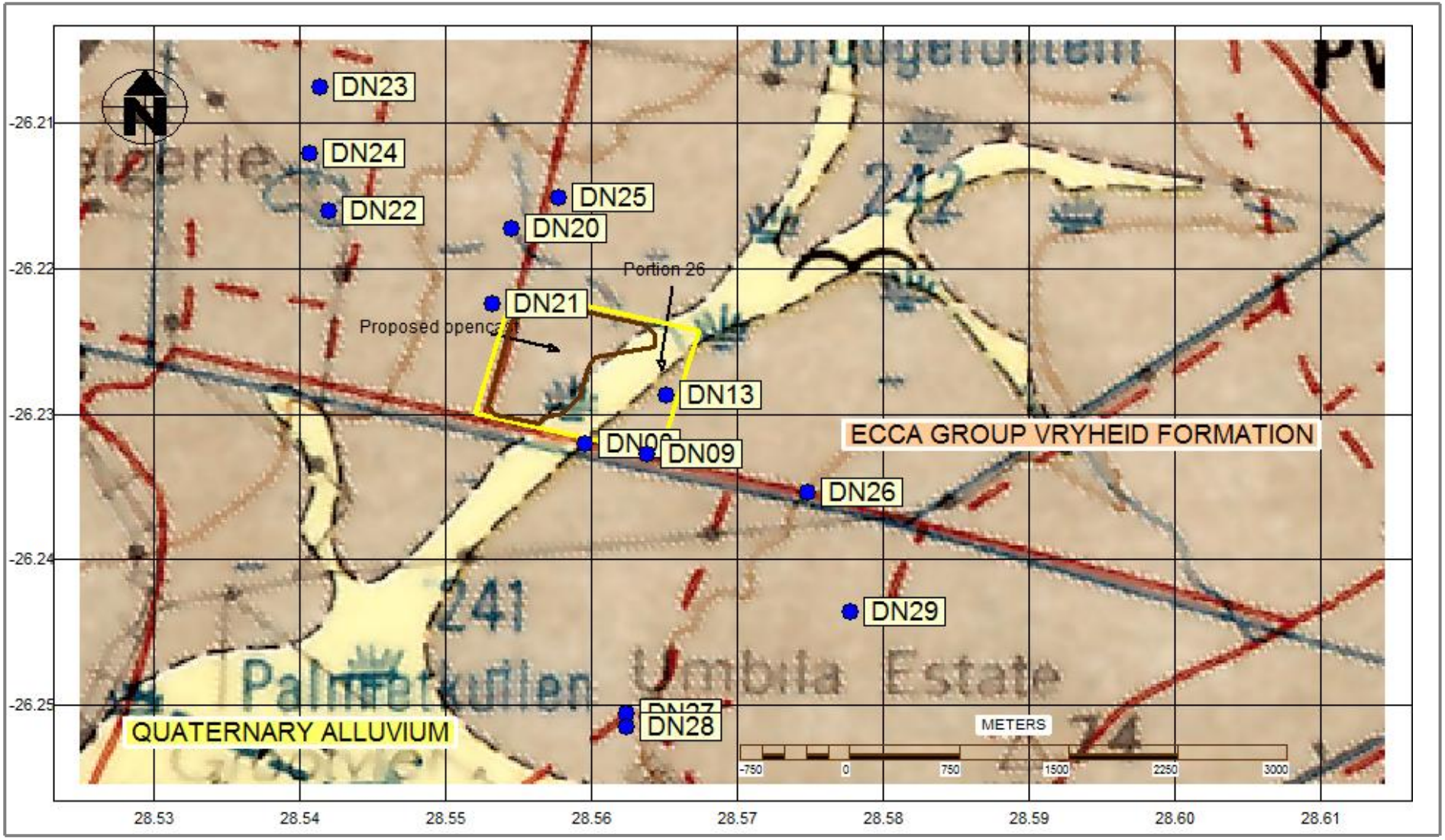

Figure 10: Droogefontein portion 26 hydrocensus map

1.1.11.7.2 Portion 46 and 47

A detailed hydrocensus was conducted in 2 km radius on and around portions 46 and 47 to obtain a representative population of the boreholes and springs on the properties of adjacent land owners. A total of 13 boreholes were surveyed in a 2 km radius around portions 46 and 47. These portions were included in the hydrocensus due to their inclusion in the mining right application although no activities are planned on these properties. The initial strategy was that the plant and workshops would be erected on portions 46 and 47 but this was later rejected given the distance to portion 26 and the pit.

The results from the hydrocensus are summarised in Table 13 and a map showing their positions relative to the mining infrastructure in Figure 11. The hydrocensus and water user survey revealed that groundwater from these boreholes is used mainly for domestic supply, livestock watering and watering of gardens at farmsteads.

Table 13: Hydrocensus information for portions 46 and 47

Borehole ID	Coordinates	Property	Owner	Collar WL (m)	Application	Aquifer	Equipped	Approx yield (l/s)
DN30	S26.18661 E28.55896	Droogefontein 242 Ir/3	Danie van Wyk	89.0	Irrigation, domestic	Malmani dolomite	Yes	8
DN31	S26.19052 E28.55371	Droogefontein 242 Ir/44	Danie van Wyk	91.0	Irrigation, domestic	Malmani dolomite	Yes	23
DN32	S26.19697 E28.56300	Droogefontein 242 Ir/3	Danie van Wyk	94.6	Irrigation	Malmani dolomite	Yes	20
DN33	S26.20565 E28.55396	Droogefontein 242 Ir/29	Danie van Wyk	NAWL	Livestock watering	Karoo	Yes	0.5-1.0
DN34	S26.18827 E28.56061	Droogefontein 242 Ir/46	Michael Vereker	40.21	Domestic, irrigation (small scale)	-	Yes	-
DN35	S26.18763 E28.56013	Droogefontein 242 Ir/47	Ockie Bezuidenhout	20.12	Livestock watering, domestic	-	Yes	-
DN36	S26.18203 E28.56246	Droogefontein 242 Ir/68	Roy Shearer	77.05	Domestic	Malmani dolomite	Yes	>5
DN37	S26.18264 E28.56452	Droogefontein 242 Ir/68	Sampie Venter	NAWL	Boreholes sealed. Possibility of future use	-	No	-
DN38	S26.18444 E28.55955	Droogefontein 242 Ir/38	Debbie Van Den Heever	1.2	Possible future use: Commercial car wash, domestic	-	No	-
DN39	S26.18347 E28.55722	Droogefontein 242 Ir/38	Gideon Steenberg	21.36	Domestic	Karoo	Yes	0.5-1.0
DN40	S26.18317 E28.55673	Droogefontein 242 Ir/38	Frederick Zeelie	20.21	Livestock watering: sheep	Karoo	Yes	0.5-1.0
DN41	S26.18628 E28.55533	Droogefontein 242 Ir/38	Pieter Senekal	NAWL-bees	None	-	No	-
DN42	S26.18205 E28.55694	Droogefontein 242 Ir/38	Roy Shearer	60.05	Domestic, irrigation (small scale)	Malmani dolomite	Yes	>5

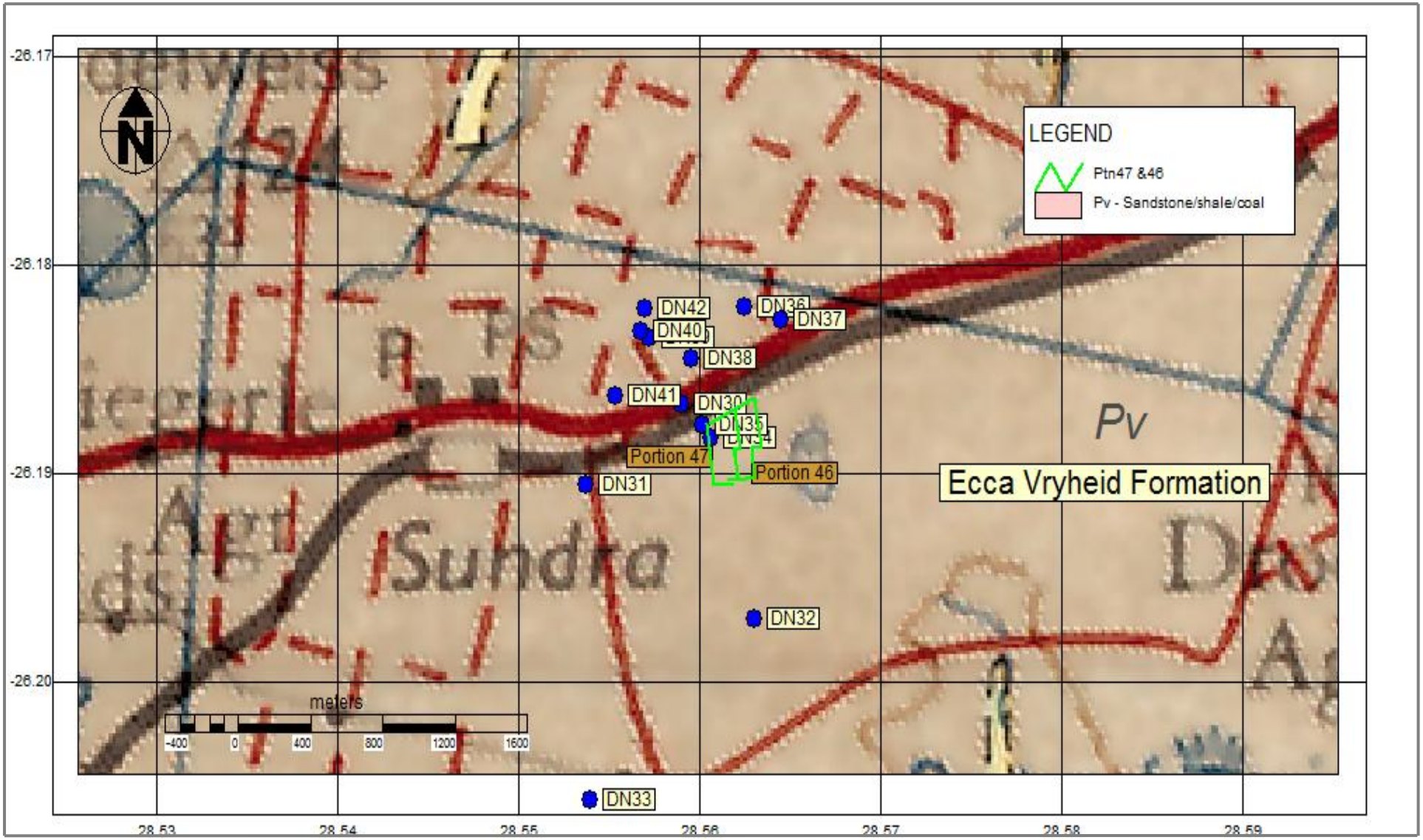

Figure 11: Droogefontein portions 46 and 47 hydrocensus map

1.1.11.8 Groundwater recharge

Groundwater recharge for the area was reported using:

i. The CMB method (Bean, 2003)
ii. Recharge estimation in the GRDM database

The first approach adopted is the CMB approach. This method is based on the principle that chloride behaves as a conservative tracer and is neither absorbed nor lost as it flows from precipitation to groundwater. Thus the method assumes that chloride in recharge water percolating vertically through the unsaturated zone and into the aquifer is derived entirely from precipitation (i.e. no chloride is derived from the soil or unweathered zone) and the chloride concentration of groundwater is controlled by evapotranspiration processes. Thus the proportion of rainfall that occurs as recharge can be quantified as the ratio between the two concentrations. Using the simplified CMB method equation 4 applies (Bean, 2003):

$R\% = Cl_P / Cl_{GW} \times 100$

Eq. 1

Where R = recharge and Cl_P and Cl_{GW} represent the Cl-concentration (in mg/l) of precipitation and water percolating through the soil zone (water table), respectively.

The following assumptions are necessary for successful application of the CMB:

- There is no source of chloride in the soil moisture or groundwater other than that from precipitation, i.e. Cl levels suspected to be caused from surface seepage should not be used.
- Chloride is a conservative ion, i.e. it does not readily take part in biological processes nor does it precipitate.
- Steady-state conditions are maintained with respect to long-term precipitation and chloride concentrations.
- A piston flow regime, which is defined as downward vertical diffuse flow of soil moisture, is assumed.

1.1.11.9 Groundwater qualities

Groundwater samples were collected from the hydrocensus boreholes. The samples were submitted to Yanka Laboratories situated in Witbank. Yanka takes part in the SABS inorganic inter-laboratory testing scheme (z-score = 0.73), including in the National Laboratory Association Water Microbiology Proficiency Test Scheme. The laboratory is in the process of achieving SANAS accreditation (ISO/IEC 17025:2005). Water quality was interpreted based on the domestic colour coded classification system (refer to Table 14; WRC, 1998), including the South African Nation Standard for drinking water (SANS 241: 2011; refer to Table 15).

Table 14: Colour coded classification system (WRC, 1998)

Classification	Risk
Class 0	Ideal drinking water suitable for lifetime use
Class 01	Good drinking water suitable for lifetime use

Class 02	Marginal drinking water which may be used without health effects by the majority of individuals in all age groups but may cause some effects in sensitive individuals.
Class 03	Poor drinking water which poses a risk of chronic health effects, especially in babies, children and the elderly.
Class 04	Unacceptable water quality posing severe acute health effects even with short term use.

Table 15: Relevant physical aesthetic, operational and chemical parameters

Parameter	Risk	Unit	Standard limits [a]
Physical and aesthetic determinands			
Electrical conductivity	Aesthetic	mS/m	≤170
Total dissolved solids	Aesthetic	mg/l	≤1200
Turbidity [b]	Operational	NTU	≤1
	Aesthetic	NTU	≤5
pH [c]	Operational	pH units	≥5 to ≤9.7
Chemical determinands – macro			
Nitrate as N [d]	Acute health	mg/l	≤11
Sulphate as SO_4^{-2}	Acute health	mg/l	≤500
	Aesthetic	mg/l	≤250
Fluoride as F	Chronic health	mg/l	≤1.5
Ammonia as N	Aesthetic	mg/l	≤1.5
Chloride as Cl^-	Aesthetic	mg/l	≤300
Sodium as Na	Aesthetic	mg/l	≤200
Zinc as Zn	Aesthetic	mg/l	≤5
Chemical determinands – micro			
Antimony as Sb	Chronic health	mg/l	≤0.020
Arsenic as As	Chronic health	mg/l	≤0.010
Cadmium as Cd	Chronic health	mg/l	≤0.003
Total chromium as Cr	Chronic health	mg/l	≤0.050
Copper as Cu	Chronic health	mg/l	≤2.0
Iron as Fe	Chronic health	mg/l	≤2.0
	Aesthetic	mg/l	≤0.30
Lead as Pb	Chronic health	mg/l	≤0.010
Manganese as Mn	Chronic health	mg/l	≤0.50
	Aesthetic	mg/l	≤0.10
Mercury as Hg	Chronic health	mg/l	≤0.006
Nickel as Ni	Chronic health	mg/l	≤0.07
Selenium as Se	Chronic health	mg/l	≤0.010
Uranium as U	Chronic health	mg/l	≤0.015
Vanadium as V	Chronic health	mg/l	≤0.2
Aluminium as Al	Operational	mg/l	≤0.3

1.1.11.9.1 Portion 26 Groundwater Qualities

The hydrochemical data for portion 26 hydrocensus boreholes are shown in Table 16. The results indicate that most parameters recorded well within the SANS: 241 guidelines and can be classified as *Ideal (class 0)* with neutral, non-saline and soft to very hard water. However, groundwater sampled from DN08, DN09, DN13 and D22 recorded high to very high levels of inorganic N – DN08, DN09 and DN13 as NH_4 and DN22 as NO_3, consequently exceeding the SANS: 241 guidelines. DN23 recorded a Fe concentration of 2.42 mg/l exceeding SANS 241 guidelines with a classification of *Marginal* (class 02). In terms of domestic classification, DN08 can be classified as *Marginal (class 02)*, DN09 as *Poor* (*class 03*), DN13 as *Good (class 01*) and DN22 as *Marginal (class 02)*.

The chemistry analyses supplied in Table 16 should serve as baseline water quality throughout the life of the proposed mining operations.

Stiff diagrams displayed in Figure 12 and the Expanded Durov diagram in Figure 13 display mostly Ca-HCO_3^- water types while the boreholes DN08, DN09 and DN13 display Na-HCO_3-(Cl) water types. The Expanded Durov diagram indicate mostly unpolluted fresh and recently recharged water plotting in fields 1 and 2 of the Durov; only DN08 plotted in Field 3 indicating possible Na-Cl enrichment. The Durov diagram also indicates that boreholes DN09 and DN13 are grouped separately from the remaining boreholes in Field 2 which may also indicate a level of Na-Cl enrichment. The above-mentioned boreholes with Na-HCO_3^-(Cl facies) are all exploration boreholes located in a maize field and the enrichment may be due irrigation activities and evapo-transpiration processes.

Table 16: **Hydrochemical results for the Droogefontein portion 26 hydrocensus boreholes**

SAMPLE ID	DN08	DN09	DN13	DN20	DN21	DN22	DN23	DN24	DN25	DN26	DN28	DN29
Parameter												
pH	8.47	7.89	8.08	7.45	7.25	7.91	7.40	7.50	7.92	6.82	6.52	6.81
EC (mS/m)	27.6	22.2	44.7	51.4	40.2	52.3	21.1	47.9	33.7	28.1	19.5	36.3
TDS (mg/l)	145	148	216	260	203	288	106	252	170	146	96.8	184
Ca (mg/l)	8.57	11.4	14.8	52.1	38.1	52.0	19.7	48.7	34.2	26.1	19.7	30.8
Mg (mg/l)	4.08	5.09	14.9	22.6	13.2	19.4	6.59	15.0	13.0	10.4	4.42	12.7
Na (mg/l)	27.7	17.1	39.9	17.0	20.4	18.8	7.92	28.3	11.8	11.5	8.81	14.7
K (mg/l)	11.2	3.78	7.43	4.73	4.06	4.61	2.74	5.64	2.91	8.14	3.04	10.5
Cl (mg/l)	35.2	20.5	46.1	23.2	19.3	21.8	11.5	16.0	9.40	7.53	4.96	20.4
SO_4 (mg/l)	0.10	6.10	12.9	9.17	8.09	25.2	11.4	7.57	2.25	3.97	2.95	11.7
Talk (mg/l)	85.4	64.6	129	216	154	158	71.8	216	140	129	87.0	123
Hardness (mg $CaCO_3$/l)	38.2	49.4	98.3	223	149	210	76.3	183	139	108	67.4	129
NO_3 (mg N/l)	0.010	7.16	0.010	0.010	1.51	**11.4**	0.010	0.010	2.72	0.080	0.010	2.06
Total ammonia (mg/Nl)	**5.00**	**10.1**	**1.64**	0.18	0.09	0.38	0.39	0.13	0.03	0.07	0.29	0.14
PO_4 (mg P/l)	<0.01	0.090	0.010	0.020	0.030	<0.01	0.050	<0.01	<0.01	0.030	0.010	<0.01
F (mg/l)	0.38	0.14	0.31	0.43	0.21	0.09	0.16	0.39	0.10	0.17	0.16	0.18
Si (mg/l)	0.700	2.37	1.82	12.7	26.3	20.6	6.96	14.2	20.9	27.1	15.6	26.3
Al (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sb (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
As (mg/l)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ba (mg/l)	<0.01	0.05	0.05	0.24	0.15	0.16	0.13	0.15	0.06	0.48	0.33	0.39

SAMPLE ID	DN08	DN09	DN13	DN20	DN21	DN22	DN23	DN24	DN25	DN26	DN28	DN29
B (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cd (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cr (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cr^{6+} (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cu (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fe (mg/l)	<0.01	<0.01	0.070	0.180	<0.01	<0.01	**2.42**	0.230	<0.01	<0.01	<0.01	<0.01
Pb (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mn (mg/l)	<0.01	<0.01	<0.01	0.180	<0.01	<0.01	0.260	0.040	<0.01	<0.01	0.090	<0.01
Hg (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Mo (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ni (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Se (mg/l)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
U (mg/)l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
V mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zn (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
COD (mg/)l	39.2	33.6	66.3	9.40	6.60	13.8	21.9	10.2	19.3	10.4	22.2	5.90
SAR	1.94	1.05	1.74	0.49	0.72	0.56	0.39	0.91	0.43	0.48	0.47	0.56
DWA classification	Class 02	Class 03	Class 01	Class 0	Class 0	Class 02	Class 02	Class 0	Class 0	Class 0	Class 0	Class 0
Worst parameter	Ammonia	Ammonia	Ammonia	-	-	NO3	Fe	-	-	-	-	-

Values denoted in red font exceeds SANS 241: 2011 drinking water quality guidelines

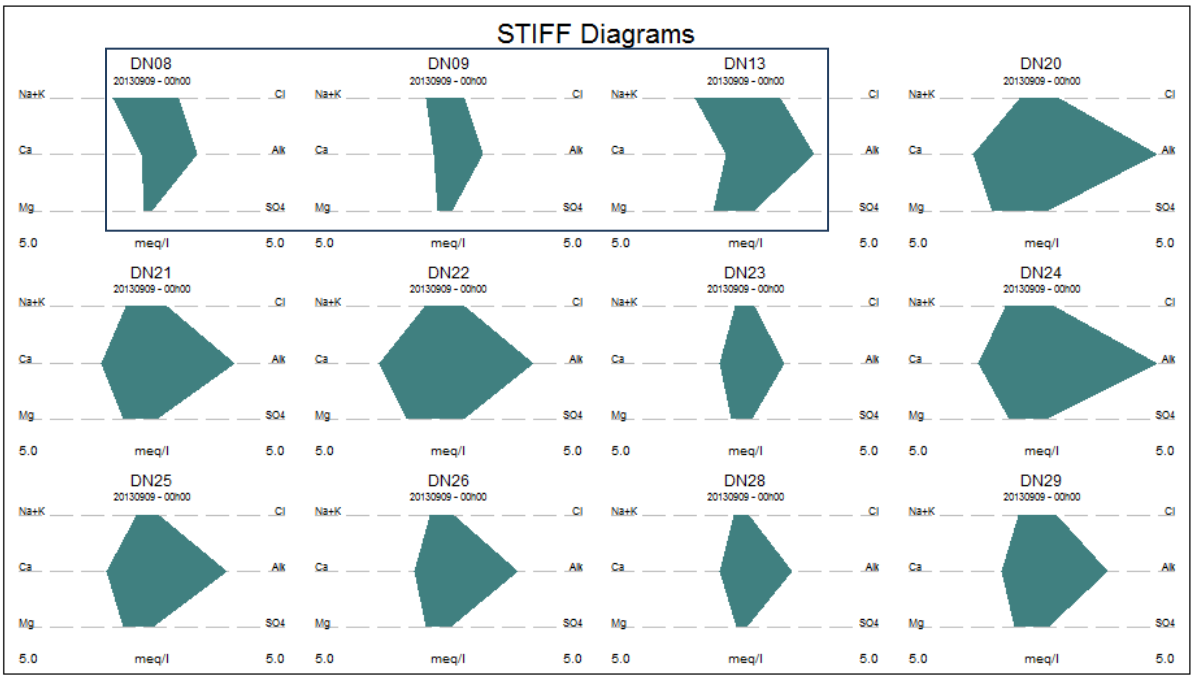

Figure 12: Stiff diagrams displaying major cation and anion distributions in meq/l for portion 26 hydrocensus boreholes

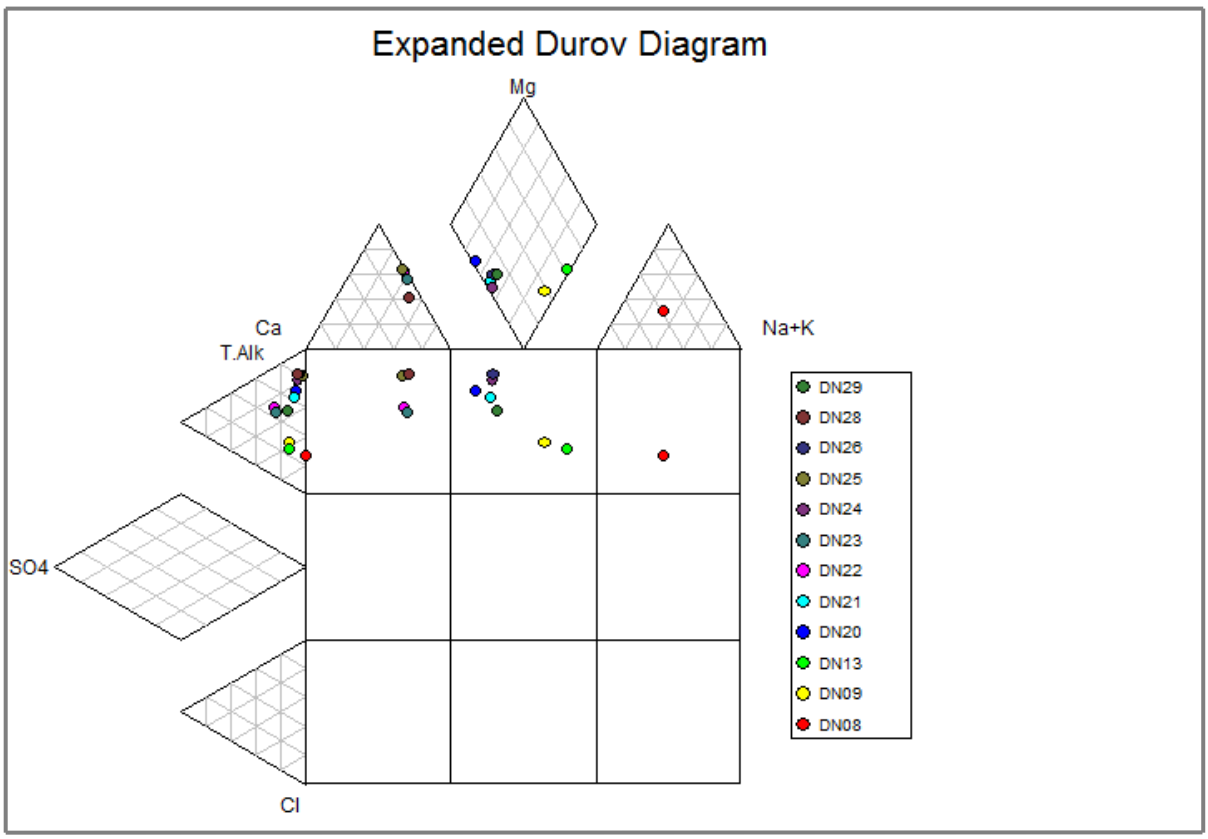

Figure 13: Expanded Durov diagram displaying ratios of major cations and anions in meq/l for portion 26 hydrocensus boreholes

1.1.11.9.2 Portion 46 and 47 Groundwater Qualities

The hydrochemical data evaluated according to the relevant standards are shown in Table 17. The results indicate that most parameters recorded well within the SANS: 241 standards and can be classified as *Ideal (class 0)* with neutral, non-saline and hard to very hard water typical of dolomitic aquifers. The majority of the hydrocensus boreholes drilled are in excess of 100 m which is the depth at which the Malmani dolomites are expected. Groundwater from a few boreholes recorded fluoride (F) in excess of the *Class 0* and *Class 01* standards (DWAF, 1998) and can be classified as *Marginal* (*Class 02*) as a result thereof. DN30, DN32 and DN36 recorded F of 1.37 mg/l, 1.36 mg/l and 1.38 mg/l, respectively. Slightly raised F was also recorded for DN33 and DN42 with 0.72 mg/l and 0.69 mg/l, respectively. The DWA (DWAF, 1998) proposes that F levels between 1.0 mg/l and 1.5 mg/l may pose increasing health based effects in sensitive groups and may result in tooth staining. Sensitive users as defined by DWA include:

- Children up to the age of 3 years.
- Individuals with HIV infection.
- Individuals with suboptimal dietary calcium.
- Individuals with liver of kidney disease.
- Individuals with malnutrition, particularly those with zinc deficiency.
- Individuals with a high daily water intake.
- Individuals with renal dialysis.

It should be noted that the upper limit for the SANS 241: 2011 health based guidelines for F intake is 1.5 mg/l (based upon consumption of 2 L of water per day by a person of a mass of 60 kg over a period of 70 years) – no sample exceeded this limit.

The chemistry analyses supplied in Table 17 should serve as baseline water quality for future planned activities on portions 46 and 47 (none planned currently). Stiff diagrams in Figure 14 displays water quality with dominantly Ca-HCO_3^- type facies. Samples from DN30, DN32 and DN36 display Na and HCO_3^- domination. The Expanded Durov diagram (Figure 15) displays water of three different types – these can be described as follows:

- Field 2: DN33-DN35; DN39, N40, DN42
  - Fresh, clean, relatively young groundwater that has started to undergo magnesium ion exchange, often found in dolomitic terrain.
- Field 3: DN32 and DN36
  - Fresh, clean, relatively young groundwater that has undergone sodium ion exchange (sometimes in sodium enriched granites or other felsic rocks). The dominance in sodium may also be as a result of sodium enriched pollution.
- Field 6: DN30
  - Groundwater from field 5 that has been in contact with a source rich in Na or old stagnant NaCl dominated water that resides in Na rich host rock/material.

Table 17: Hydrochemical results for the Droogefontein portion 46 and 47 hydrocensus boreholes

SAMPLE ID	DN30	DN32	DN33	DN34	DN35	DN36	DN39	DN40	DN42
pH	7.82	7.37	7.73	7.54	7.63	8.02	8.01	7.38	7.82
EC mS/m	72.2	70.6	27.7	28.1	22.0	55.3	34.1	29.1	55.4
TDS mg/l	421	383	148	145	115	299	184	150	301
Ca mg/l	20.80	20.4	22.4	24.6	22.5	17.8	37.8	22.1	45.0
Mg mg/l	10.40	10.60	8.7	9.8	7.0	7.6	14.98	9.8	22.1
Na mg/l	120.0	118.0	17.9	12.5	11.0	90.7	11.70	13.2	46.4
K mg/l	1.2	1.68	6.70	6.36	4.23	2.55	7.19	5.83	5.27
Cl mg/l	88.8	90.2	13.9	17.8	3.8	34.9	3.5	31.6	22.80
SO_4 mg/l	71.70	38.00	10.2	5.78	1.07	27.8	8.3	<0.01	9.59
Talk mg/l	176.0	169.0	110	85	97	193	166.0	95	246
Hardness mg $CaCO_3$/l	95	95	92	102	85	76	156	96	203
NO_3 mg N/l	0.220	0.14	<0.01	3.88	1.40	0.09	0.150	<0.01	0.18
Total ammonia mg N/l	0.25	0.4	0.95	0.05	0.03	<0.01	<0.01	0.05	0.17
PO_4 mg P/l	<0.01	<0.01	<0.01	<0.01	0.030	<0.01	<0.01	<0.01	<0.01
F mg/l	**1.37**	**1.36**	0.72	0.13	0.31	**1.38**	0.23	**1.36**	**0.69**
Si mg/l	7.280	6.91	1.05	24.4	28.0	9.7	28.50	22.7	11.5
Al mg/l	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01
Sb mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
As mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ba mg/l	0.12	0.11	0.10	0.06	0.10	0.09	0.04	0.04	0.03
B mg/l	0.50	0.49	<0.01	<0.01	<0.01	0.53	<0.01	<0.01	0.35
Cd mg/l	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Cr mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cu mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fe mg/l	<0.01	<0.01	0.250	<0.01	<0.01	<0.01	0.02	0.600	<0.01
Pb mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mn mg/l	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	0.34	<0.01
Hg mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ni mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Se mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Sr mg/l	0.34	0.33	0.15	0.15	0.09	0.30	0.15	0.14	0.84
U mg/l	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
V mg/l	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zn mg/l	<0.01	<0.01	0.18	<0.01	<0.01	<0.01	<0.01	7.92	<0.01
COD mg/l	4.0	1.0	44.0	3.00	8.00	<1.00	1.0	1.0	3.0
SAR	5.34	5.26	0.81	0.54	0.52	4.51	0.41	0.59	1.41
DWA	class 02	class 02	class 01	class 0	class 0	class 02	class 0	class 0	class 0

SAMPLE ID	DN30	DN32	DN33	DN34	DN35	DN36	DN39	DN40	DN42
classification									
Worst parameter	F	F	F	-	-	F	-	-	-

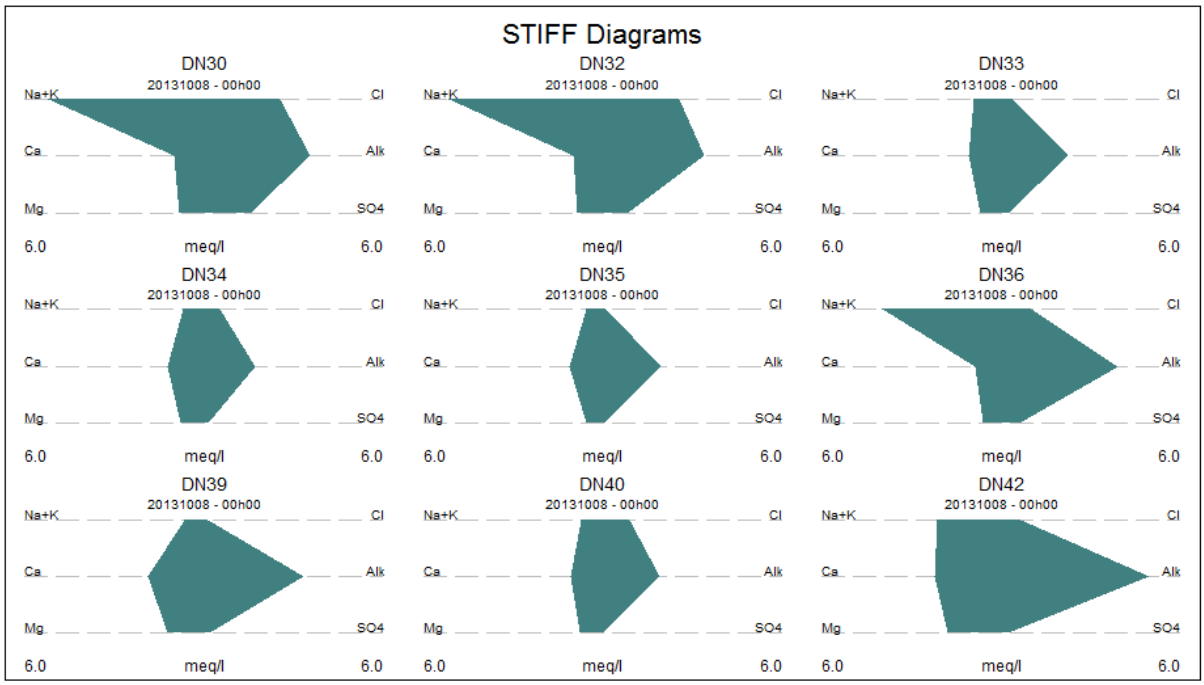

Figure 14: Stiff diagrams displaying major cation and anion distributions in meq/l for portion 46 and 47 hydrocensus boreholes

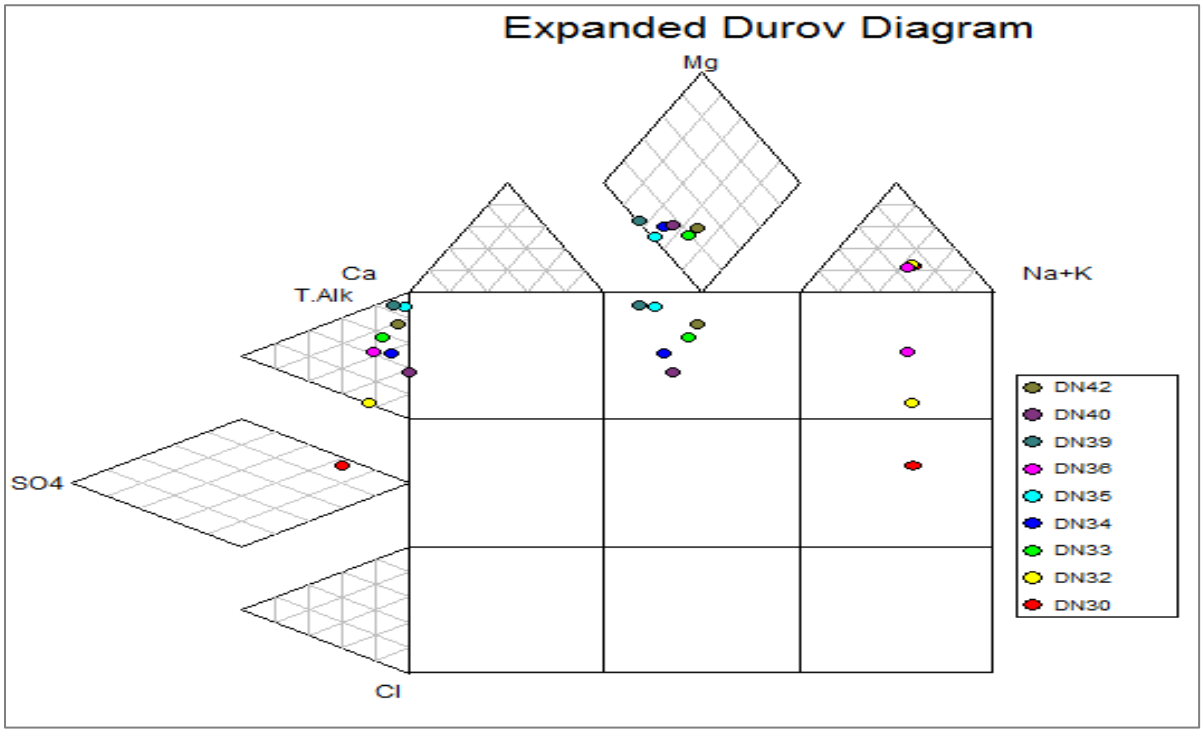

Figure 15: Expanded Durov diagram displaying ratios of major cations and anions in meq/l for portion 46 and 47 hydrocensus boreholes

1.1.11.10 Groundwater use

The main groundwater uses in the vicinity of the proposed mine are domestic and agricultural. The total groundwater usage for the catchment is relatively low which is estimated at approximately 0.3 Mm^3/a of which livestock watering and irrigation are the largest users.

1.1.12 Water Authority

The competent water authority is the Gauteng Department of Water Affairs Regional Offices.

1.1.13 Air quality

1.1.13.1 Emission sources

The following information was extracted from the Basic Atmospheric Impact report, compiled by Shangoni Management Services, dated January 2014.

South Africa is situated in the subtropical high pressure belt and is influenced by several high pressure cells, in addition to circulation systems in adjacent tropical and temperate latitudes. The mean upper air circulation over South Africa is anticyclonic throughout the year due to the dominance of the following three high pressure cells: South Atlantic High Pressure, South Indian High Pressure off the east coast, and the Continental High Pressure over the interior. The seasonal variation of the position and intensity of these high pressure cells determine the extent to which circumpolar westerlies impact the atmosphere over a region.

In winter, the high pressure belt strengthens and moves northward and the upper level circumpolar westerlies are able to impact significantly on the region. During summer months, the belt weakens and shifts southwards, reducing the influence of the circumpolar westerlies.

Anticyclones are characterised by convergence in the upper levels of the troposphere, strong subsidence throughout the troposphere, and divergence in the near surface wind field. Such airflow results in subsidence inversions, fair atmospheric conditions and little to no rainfall.

In contrast circumpolar westerlies are associated with convergence in the near surface wind field and divergence in the upper levels of the troposphere. These westerlies produce continual uplift, cloud and the potential for precipitation. The convective activity associated with westerly and easterly wave disturbances, such as strong winds and upward vertical air motion, disrupt the persistence of inversions and therefore facilitate the dispersion and dilution of accumulated atmospheric pollution.

Nkangala District Municipality forms part of the Highveld Priority Area. Industries such as Eskom, Columbus, Highveld Steel, Samancor, Rand Carbide, Vanchem, and Sasol are the major source of emissions in Nkangala. Mining and quarries are an air quality issue in all municipalities, particularly as the result of opencast coal mining, with dust fallouts experienced. The district municipality raised mining as a high priority, with varying degrees of emphasis by the local municipalities (DEA, April 2011).

As site specific meteorological data was not available, suitable surface meteorological data from the South African Weather Service, for a period of three years, was used (2010-2012). No ambient air quality was available for inclusion at the time of compilation of this document.

Wind speed, wind direction, ambient air temperature and precipitation data was acquired from the Springs weather station (0476762A3) and cloud cover data from the Oliver Tambo weather station (Johannesburg Int Wo - 0476399 0) (2010-2012), located approximately 13km and 33km from the proposed site, respectively, in a westerly direction.

1.1.13.2 Wind field

The predominant wind field for the period 2010 – 2012 is in a east south easterly direction with calm to moderate wind speeds of 0-3.1 m/s. (Refer to Figures 16 to 20) or seasonal wind fields).

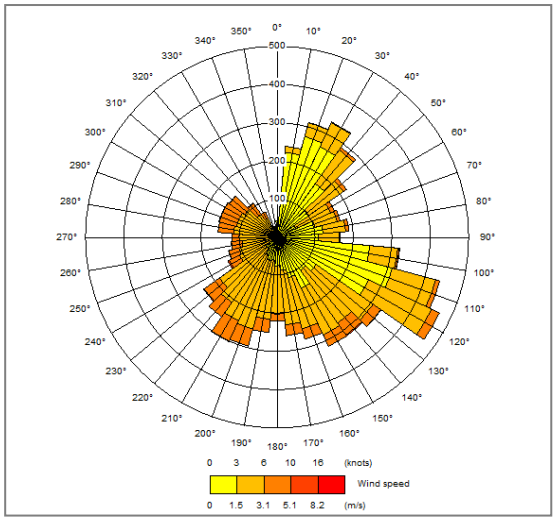

Figure 16: Predominant wind field

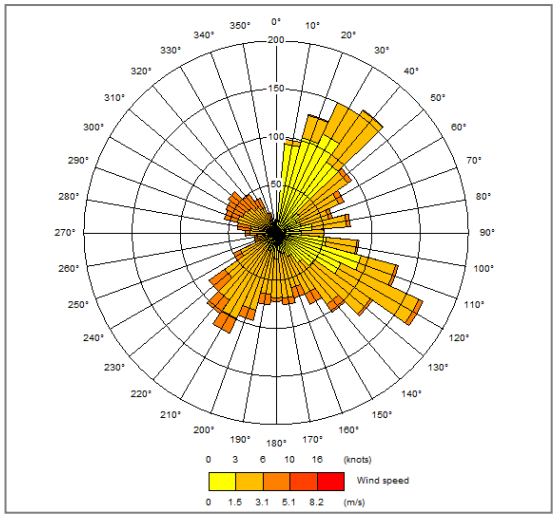

Figure 17: Summer wind field

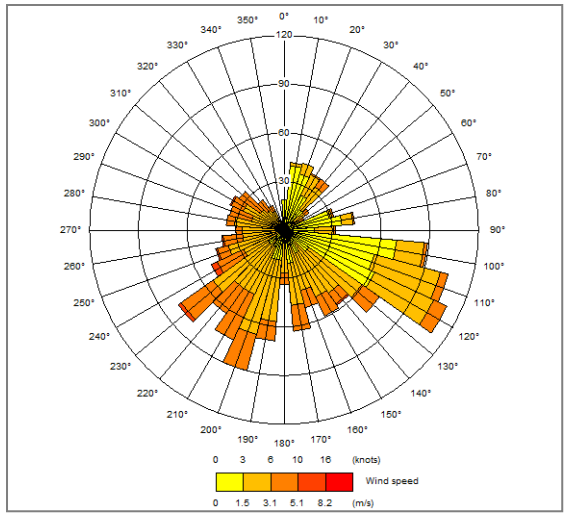

Figure 18*:* Spring wind field

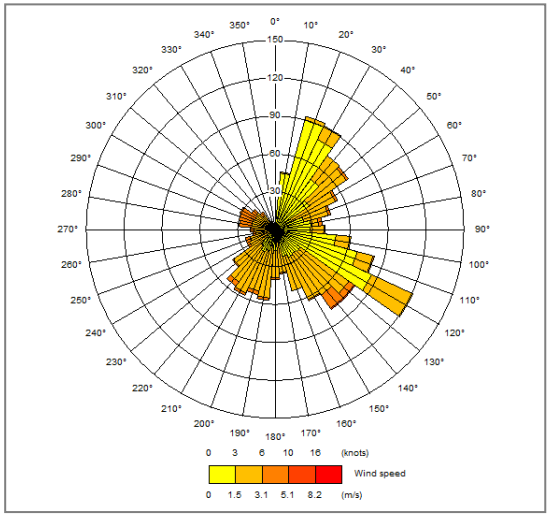

Figure 19: Autumn wind field

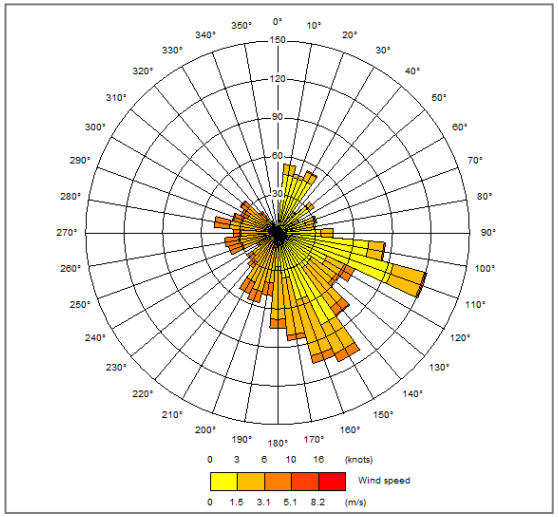

Figure 20: Winter wind field

1.1.14 Noise

A baseline Environmental Noise Survey was conducted by Varicon CC in October 2013 around the proposed mining areas as part of the Environmental Impact Assessment (EIA) process to be followed (Refer to Appendix C3 for comprehensive details on this survey). As part of the survey, the sound levels were evaluated against the standards as specified in the SABS Code of Practice 0103 of 2008 (The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication) with reference to Code SABS 0328 of 2003 (Environmental Noise Impact Assessments).

For the purpose of this survey and according to SABS 0103 of 2008, it is probable that the noise will be annoying, or otherwise intrusive to the community, or to a group of people, if the rating level of the ambient noise under investigation exceeds the typical rating levels for the ambient noise as given in Table 18 below. Applicable values in the tabulation are highlighted.

Table 18: Typical rating levels for ambient noise in districts

Type of District	Equivalent Continuous Rating Level ($L_{Req.T)}$ for Ambient Noise					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
(a) Rural Districts	45	45	35	35	35	25
(b) Suburban with little road traffic	50	50	40	40	40	30
(c) Urban Districts	55	55	45	45	45	35
(d) *Urban districts with some workshops, business premises and with main roads.*	*60*	*60*	*50*	*50*	*50*	*40*
(e) Central Business Districts	65	65	55	55	55	45

(f) Industrial Districts	70	70	60	60	60	50

Stationery noise levels were measured at pre-selected positions around the proposed mining areas. Two sets of measurements were taken during the daytime in the month of October 2013. The measurement positions were selected around the proposed mining areas and at specific locations around the farmlands. Currently the noise levels around the proposed mining sites are mainly generated by chicken farming activities and small scale farming activities (Portion 26). Portions 46 and 47 are situated next to a main railway line and the main road (R555) between Delmas and Springs. Noise generation is obviously resulting from the road traffic and the train passing on scheduled times. The noise levels all were measured within the recommended levels that could cause disturbance to any community that could be affected. The results of the environmental noise surveys are listed below in Tables 19 and 20. The test results are compared to the typical rating levels (Category D for Portions 46 and 47) and (Category B for Portion 26) (assumed to be best fit) as provided in Table 18 shown above. All noise levels measured were below the prescribed requirements

Table 19: Noise levels at various sampling locations around the proposed mining site (Portions 26).

Measuring Positions	AMBIENT NOISE (dB(A))					Remarks
	Day Time Levels					
	Average Results (dBA)		Typical Rating (SABS 0103) (Category B)	Excess ΔLReq,T (dBA)		
	October 2013	October 2013		October 2013	October 2013	
Position 1: On the Eastern Corner of Portion 46, next to the dirt road and next to the railway tracks.	45,1	48,6	60,0	-14,9	-11,4	Day Time: - No mining activities. Mainly noise from neighbouring farms, workshops and main road traffic
Position 2: On the South-Eastern corner of Portion 46, approximately 500 m from the railway tracks.	35,7	39,8	60,0	-24,3	-20,2	Day Time: - No mining activities. Mainly noise from neighbouring farms, workshops and main road traffic.
Position 3: On the South-Western of Portion 47, approximately 500m from the railway tracks.	41,8	39,7	60,0	-18,2	-20,3	Day Time: - No mining activities. Mainly noise from neighbouring farms, workshops and main road traffic.
Position 4: On the North-Eastern Corner of Portion 47, next to the dirt road and next to the railway	45,4	48,4	60,0	-14,6	-11,6	Day Time: - No mining activities. Mainly noise from neighbouring farms, workshops and main road traffic.

Table 20: Noise levels at various sampling locations around the proposed mining site (Portions 26).

Measuring Positions	AMBIENT NOISE (dB(A))					Remarks
	Day Time Levels					
	Average Results (dBA)		Typical Rating (SABS 0103) (Category B)	Excess ΔLReq,T (dBA)		
	October 2013	October 2013		October 2013	October 2013	
Position 1: On the North-Western corner of the farmland, close to the Chicken farm structures.	41,1	38,6	50,0	-8,9	-11,4	Day Time: - No mining activities. Mainly background noise from birds, background noises and some dirt road traffic
Position 2: On the North-Eastern corner of the farmland, next to the graveyard, approximately 1000 m from the farmhouse.	35,7	29,8	50,0	-14,3	-20,2	Day Time: - No mining activities. Mainly background noise from birds, background noises and some dirt road traffic.
Position 3: On the South-Eastern corner of the farmland, next to a main dirt road, approximately 1000 m from farmhouses.	31,8	29,7	50,0	-18,2	-20,3	Day Time: - No mining activities. Mainly background noise from birds, background noises and some dirt road traffic.

Position 4: On the South-Western corner of the farmland, next to a main dirt road, approximately 1000 from farmhouses.	31,4	30,4	50,0	-18,6	-19,6	Day Time: - No mining activities. Mainly background noise from birds, background noises and some dirt road traffic.

1.1.15 Visual aspects

The following information was extracted from a Visual Impact Assessment study compiled by Zoneland Solutions, dated October 2013, attached hereto in Appendix C10. As part of the study four dominant *view corridors* were identified in the region, namely the:

- Northern access road, which is the main movement route to the project site from the N12 via the R555.
- Western access road, which is a secondary access route via the R29
- Eastern access road, which is also **a** secondary access route via the R42

The nearest settlements to the project site are the rural residential settlements of Prosperity, Sundra, Sundale, and Eloff. In terms of the Nkangala District IDP, the N12 freeway has been classified as a development corridor as it links the Nkangala District with the industrial core of Ekurhuleni. The N17 to the south of the project site has an important distribution function in the region. However, both of these roads, together with the R555, R29 and R42 are located in the background of the project site and are therefore not regarded as dominant view corridors of relevance to the proposed activity.

As illustrated by the DEM below (Figure 21), the project site is located at a mean elevation of approximately 1590m above sea level. The DEM shows that there is little prominent topographical manifestation in close proximity to the project site, from which the proposed activity is particularly visually exposed. On a local scale, as a result of the undulating nature of the area, a local ridgeline is formed in the centre of the site.

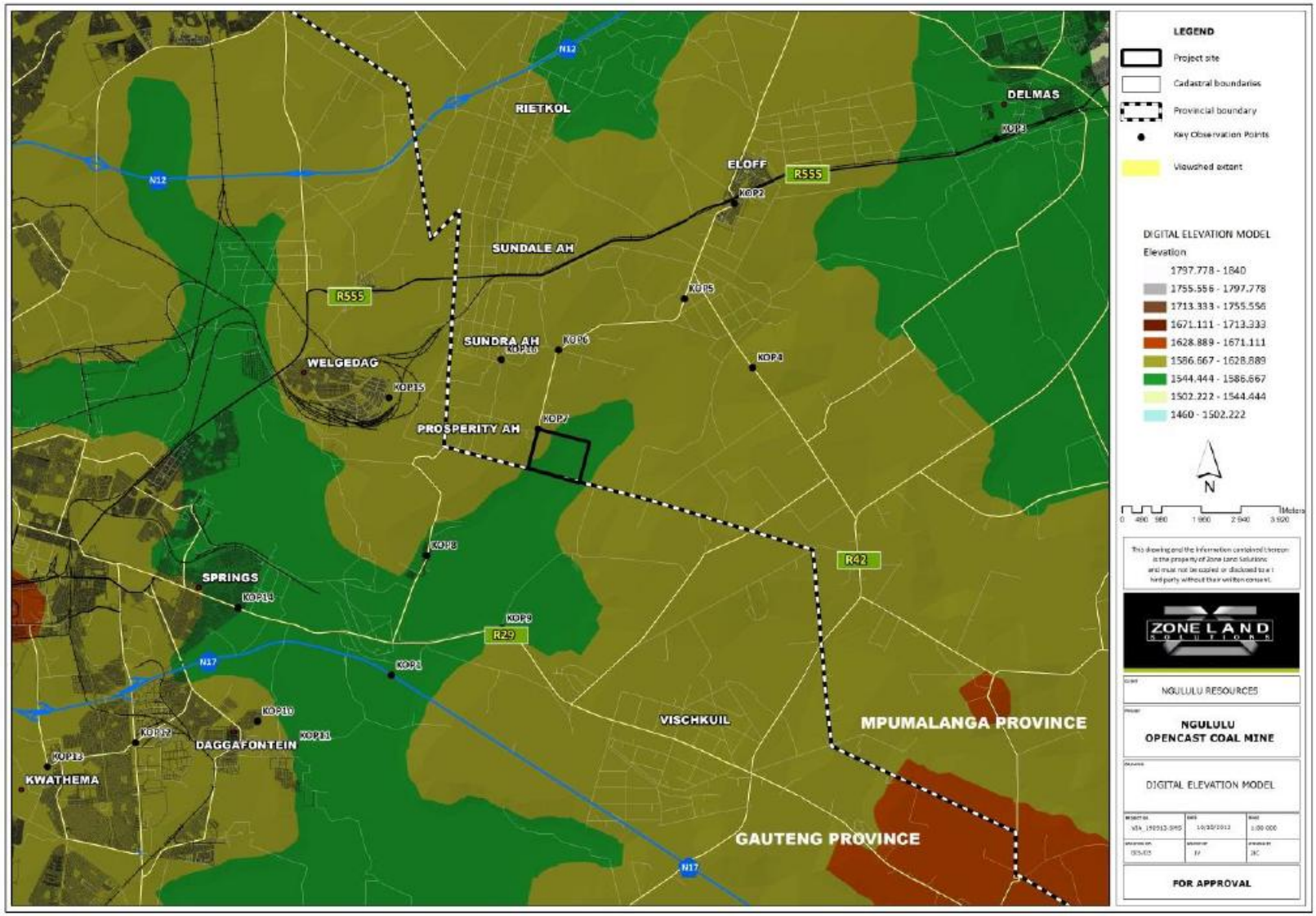

Figure 21: Digital elevation model illustrating major ridgelines and dominant view corridors in the sub-region

1.2 Concise description of each of the existing environmental aspects both on the site applied for and in the surrounding area which may require protection or remediation

All environmental aspects that may require protection from the mine's potential impacts were described in detail in the above sections. This includes:

- Land use and capability;
- Threatened or protected flora (Declining *Crinum bulbispermum* and Near Threatened *Kniphofia typhoides)* or fauna species that could potentially occur within the area;
- Sensitive landscapes (Wetland);
- Air quality in terms of dust generation;
- All water resources; and
- All heritage structures

1.3 Concise description of the specific land uses, cultural and heritage aspects and infrastructure on the site and neighbouring properties/farms in respect of which the potential exists for the socio-economic conditions of other parties to be affected by the proposed mining operation

1.3.1 Land use

1.3.1.1 Historical Agricultural Production

The northern section of portion 46 was ploughed in the past and now contains secondary grassland used for grazing

The area capability of Portion 26 of the farm Droogefontein is classified as high potential farm land. The agricultural potential is high due to an ideal climate, topography and high potential soil.

The level of sophistication in agricultural methods practiced on Portion 26 is high. The soil is well cultivated and well fertilised.

There is a wetland present on Portion 26, which is of low agricultural potential.

Land in the wider area currently used for agriculture has been rezoned for mining purposes.

1.3.1.2 Existing Structures

Portion 46 and 47 comprise of small holdings. Both portions contain houses and outbuildings. An artificial dam is also situated on this section of portion 46. . A small cemetery is situated in the northern eastern corner of portion 26.

1.3.1.3 Land misuse

Most of portion 26 and its surrounds are used for maize cultivation. The area not currently ploughed comprises of wetland areas that show signs of grazing. Historic aerial imagery indicate that parts of the larger wetland area was also ploughed in the past – probably during dry years when the area was not too saturated to plough. The dirt roads forming the western and southern boundary of portion 26 were recently upgraded and soil berms and culverts constructed, likely to aid drainage of the roads due to the wetland conditions.

1.3.2 Sites of archaeological and cultural interests

A phase 1 heritage impact assessment was conducted on the proposed site. The following formation was extracted from a report titled “Report on a Phase 1 HIA for a proposed coal mine on portions 26, 46 & 47 of the farm Droogenfontein 242IR, Delmas District, Mpumalanga”, compiled by Pelser Archaeological Consulting (APAC),(2013), hereto attached in Appendix C6.

According to the report, no cultural heritage (archaeological or historical) sites, features or objects were found on Portions 46 & 47. All the structures/buildings on these two portions (including the homesteads) are less than 60 years of age. If any did exist here in the past it would more than likely have been destroyed or disturbed in the recent past through various changes.

Portion 26 has been largely ploughed for crop-raising, while a part of the land parcel is covered by a wetland. Any significant archaeological or historical sites that could have existed here in the past would have been severely disturbed or destroyed as a result of agricultural practices. Two sites dating to the recent past were however identified and recorded on Portion 26.

Site 1 - Graveyard

The first site is an informal graveyard containing at least 80 graves, although there might be more located here. Many of the graves have formal headstones with legible inscriptions, while some are only marked with single stones at the head; some are only identified through the depressions left by the burial pit, while others are demarcated by soil heaps, bricks and cement dressings. A number of families are represented by the graves (those who could be identified from inscriptions). These include Gamede, Ndungwane, Molife, Radebe, Majola and Mvathulane. The oldest date of death seen is 1963, with the most recent being 1988. A large number of the graves seem to have been those of young children or infants. The graves are more than likely those of farm workers who used to work and live on this and other farms in the area.

Site 2 – Settlement remains

The site contains the remains of a mud-brick and plastered dwelling, as well as the foundations of other structures and ash and refuse dumps. It is possibly the remnants of a farm worker “settlement” on Droogefontein, and might be related to the graveyard found at Site 1. It should be noted that there

is always a possibility that the burials of still-born or small infants could be located inside or close to the dwellings, and this aspect should be taken into consideration during any development actions.

1.3.3 Regional socio-economic structures

The following section is sourced from the following documents:

- Victor Khanye Local Municipality Final IDP Document 2012-2016
- 2012/2013 Integrated Development Plan Final Nkangala District Municipality
- Social and Labour Plan of Ngululu Resources (PTY) LTD, dated April 2013

1.3.3.1 Demographic Profile

Provincial level – Mpumalanga Province

Mpumalanga is the second smallest province in the country (after Gauteng) but has the fourth-largest economy in South Africa. The capital is Mbombela (formerly Nelspruit). The province is bordered by Mozambique and Swaziland in the east and Gauteng in the west. Its landscape is characterised by high plateau grasslands in the west and the low-lying area known as the Lowveld in the east. The Lowveld is a popular tourist destination, with the Kruger National Park, Pilgrim's Rest, Barberton, Sabie, Graskop and various privately owned game reserves the main attractions. The Maputo Corridor, which links Maputo in Mozambique with Gauteng Province, runs through Mpumalanga and enables economic growth and development in the region. Important towns in the Highveld region of Mpumalanga include Witbank, Middelburg, Standerton, Secunda and Piet Retief (Mpumalanga Province).

The main industries in Mpumalanga Province are agriculture (citrus, mangoes, avocadoes, litchis, bananas, granadillas, guavas, nuts, cotton, tobacco, wheat, potatoes, sunflowers, maize and sheep), manufacturing (especially the large petrochemical industries such as Sasol II and III, chrome, alloy and steel), forestry, electricity generation and coal mining. Three of the southern hemisphere's largest power stations are located in Mpumalanga, and coal produced in the province feed these power stations (Mpumalanga Province).

Unemployment figures are very high in the province and job creation has been identified as the first of six areas that should be focused on in the province's Growth and Development Path, amongst other things specifically growth in labour absorbing sectors, green jobs, youth employment initiatives, industry diversification and land and water resource management (Nkangala District Municipality).

Furthermore, in terms of the Provincial Growth and Development Strategy, the following infrastructure projects and Programmes of Action are amongst those listed as applicable to the province in general:

- Maximum exploitation of agricultural potential and opportunities;
- Expanded Public Works Programme (EPWP);
- Local Economic Development (LED);
- Urban and Rural Development Programme; and

- Environmental management.

Demographics

Figure 22 below shows that the population of Mpumalanga is still young; the majority of the population is aged below 35 years.

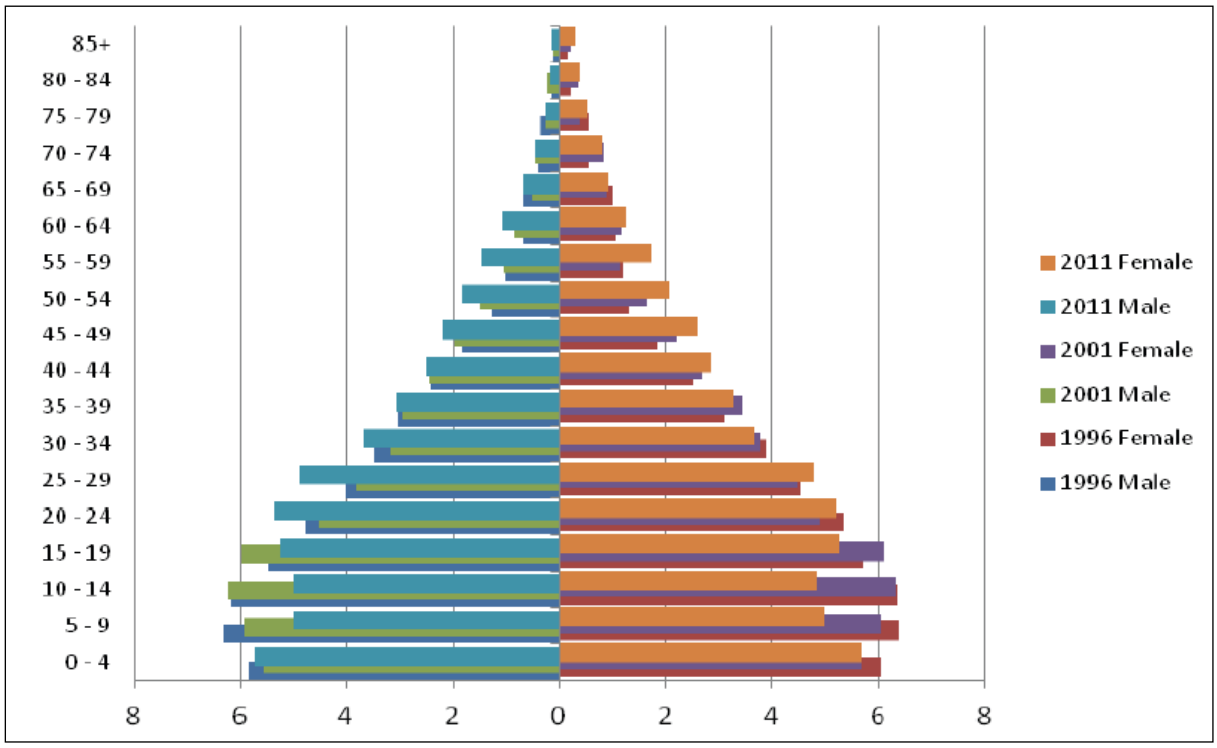

Figure 22: Distribution of population by age and sex, Mpumalanga - 1996, 2001 and 2011(*Source: Census 2011 Municipal report – Mpumalanga)*

Nkangala District

Nkangala District Municipality is made up of the following local municipalities: Delmas (Victor Khanye), Dr J.S. Moroka, Emalahleni, Emakhazeni, Steve Tshwete, and Thembisile. It is also responsible for the Mdala District Management Area. Nkangala is at the economic hub of Mpumalanga and is rich in minerals and natural resources. According to Nkangala District Municipality's Integrated Development Plan (IDP) 2013/14 the leading sectors in terms of percentage contribution to the district's economy are mining (28.8%), manufacturing (13.6%) and community services (13.5%). Agriculture was responsible for 5% of the total employment in the district in 2011. Targeting of more labour-absorbing activities across the main economic sectors, specifically the agricultural and mining value chains, has been identified as one of the main job drivers in the district's IDP 2013/14 (Nkangala District Municipality).

Demographics

Figure 23 below indicates that the population of Nkangala District Municipality is still young, in line with the population of the province as a whole. The majority of the population is aged below 35 years.

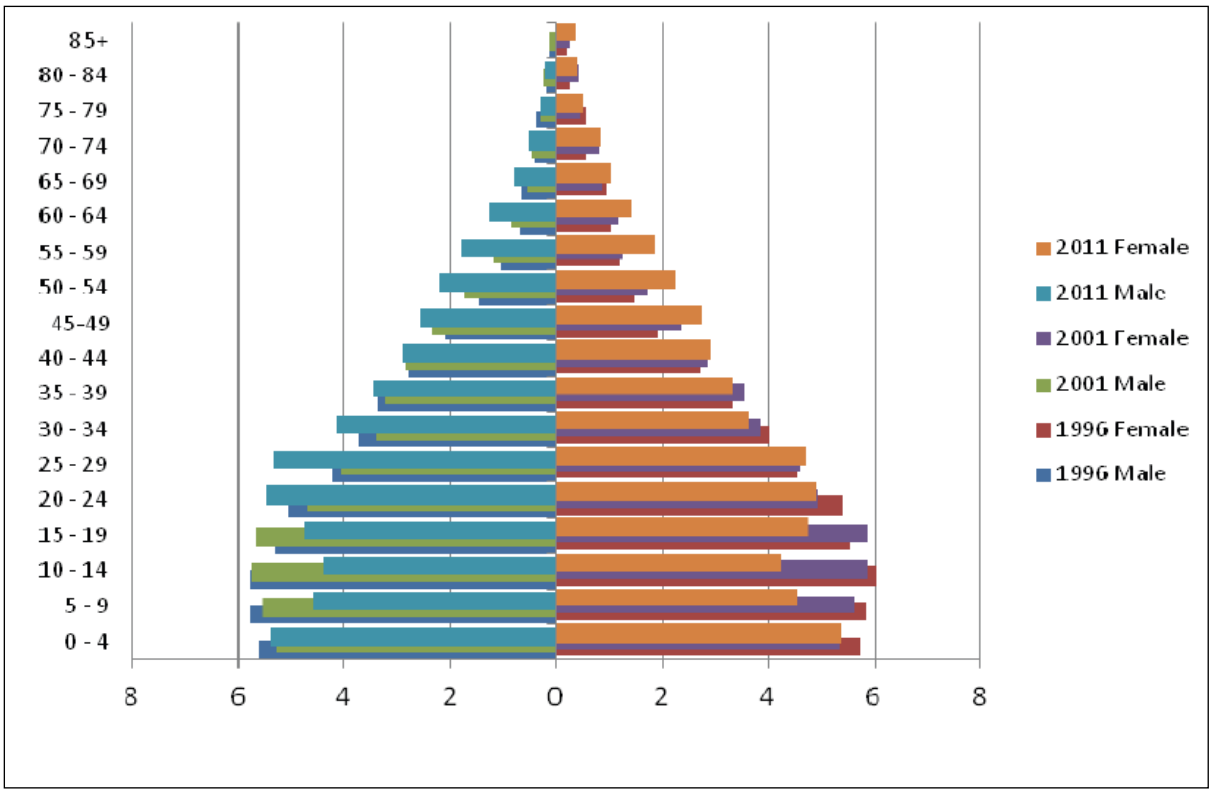

Figure 23: Distribution of population by age and sex, Nkangala – 1996, 2001 and 2011 ***(Source: Census 2011 Municipal report – Mpumalanga)***

Victor Khanye Local Municipality

The Victor Khanye Local Municipality is situated on the western Highveld of Mpumalanga Province, covering a geographic area of approximately 1 567km². The prominent towns and settlements in the municipality include Abor, Argent, Delmas, Leandra and Lionelton. The municipality is strategically located close to the metropolitan areas of Gauteng and Tshwane and borders the metropolitan area of Ekurhuleni in the west.

The headquarters of the municipality are in Delmas. Victor Khanye is currently characterised by an increase in the number of mining and related activities in the Leandra area. In addition to mining (concentrating on coal and silica), other important sectors in this area are agriculture (a major provider of food (maize), finance and manufacturing (capitalising on its proximity to Gauteng). Natural resources thus make a significant and direct contribution to the Nkangala District economy, which is 'resource based' (coal, water, land capacity, geographical features, climate, conservation areas and ecosystems).

Functionally, the municipal area comprises the following functional land use categories:

- Developed Urban Areas: Predominantly residential (Delmas, Botleng, and Eloff) with their supportive businesses, social services and industrial developments;

- Agricultural Holding Areas: Primarily extensive residential with numerous non-conforming land uses (Union Forest Plantation, Eloff, Rietkol, Springs and Sundra Agricultural Holdings);
- Informal Settlements (4) as well as the Brakfontein “residential” area (mine);
- Agricultural/ Farming operations; and
- A mining Component.

Unlike Nkangala District, Victor Khanye recorded high labour absorption capacities in electricity. Of all six local municipalities, Victor Khanye registered the highest comparative advantage for agriculture. The regeneration of power stations, as well as the new Kusile power station in the Victor Khanye area could serve as catalyst to increased demand for coal reserves in the Nkangala area. The industrial potential of Delmas (agro-processing) should also be promoted to capitalise on its strategic location in relation to the major transport network.

Demographics

Victor Khanye Local Municipality had a population growth rate of 1.14 during the period between 1996 and 2001. The population growth rate in the municipality increased drastically between 2001 and 2011 at 2.92. This was the biggest population increase of all the local municipalities in the province, except for Steve Tshwete Local Municipality and Emalahleni Local Municipality (both also in Nkangala District), which had a growth rate of 4.76 and 3.58 respectively.

1.3.3.1.1 Population and population distribution

The total population of the NDM was 1 226 500 in 2007 (Stats SA 2007), constituting approximately 34% of Mpumalanga‟s population. The population growth rate increased by about 2% between the period 2001 and 2007. The Districts population makes up 33.6% of Mpumalanga Province’s population. Nkangala District Municipality’s share of the Mpumalanga population increased from 30.3 percent in 2001 to 33.7 % in 2007. The black population formed the bulk of the District’s population with 90.9 percent, followed by the White population with 7.8 %.

The population of Victor Khanye Local Municipality has since 2001 increased from 56 335 to 75 452 (Table 21), which is the total growth of 19 245 (Census, 2011). The census results have shown that the number of females is greater than the number of males in Victor Khanye. In terms of percentage, males comprised 49% and females 51%. Since 2001, the male/female ratio has however changed to 51:49.

Table 21: Population trends and distribution per gender

Age	2001			2011		
	Male	Female	Total	Male	Female	Total
0 - 14	9008	8 984	17 992	10 754	10 531	21 285
15 - 64	17 745	18 235	35 980	26 516	24 089	50 605
65+	985	1 378	2 363	1 547	2 016	3 563

Age	2001			2011		
	Male	Female	Total	Male	Female	Total
Total	27 738	28 597	56 335	38 816	36 636	75 452

1.3.3.1.2 Age, gender and households

The number of households has increased from 13 409 in 2001 to 20548 in 2011.

The census results have shown that the number of females is greater than the number of males in Victor Khanye. In terms of percentage, males comprised 49% and females 51%. Since 2001, the male/female ratio has however changed to 51:49.

The youth age group make up 40, 58% of the total population. The municipality however, has in their records 27 020 people registered as indigent by June 2012.

1.3.3.2 Economic Profile

1.3.3.2.1 Industries

With 27.4% of the working population involved in agriculture, the agricultural industry is the main employer in the municipal area, followed by community services. The high importance of community services is a matter of concern because such activities do not contribute directly to income generation in most circumstances; however, certain community services (most notably, health and especially education) are vital to economic growth over the long term. Mining is also an important industry. Overall, the area is highly dependent on the primary sector (agriculture and mining), with the tertiary sector, especially business services, lacking behind. Industrial diversification efforts are needed, and opportunities for industrial diversification are plentiful, especially because of the area's proximity to the major urban and industrial areas of Gauteng. The fact that the area lies between the industrial and logistic hub of Ekurhuleni and the expanding mining areas to the east (coal, and more distant platinum areas), also pose a variety of business opportunities for local residents. The local construction industry are relatively well developed (5.8% of the population are involved in the construction industry), this may serve as an indication that local construction businesses probably have the capacity to be involved in the construction aspect of the proposed mine. Use of local construction businesses will reduce economic leakage end enhance positive economic impacts associated with the construction phase of the proposed mine development.

1.3.3.2.2 Occupation and employment

The unemployment rate is defined as the percentage of those in the labour force who are unemployed but actively seeking work. The relatively high unemployment rate remains a challenge, to which the government has given priority and for the country as a whole. According to Statistics South Africa, the unemployment rate for South Africa and Mpumalanga at the end of the third quarter of 2010; was 25.3 per cent and 28.4 respectively. In 2001, Nkangala had an average unemployment rate of 30.2 per

cent, which was higher than the provincial rate. The unemployment rate in Nkangala decreased to 26.2 per cent in 2009 or to 112 642 unemployed people. According to the South Africa Statistics results of 2011, unemployment rate with –in Victor Khanye Local Municipality is 28.19%.Unemployment has undesirable social effects such as, crime, prostitution, and poverty.
The formal sector (non-agricultural) in Nkangala was responsible for 66.3 per cent of total employment in the district in 2009, the informal sector (non-agricultural) 21.0 per cent, agriculture 5.0 per cent and private households 7.7 per cent. The province as a whole registered a lower share in the formal sector (55.4 per cent) and subsequently higher shares by the three other sectors.

Emalahleni dominated Nkangala's employment numbers with a 47.4 percent share of the total employment. Steve Tshwete was the second largest provider with 27.7 percent, while Dr JS Moroka (1.8 percent) contributed the least to employment figures. Except for the agriculture sector, Emalahleni was the leading contributor to the employment figures of each of Nkangala's sectors. Incidentally, Victor Khanye Local Municipality was the leading employer of the agriculture sector.

In 2009, the wholesale and retail trade sector was the biggest employer in Nkangala with a share of 21.8 per cent. Mining (16.7 per cent), community services (15.1 per cent) and manufacturing (13.1 per cent) contributed significantly to employment in the district. The trade sector was the leading sector in terms of employment provision in all municipal areas, with the exception Steve Tshwete and Dr JS Moroka.

Mining was the dominant employer in Steve Tshwete with 21.1 per cent. In Dr JS Moroka community services sector (49.6 per cent) was the main employer. The agriculture sector was the main employment provider in Victor Khanye with a significant share of 17.6 per cent in 2009. The smallest provider of employment in the district, as well as in the majority of the lo-cal municipalities, was electricity.

1.3.3.3 Community, social and personal services

1.3.3.3.1 Schools and education

According to Table 22 below, 5529 of people at Victor Khanye local municipality did not attend an educational institution or do not possess any formal education, compared to 325540 in Mpumalanga. This implies that there are a relatively large proportion of young people who are illiterate in terms of children attend pre-school and school as compared to 71,6% of Mpumalanga 0,8% (175 persons) attended college, technikon and university, compared to 1,3% in Mpumalanga. Only 0,1% (18 people) attended some form of adult education.

Table 22: Educational levels

	Mpumalanga	Nkangala	Victor Khanye
No schooling	325540	92112	5529

	Mpumalanga	Nkangala	Victor Khanye
Grade 1 / Sub A - Grade 7 / Std 5/ ABET 3	359683	12175	8180
Certificate with less than Grade 12 / Std 10 -Diploma with less than Grade 12 / Std 10	11212	4419	203
Grade 12 / Std 10 / Form 5 – NTC III /N3/ NIC/ V Level 4	695042	248063	13009
Matric+	218140	77793	3511
Total	2312320	797615	46548

1.3.3.3.2 Basic services

Water and sanitation

Approximately 10 0002 households out 13 409 households at Victor Khanye Local Municipality have access to potable water on their stands, excluding rural areas. The municipal council has provides for at last 80% of the households in rural areas with borehole water. The water backlog affects the sanitation directly as most houses without potable water are still using the bucket system, pit latrines or septic tanks. At least 4356 of the 13 409 households in Victor Khanye local municipality have a sanitation backlog. Water supply in Victor Khanye, Botleng, Delpark and other Extensions are supplied with water by means of boreholes. With the new development in Botleng Extension 5, Victor Khanye Extension 17 and other residential developments and the expansion of McCain Foods, the demand for water exceeds the supply. The demand for water will be 18Ml per day and the boreholes are delivering currently only 16Ml per day. Rand Water supplied to Eloff is used to augment the water supply to Victor Khanye, which affect certain areas e.g. Eloff Agricultural Holdings negatively. Higher positioned areas experience water shortages when the level in the reservoirs reaches certain low levels e.g. Botleng Extension 4, Leeupoort Agricultural Holdings, Eloff Agricultural Holdings, Delmas West and Delmas Extension.

The old asbestos water pipes cause high frequency of pipe breakages, which contributes negatively to the water shortage and water quality. The rural communities around Victor Khanye receive their water supply from boreholes. However the communities are scattered all over the Municipal area e.g. Hawerklip situated approximately 21km South East from Delmas and Groenfontein situated 34km North East from Delmas. These communities receive water by means of a water tanker. The majority of the communities live on privately owned lands and the relevant owner would be relevant to provide services to people not working on the farm. Some of these rural boreholes are biologically contaminated, not maintained or functional.

Access to Electricity

Approximately 65%4 of the households in the Victor Khanye Municipal area use electricity for lighting. The remaining 35% includes residents of the rural areas and informal settlements or farm dwellers. The electricity network within Victor Khanye Local Municipality is ageing and has
become inefficient. The main electricity substation is under severe pressure and needs to be upgraded since the electricity demand is increasing due to the following: Newly proposed industrial developments e.g. Sephaku Cement Factory, Shopping Mall Botleng Ext.3 Industrial expansions e.g. McCain Foods. New residential development e.g. Botleng Ext. 5, Delmas Ext.17 and West ridge Estates. The infrastructure within the area supplied by Eskom (Eloff, Sundra, Botleng and Extension 3) needs to be upgraded to ensure that communities receive uninterrupted services.

1.4 Annotated map showing the spatial locality and aerial extent of all environmental, cultural/heritage, infrastructure and land use features identified on site and on the neighbouring properties and farms

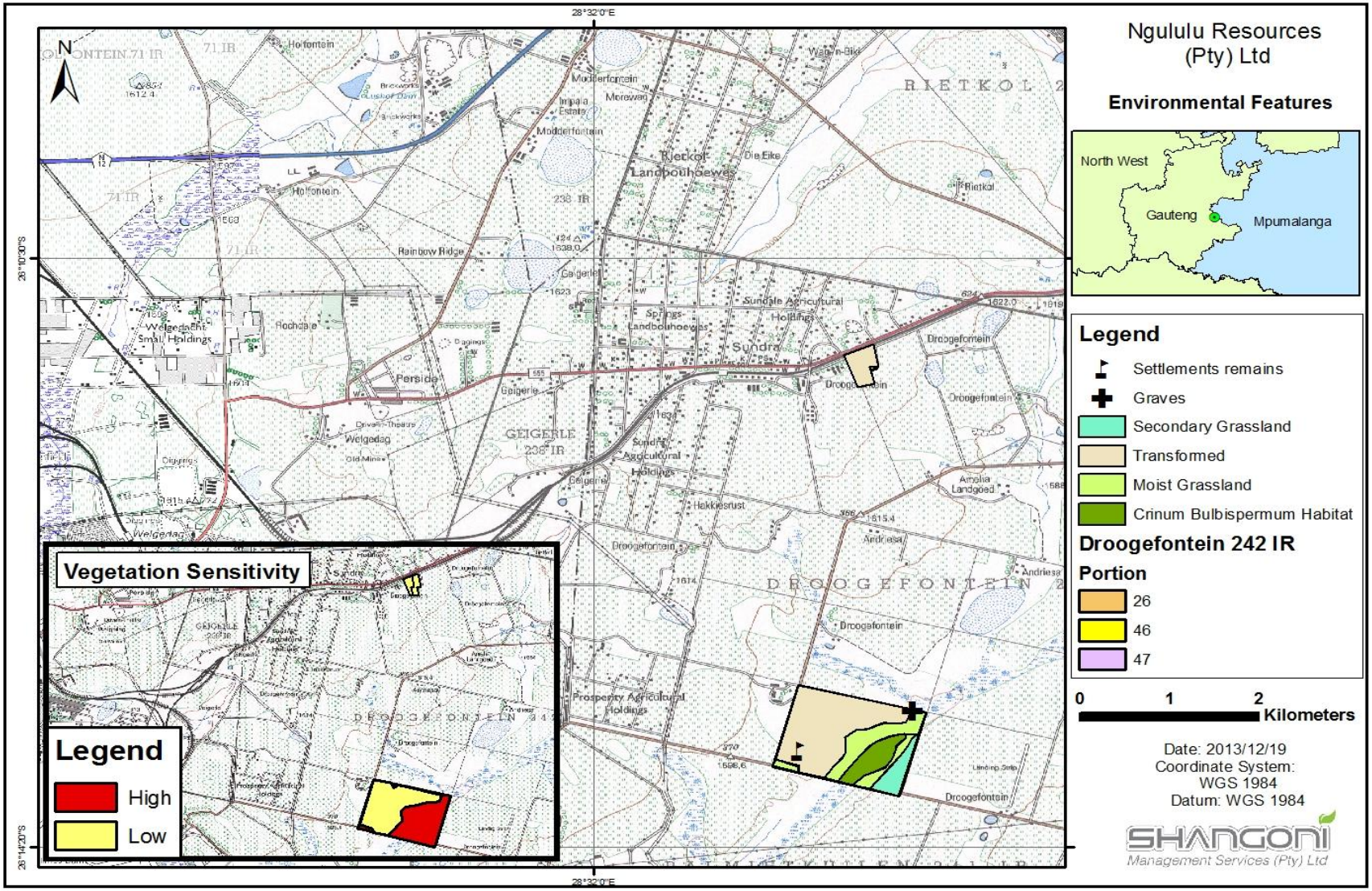

Figure 24: Environmental features

1.5 Confirmation that supporting documents in the form of specialist studies are attached as appendices

- Agricultural impact assessment report
- Basic Atmospheric Impact Report
- Environmental noise survey report
- Faunal assessment report
- Geohydrological investigation report
- Heritage impact assessment report
- Hydrological Assessment Report
- Social impact assessment report
- Vegetation assessment report
- Visual impact assessment report
- Wetland and riparian functional assessment report

2 The mining operation

2.1 The mined mineral

The mineral of interest is Coal.

2.2 The mining method to be employed

2.2.1 Estimated reserves, resources and deposits

According to the Mining Works Programme (Appendix F1) the Resource Statement was prepared using “SANS 10320ED” South African guide to the systematic evaluation of coal resources and coal reserves section 6 and the definitions from section 3. Table 23 reflects the drilling densities and resource categories while Table 24 gives a summary of resources.

Table 23: Drilling densities and resource categories

SAMREC boreholes with analyses		
SAMREC Classification	**Ha/borehole**	**Grid**
Reconnaissance coal resource	1,600	4 km
Inferred coal resource	1,000	3 km
Indicated coal resource	25	500 m
Measured coal resource	12.5	350 m

Table 24: Summary of the resources

4 Seam Tonnages			
Block	**GTIS**	**Geol Loss %**	**MTIS**
4 Seam North	3,255,774	20%	2,604,619

4 Seam South	158,149	20%	126,519
2 Seam Tonnages			
Block	**GTIS**	**Geol Loss %**	**MTIS**
2 Seam Top	24,964,911	20%	19,971,929
2 Seam Bot	16,383,807	20%	13,107,046
Total	**44,762,640**		**35,810,112**

2.2.2 Production rate

The estimated production rate is 3 000 000tpa. It is estimated that in year 4 seam 4 will be mined out and the preparation to open up seam 2 needs to commence. A decline in production will be experience in year 18 – 20 due to the final reserves being mined and preparation for rehabilitation to commence.

2.2.3 Life of mine

The life of mine is dependent on the production rate that can be applied. If a rate of 3 000 000 tpa ROM is maintained the LOM equates to about 20 years. However, if the rate of production drops below the current forecast of 3 000 000tpa the LOM could be extended. Allowing an additional two years for market fluctuation and a further 5 years for closure a mining right for 20 years would be required.

2.3 List of the main mining actions, activities, or processes

2.3.1 Mining activities

2.3.1.1 Mine Layout

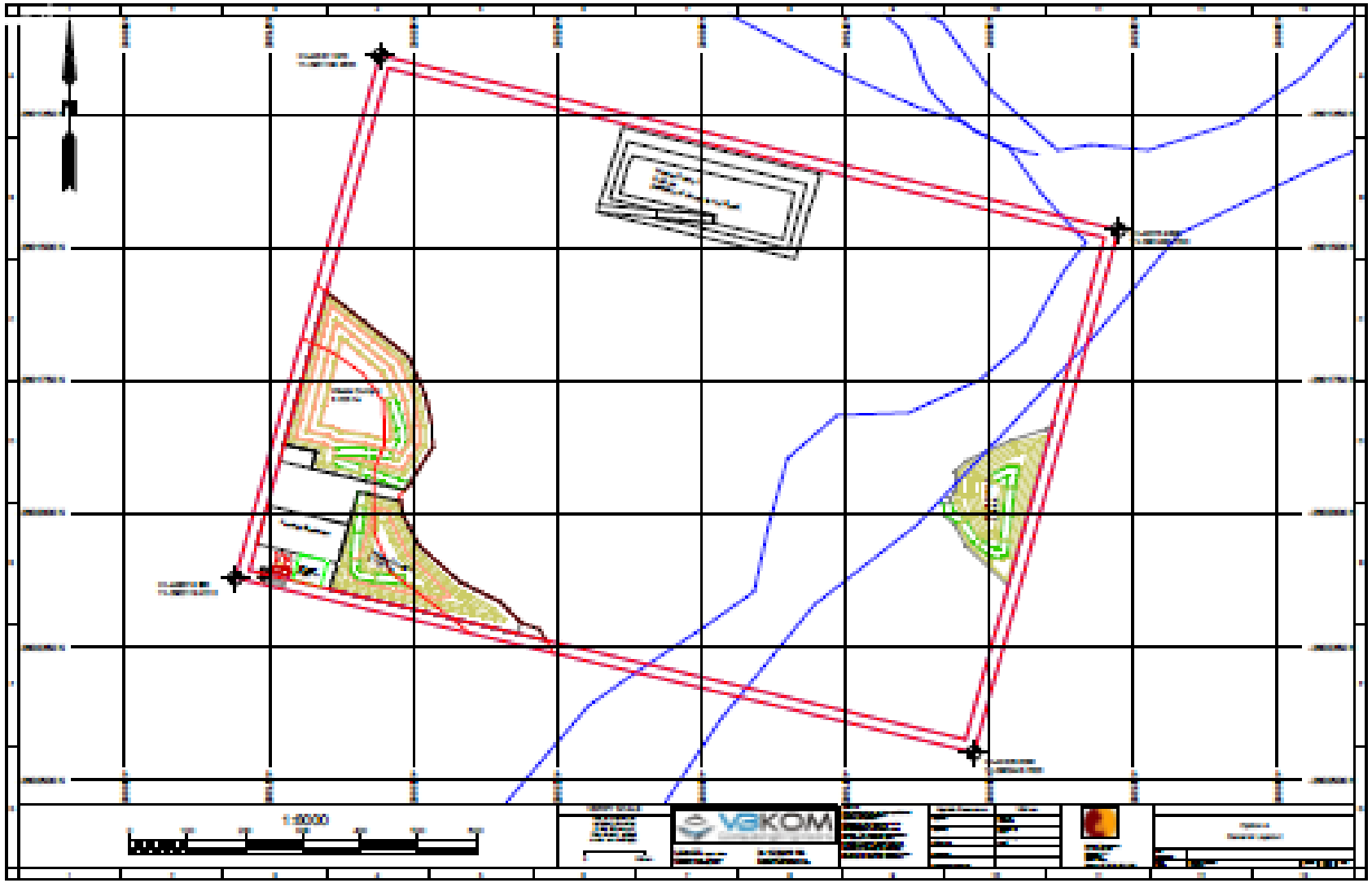

Figure 25: Mine Layout Plan

2.3.1.2 Mining Method

Ngululu Resources holds the prospecting rights on Portions 26, 46 and 47 of the farm Droogenfontein 242 IR under the prospecting permit MP 11645 PR. Ngululu Resources does not currently own the surface right of these portions.

The whole of Portion 26 will be exploited through an opencast box cut to gain access to the coal seams. Three minable seams, a top, middle and bottom seam have been identified during exploration and will be exploited. The first 3 months will be dedicated to stripping and storing of topsoil and the establishment of storm water diversion channels. Subsoil will be drilled and blasted and stored for later use during rehabilitation.

Mining will be carried out by conventional truck and shovel mining techniques through a modified terrace mining methodology that maximises direct back filling. The mineable resources have been delineated using a minimum width of 1.0 metres. The initial cut will be through a box cut designed to expose sufficient reserves for the first year of production and also act as a future access ramp into the Mine.

Faces will be opened up in one area through overburden stripping and the exposed coal seams will be mined and transported to the plant by a fleet of trucks and shovels. Once the coal seams have been removed, the mined out areas will be backfilled through direct backfilling methods.

The final void will be backfilled with overburden from the initial boxcut. One opencast section is planned for Droogefontein with an estimated life-of-mine (LoM) of 20 years. The coal is suitable as a feed stock for domestic power generation as well as low volatile pseudo anthracite.

2.3.1.3 Transport and conveyance

There is an existing access road to the project site. Internal roads will likely be constructed between the open pit and support services. The proposed mine product will be transported by truck to surrounding mines in the area for washing and screening.

2.3.1.4 Mine residue

There will be a waste rock dump during operational phase adjacent to the open pit. This WRD operation and backfilling sequence must still be designed. This design will further include the WRD capacity, specifications, characterisation and classification and the development of a code of practice for the WRD management

2.3.1.5 Topsoil and Subsoil Stockpiles

Subsoil and topsoil will be stockpiled separately to be replaced in same sequence during rehabilitation.

2.3.2 Ore processing activities

During mining the carbonaceous waste material (Mine Residue Deposits) such as spoils and waste rock will be stockpiled separately. There will be only one such stockpile originating from seam 1. When commencing with seam 2, this material plus the carbonaceous material from seam 2 will be backfilled into the first void.

The non-carbonaceous material or overburden, which is a sand stone layer and therefore not acid generating or combustible, will be stored next to the active seam and will be placed on top of the carbonaceous backfilled material. Therefore the non-carbonaceous stockpile will be an ongoing temporary stockpile along the advancing mine.

Due to the small size of the project site, Ngululu Resources have decided not to establish a processing plant, but to consult with the surrounding mines in the area to wash and screen the coal. It is not known at this stage where ore processing will take place.

2.3.3 Support services

2.3.3.1 Waste management

There will be no permanent general and hazardous waste disposal facilities. General waste will be stored in a waste container and disposed at a licensed disposal area. Hazardous waste generated by the proposed mine will be collected by a waste contractor and disposed of at appropriately licensed hazardous waste disposal facilities.

2.3.3.2 Water management

A pollution control dam (PCD) will be required, for the collection of runoff water and affected storm water collection. It is envisaged that chemical toilets or a septic tank system will be utilised. Potable water may be transported to the site from outside sources, but could also be obtained from a borehole to be located on site. Potable water tanks will be located on the site. No process water will be required.

2.3.3.2.1 Groundwater management

Pit dewatering

The most significant source of water in the pit will be rainwater that accrues from both direct rainfall on the pit area and surface runoff via haul roads and other access ramps. Other water accumulation will be from groundwater seepage. Water gathering in the open pit will be pumped to the proposed pollution control dam.

A section 21(j) water use license will be lodged with the Department of Water Affairs for the dewatering of the pit.

2.3.3.2.2 Surface water management

Potable water

Potable water will be obtained from the municipality.

Domestic wastewater

It is envisaged that chemical toilets or a septic tank system will be utilised.

2.3.3.2.3 Storm water management

Storm water management measures will be constructed to separate clean and affected water. Areas of focus will include the open pit, the stockpile areas and vehicle maintenance areas.

2.3.3.2.4 Pollution control dam

A pollution control dam shall be constructed to contain runoff water from affected areas. Information on the design and specifications of the pollution control dam has not yet been finalised.

2.3.3.3 Energy supply

Electricity at the proposed mine will be supplied by Eskom

2.3.3.4 Chemical and hazardous substances facilities

A bulk diesel and fuel storage facility shall be erected

2.3.3.5 Maintenance facilities

Workshops shall be erected for maintenance of vehicles and machineries

2.3.3.6 Mobile administration and other buildings

Buildings at the proposed mine shall include mobile:

- Administration buildings;
- Security offices for access control; and
- Change houses.

2.4. Plan showing the location and aerial extent of the aforesaid main mining actions, activities, or processes as required to calculate the financial provision in accordance with the Department's published guideline

Refer to the Mine layout Plan (Figure 25).

2.5. Listed activities (in terms of the National Environmental Management Act [NEMA] EIA regulations) which will be occurring within the proposed project

In terms of the National Environmental Management Act 1998, as amended, and the Government Notice R543 published in Government Gazette 33306 of 18 June 2010, for the following listed activities R544, R545 and R546, and Section 21 of the National Water Act, 1998 (Act 36 of 1998) published in the Government Gazette No. 20119 on 4 June 1999 under Government Notice GN 704, an Environmental Impact Assessment is triggered. Refer to Table 25 below for the listed activities.

Table 25: Proposed listed activities

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice) :	Listed activity as per the detailed project description
No. R, 544 18 June 2010	9	**Project Description** Construction of return water pipelines delivering return water from the affected areas to the return water dam with a combined throughput of more than 120ℓ per second. **Listed activity** The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water - (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more, excluding where: a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or b. where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.
No. R, 544 18 June 2010	11	**Project Description** Construction of a return water dam within 32metres of a watercourse (Wetland). **Listed activity** The construction of: (i) dams where such construction occurs within a watercourse or within 32 meters of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.
No. R, 544 18	12	**Project Description**

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice) :	Listed activity as per the detailed project description
June 2010		Storage of clean water on site for potable use. **Listed activity** The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic meters or more, unless such storage falls within the ambit of activity 19 of Notice 545 of 2010.
No. R, 544 18 June 2010	13	**Project Description** Construction of diesel storage facility with the capacity above 80 but less than 500 cubic metres **Listed activity** The construction of facilities or infrastructure for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 cubic metres;
No. R, 544 18 June 2010	22	**Project Description** Construction of haul and internal access roads. **Listed activity** The construction of a road, outside urban areas, (i) with a reserve wider than 13,5 meters or, (ii) where no reserve exists where the road is wider than 8 metres, or (iii) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010.
No. R, 545 18 June 2010	5	**Project Description** The mine will require a water use license as the following water use activities will be triggered: • Section 21 (a) for the extraction of water from boreholes (groundwater will be abstracted for use on the mine), • Section 21 (b) for storage of water on site (Storage of clean water on site), • Section 21 (c) impeding or diverting flow of water in a watercourse (impeding or diverting the flow of water in wetland) • Section 21 (i) altering the bed, banks, course or

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice) :	Listed activity as per the detailed project description
		characteristics of a watercourse (altering the bed, banks course or characteristics of a wetland) • Section 21 (g) disposing of waste in a manner which may detrimentally impact on a water resource (deposition of waste rock on a waste rock dump); • Section 21 (j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people (dewatering of the pit for safe mining). **Listed activity** The construction of facilities for any process or activity which requires a permit or license in terms of national or provincial legislation governing the release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the Act will apply.
No. R, 545 18 June 2010	15	**Project Description** Disturbance of more than 20 hectares of land for the establishment of a coal mine and associated infrastructure. **Listed activity** Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for: (i) linear development activities; or (ii) agriculture or afforestation where activity 16 in this Schedule will apply.
No. R, 546 18 June 2010	14	**Project Description** The clearance of an area of 5 hectares or more for the establishment of a coal mine and associated infrastructure. **Listed activity** The clearance of an area of 5 hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for: (1) purposes of agriculture or afforestation inside areas

Number and date of the relevant notice:	Activity No (s) (in terms of the relevant notice) :	Listed activity as per the detailed project description
		identified in spatial instruments adopted by the competent authority for agriculture or afforestation purposes, (2) the undertaking of a process or activity included in the list of waste management activates published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the activity is regarded to be excluded from this list, (3) the undertaking of a linear activity falling below the thresholds in Notice 544 of 2010.

Note: An application for Environmental Authorisation (to MDEDET) is being undertaken for the above mentioned listed activities.

2.6. Indication of the phases (construction, operational, decommissioning) and estimated time frames in relation to the implementation of these actions, activities or processes and infrastructure.

The whole of portion 26 will be exploited through an opencast boxcut to gain access to the seams. The first 6 (six) months are allocated for site clearance and topsoil and subsoil removal and storage which leaves the rest of the year for product removal thus only resulting in 600 000tons of the planned 1 200 000tons production for the year. Refer to Table 26 below for a production forecast

It is estimated that in year 4 seam 4 will be mined out and the preparation to open up seam 2 needs to commence. A decline in production will be experience in year 18 – 20 due to the final reserves being mined and preparation for rehabilitation to commence.

Table 26: Production forecast for each year over the full period applied for based on the above explanations. (Not Life of Mine calculation).

Year	Production	Description
1	600 000 tpa	The production tonnage is lower due to the construction and implementation phase.
2	1 200 000 tpa	This is part of the production build-up period on an average of 100 000 tons per month
3	1 200 000 tpa	This is part of the production build-up period on an average of 100 000 tons per month.
4	413 923 tpa	The production tonnage is lower due to the final reserves of seam 4 and the opening up of seam 2.

Year	Production	Description
5	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 13 years.
6	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 12 years
7	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 11 years.
8	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 10 years.
9	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 9 years
10	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 8 years.
11	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 7 years
12	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 6 years.
13	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 5 years.
14	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 4 years
15	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 3 years
16	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 2 years.
17	3 000 000 tpa	Full production of seam 2 will commence and continue to deliver 3 000 000 tons for the next 1 year.
18	1 500 000 tpa	The production tonnage is lower due to the final reserves of seam 2 and preparation for final mining void.
19	1 000 000 tpa	The production tonnage is lower due to the final reserves of seam 2 and preparation for final mining void.
20	500 000 tpa	Final product removal and preparation for rehabilitation

3. The Potential Impacts

3.1. List of the potential impacts, on environmental aspects separately in respect of each of the aforesaid main mining actions, activities, and processes

Refer to sub-section 7 of this Section 1 (EIA) for a complete list of impacts associated with the proposed activities (i.e. the proposed pit and associated infrastructure) during the Construction, Operational and Decommissioning Phase.

3.2. List of all potential cumulative environmental impacts

Cumulative impacts result from other impacts of other past, present or future developments. It reflects how the impacts of one project may affect and be affected by other projects and can be seen as the sum of the proposed action plus past and present activity in the same area (DEAT, 2006).

The proposed site is surrounded by various mining activities, built-up areas. In order to affectively address the impacts of the Mine, the cumulative impacts of the area must be evaluated. Table 27 gives a detailed description of cumulative impacts that were identified.

Table 27: Potential cumulative environmental impacts

ENVIRONMENTAL COMPONENT	GENERAL DESCRIPTION OF EXISTING CUMULATIVE IMPACTS	CONTRIBUTION OF MINE TO CUMULATIVE IMPACTS
Geology	The Springs Vischkuil Coalfield, located mostly within the Mpumalanga Highveld region between Delmas and Springs in Gauteng, generally contains seams of coal most of which is of good quality suitable as a feed stock for domestic power generation as well as low volatile pseudo anthracite. As such, coal is extracted from numerous mines located near the Delmas area. Due to the existing surrounding coal mining operations (Exxaro's Leeuwpan Mine and Stuart Colliery, etc) in the surrounding area, the geological strata in the region will be permanently altered.	The contribution of the mine to this cumulative impact will increase progressively as mining advances
Geology and Socio-economic conditions	The extraction of coal from the Springs Vischkuil Coalfield and close by Witbank Coal Field has occurred over a period spanning more than a century, and modern day opencast mining techniques enable coal extraction to be maximised. This has led to the systematic depletion of the coal reserves in the region, increasing significantly in the last several decades due to improvements in mining technology. Since coal is a fossil fuel it is a non-renewable resource, and as the remaining coal reserves decrease, the value of the coal will increase because of supply and demand principles. This will lead to an increase in income generation and positive contributions to the regional socio-economic conditions during the Operational Phase of the mine, but will ultimately result in the complete exhaustion of the coal reserves, leaving no coal for future generations.	The contribution of the mine to the exhaustion of coal reserves will increase progressively as mining advances

ENVIRONMENTAL COMPONENT	GENERAL DESCRIPTION OF EXISTING CUMULATIVE IMPACTS	CONTRIBUTION OF MINE TO CUMULATIVE IMPACTS
Topography, Land-use and visual aspects	The mine is located in a region where opencast coal mining is common place. The large number of opencast coal mines in the region, together with the historical nature of the mining in the Witbank region (over 100 years of mining history) will most likely have desensitised local residents and frequent travellers through the area. On the contrary, the visibility of the mining areas from the surrounding areas could be of interest to passersby, especially since coal mining is an important part of Mpumalanga's history, and visits to coal mines are even cited as being of interest to tourists.	Visual impacts of the opencast mining at the mine would result from the removal of vegetation and the underlying geological layers to expose carbonaceous material and coal, stockpiling of soil and spoils, changes in topography and the general sense of place associated with the pre-mining landscape. In addition, much of the proposed surface infrastructure at mine shall result in topographical elevations within the surface land use area, thereby altering the visual 'sense of place' from that associated with the pre-mining agricultural land use. In situ rehabilitation of mine residue facilities and the continued utilisation of some water management infrastructure mean that the resultant permanent change in topography will also result in permanent changes to the visual aspects of the study area. Should groundwater management investigations reveal that the use of final voids may be required as part of the long-term water management strategy, the depressions in topography will impact on visual aspects of the study area, depending on the location of the viewpoint.

ENVIRONMENTAL COMPONENT	GENERAL DESCRIPTION OF EXISTING CUMULATIVE IMPACTS	CONTRIBUTION OF MINE TO CUMULATIVE IMPACTS
Topography, surface water and groundwater	Large sections of the Mpumalanga area affected by shallow undermining, which has had a significant impact on the environment, resulting in sinkhole formation, subsidence and seepage of water from underground workings (ELM IDP, 2009-2010), amongst others.	Restoration and improvement of the topography at the mine will have consequent impacts on surface water, visual aspects, and safety of future land users, amongst others. Overburden and mine residue used to backfill opencast voids will be highly fractured, in most cases leading to bulking. Furthermore, backfilled areas would be porous and subject to settling, leading to possible localised subsidence and cracking, if not appropriately managed.
Soil, Land capability and socio-economic conditions	Agriculture is one of the largest economic sectors in Mpumalanga, producing 15% of total output in South Africa (South Africa Yearbook, 2001/02). The numbers of opencast mines in Mpumalanga, particularly large operations, have led to a significant loss of high agricultural potential soils that would otherwise continue to be capable of supporting crop cultivation. Loss of high potential agricultural land due to opencast mining activities in the area will reduce the food production capability of the region.	The contribution of the mine to this cumulative impact will increase progressively as mining advances.
Soil, Land capability, Biodiversity and sensitive landscapes	Large areas of the surface have been affected by agriculture and opencast mining, which has led to loss of soil structure and function, modification of wetlands in the catchment area and ultimately to loss of biodiversity due to the transformation and fragmentation of natural habitats and ecosystems. In addition, the due to mining and agricultural activities.	The contribution of the mine to this cumulative impact will increase progressively as mining advances.
land use and socio economic conditions	Mining is an important sector in Mpumalanga providing jobs and contributing to over one fifth of Mpumalanga's Gross Geographic Product (Mpumalanga SoE, 2003).	The temporary change in land use to mining will result in a much higher income per hectare of land over the short-term in comparison with agriculture.

ENVIRONMENTAL COMPONENT	GENERAL DESCRIPTION OF EXISTING CUMULATIVE IMPACTS	CONTRIBUTION OF MINE TO CUMULATIVE IMPACTS
Biodiversity-Alien species	Invading alien plants are the single biggest threat to plant and animal biodiversity through the effects of predation, alteration of habitat or disruption of ecosystem process and services. Invading alien plants have become established in over 10 million hectares of land in South Africa. If left uncontrolled, the problem will double within 15 years. Invading alien plants waste 7% of our water resources, reduce farming productivity, intensity flooding and fires, cause erosion, degrade river systems, increase rate of siltation of dams and estuaries, reduce water quality and can cause extinction of indigenous plants and animals (Mpumalanga SoE, 2003).	Alien and invasive species tend to establish in disturbed surface areas at at the mine, which will be abundant during opencast mining. Unless appropriately managed, it is likely that alien and invasive species will encroach into natural vegetation areas, and especially into areas that are newly disturbed or rehabilitated.
Biodiversity declining species	Numerous species in Mpumalanga face the risk of extinction due to factors such as habitat loss, environmental degradation and fragmentation of landscapes (Mpumalanga SoE, 2003).	The 'Declining" *Crinum bulbispermum*, and the *Kniphofia typhoides* classified as a near threatened species, occur within the mine boundary area. The impacts of mining, will severely affect the habitat of these plants, and may lead to the decline and/or loss of these species. Furthermore, the increase in human presence on site will contribute to the migration of animal species but the lack of suitable habitat in the surrounding areas may further contribute to loss of animal life.

ENVIRONMENTAL COMPONENT	GENERAL DESCRIPTION OF EXISTING CUMULATIVE IMPACTS	CONTRIBUTION OF MINE TO CUMULATIVE IMPACTS
Surface water	The bulk (65%) of water resources available in Mpumalanga comes from surface water resources, water transfers into the province provide 19% of total water availability, groundwater contributes 6% of available water and return flows from mining, industrial, irrigation and urban sectors contribute 10%. Water use in South Africa is dominated by irrigation and Mpumalanga province is no exception with 46% of its water being used for irrigation. The second largest requirement for water is for water transfers to neighbouring catchments and Water Management Areas(WMAs) which accounts for 16% of water use in the province, while water use in the urban sector is slightly less (8%) and requirements for the industrial, forestry and mining sectors each account for 9% of the provinces water use (Mpumalanga SoE, 2003). Water quality indicators have shown a general decrease in water quality over time. Median levels of surface water nutrients have increased and indicate a potential for enrichment. The consequences of these elevated levels are: • A greater potential for algal blooms; • An impact on riverine ecosystems; and • Impairment of human health. High (and increasing) total dissolved solids (TDS) levels in the Olifants Water Management Area (WMA) have the potential for decreasing the aesthetic value of the water. Exceedance of the guideline levels for certain metals in the Olifants WMA may be attributed to the numerous industrial and mining activities taking place in that area. At the WMA scale, high exceedances above water quality guideline levels exist for pH levels in the province.	The containment of contaminated water in pollution control facilities at proposed mine will lead to a decrease in the MAR available to the affected catchments. These applies to both the Operational and Post Closure Phases for containment and decant management respectively. If contaminated surface water (including decanting acid mine water) is discharged, or allowed to flow, to the receiving environment, the water quality in the receiving environment would further deteriorate. Downstream users and aquatic habitats would be negatively affected by such discharge, and the wetlands in downstream receiving areas would also be negatively impacted.

ENVIRONMENTAL COMPONENT	GENERAL DESCRIPTION OF EXISTING CUMULATIVE IMPACTS	CONTRIBUTION OF MINE TO CUMULATIVE IMPACTS
Groundwater	Groundwater contributes 6% of available water in Mpumalanga (Mpumalanga SoE, 2003). Groundwater is used for irrigation and domestic consumption in the surrounding agricultural region. Groundwater levels are drawn down at all operational mines in the region, leading to an overall impact on groundwater levels but have also lead to a complicated flow of groundwater between mines.	The extent and quality of pollution plumes emanating from mining areas will affect the overall groundwater quality in the area. This could impact on the water users in the area. Development of draw down cones during the Operational Phase will occur due to the dewatering of mining operations. This will affect the regional groundwater level during the Operational Phase, but once dewatering ceased, groundwater levels are expected to recover.
Air quality	Air quality is an issue of concern in Mpumalanga, as it is in many other parts of South Africa. A wide variety of air pollution exist in Mpumalanga, ranging from veld fires to industrial processes, agriculture, mining activities, power generation, paper and pulp processing, vehicle use and domestic use of fossil fuels (Mpumalanga Province, 2002).	Dust generated by drilling and blasting activities as well as the transport of coal along gravel roads will cause an increase in the fugitive dust in the area. Emission of carbon dioxide in exhaust fumes and smoke is generally of little consequence in isolation, but contributes to the regional air quality problems in Mpumalanga, and also to the larger, global issue of climate change.
Noise	Main source of noise in the area is from the road traffic and the train passing on scheduled times.	Noise impacts on nearby residential locations. Noise generated by the proposed mine shall be related to blasting and use of equipment and vehicles. However, noise is directional, and dissipates with distance. The spatial distribution of mines and related operations in the region reduces noise impacts inherently. However, when the noise is generated near residential areas, the location of the I&APs within the noise transmission paths together with the actual generation of noise cumulatively increases the significance of the impact.
Visual aspects	The area within which the proposed activity is to be undertaken is relatively rural, with associated gravel roads. Dust is generated from mining operations and transportation	The occurrence of the proposed mining activity and the introduction of heavy hauling trucks will contribute to the cumulative effect of dust in the area.

ENVIRONMENTAL COMPONENT	GENERAL DESCRIPTION OF EXISTING CUMULATIVE IMPACTS	CONTRIBUTION OF MINE TO CUMULATIVE IMPACTS
	The area within which the proposed activity is to be undertaken is relatively low lit.	The occurrence of the proposed mining activity will contribute to the cumulative lighting effect of the area.
IAPs	I&APs are generally affected indirectly by direct impacts of mining and related activities on environmental aspects. The location of I&APs in relation to the mining and related activities strongly influences the severity of the impacts.	Impacts on air quality, noise, vibrations, surface water, groundwater and visual impacts will cumulatively impact on I&APs.
Socio-economic	Mine closure will raise unemployment levels in the region, and would increase significantly as more mines close down.	All positive impacts of the mine on the socio-economy that will have taken place during the Operational Phase will wane during the Decommissioning Phase until they cease, mainly due to the reduction or cessation of jobs and the cessation of demand for goods and services. Rehabilitation of the surface to support 90% of the pre-mining land capability means that future land use of the site will be sustainable over the long-term. Use of the land for agricultural purposes such as crop cultivation or grazing will enable the contribution of future land users to the local and regional socio-economy through food production and agricultural job creation.

3.3 Residual impacts on environment

Residual impacts are defined as those environmental impacts that remain subsequent to closure All management actions are launched to limit the potential for residual environmental impacts. Various actions such as rehabilitation of the areas, assessing appropriate land uses and identifying practical closure objectives all work towards minimising this risk. The real risk will only be determined once a Rehabilitation Plan has been developed. In the mean-time the actions as stipulated in this EMP all work towards minimising the potential environmental impacts after Closure and hence should reduce the latent impacts.

Geology and the mineral resource

The extraction of material from the pit shall adversely affect the geology. The impact on the geology (mineral wise) will be permanent. Considering that coal seams will be removed, it is expected that a depression will be formed by the excavation activities. This area will, however, be made free-draining to ensure that no ponding takes place. The shaping and levelling of the areas will ensure that the area blends with the natural slope of the surrounding areas. The physical change due to the construction of the mine infrastructure shall, at closure shall be removed where it is reasonably feasible.

Land capability, surrounding land use and landscape character

The land capability where the open cast pit is situated as well as the waste rock dump will not be returned to the pre-mining land use.

Topography

The physical change due to the construction of the mine infrastructure shall, at closure shall be removed where it is reasonably feasible.

Animal Life

It is unlikely that animal populations will be affected to any degree by residual impacts after closure. Once mining has ceased the animals shall return to the mining area. Security fences shall be removed at the end of the mines life.

Visual

All infrastructures shall be removed during decommissioning. The final void shall remain. The potential impacts associated with the visual issues and change in topography shall be addressed as part of the implementation of closure objectives and mitigation measures to minimise the impacts. Visual impacts shall be present after closure. These impacts shall be minimised as far as practical by means of effective rehabilitation practices.

Vegetation

Except to the extent that there have been permanent changes to land capability and use patterns changes to pre-mining land vegetation brought about during the operational phase of the proposed mine shall, as far as reasonably feasible to do so, be permanently rehabilitated and re-established to its original estate.

Regional Socio-Economic structure

The socio-economic structure will change as Ngululu Resources will no longer be a source of employment, revenue or generate development of associated supply and service businesses. Thus the residual impact after Closure will be negative if measures as required by the Social and Labour Plan (SLP) are not properly implemented.

Noise

Considering that mining operations will cease, no noise impacts are expected after closure.

Air Quality

Subsequent to effective rehabilitation of mining areas, no source of air pollution i.e. dumps, roads, un-rehabilitated areas are expected. Considering the management measures identified with regards to rehabilitation and closure it is foreseen that the potential impact of these sources on air quality shall be negligible.

Sites of Archaeological and Cultural Interest

There will be no residual impacts on archaeology.

Soils

Roll-over mining will ensure timeous re-placement of soil to closely match the original soil structure. By adding fertiliser to topsoil, re-use of the soil for agricultural purposes will result in reaching the closure objective.

Sensitive Landscapes

Due to mining activities in the sensitive areas, it is envisaged that there will be residual impacts on sensitive landscapes.

Water resources

Surface elevations indicate two possible decant zones along contours on site thus appropriate mitigation measures will have to be put in place to reduce the risk of Acid Mine Drainage (AMD) generation. If the backfilled material is sulphide containing, these outflows will most likely be contaminated with mainly SO_4^{-2} and selected metals, and could also be acidic depending on the neutralisation potential of the material and reactivity of the sulphides. Acid Rock Drainage (ARD) could impact on the water quality while potentially negatively impacting on receiving water users and the wetland area downgradient and to the east of the proposed pit area. A high risk is associated with

the leaching of ARD in the long term with costly methodology for cleaning. Decanting will most probably occur after closure when the pit has been backfilled and recharged to water level equilibrium. The time to decant will depend on certain factors such as effective porosity, transmissivities and recharge volumes as discussed above. During the backfilling process material is placed back into the opencast pits in such a manner as to return the pit areas to their original pre-mining hydraulic state. Despite all the measures taken, the backfilled opencast pits will have higher transmissivities than the surrounding environment due to the irregular sizes and shapes of the backfill material. The backfilled pit areas will therefore act as preferred flow paths for groundwater.

The groundwater will return to pre-mining levels, or even above pre-mining levels in the lower sections of the backfilled cuts. This is due to the very high hydraulic conductivity of the backfilled material in comparison to the undisturbed bedrock material that will tend to flatten the water level in the opencast. Should the water level in the lower sections rise above the surface level, decanting will result at the lowest topographical point. Furthermore, normal groundwater flow from the backfilled opencast to the seasonal/intermittent stream/wetland will resume. If the backfilled material is sulphide containing, these outflows will most likely be contaminated with mainly SO_4^{-2} and selected metals, and could also be acidic depending on the neutralisation potential of the material and reactivity of the sulphides.

No receptor boreholes are situated in a downgradient direction from the proposed open pit. The main concern post closure would be decant into the wetland/drainage system to the east when water has filled the pit and hydraulic heads have returned to normal (pre-mining levels). This natural drainage system feeds the Aston Lake to the south-west which is used for recreational activities such as fishing. The Aston Lake in turn feeds the Blesbokspruit which is classified as a RAMSAR protected site.

High recharge values are associated with the backfilled areas and high hydraulic conductivity values can be expected from the compressed spoils and waste rock. Recharge is usually higher in the backfilled mine voids compared to the pre-mining aquifer and after filling up, the discharge is usually higher than before the disruption by mining. The effective recharge is especially higher for opencast mining and can be as much as 5 to 15 times the natural recharge without the effect of mining. With the proposed open cast mining activities at Droogefontein portion 26, the recharge pattern will thus be changed dramatically. Due to the irregular sizes and shapes of the backfilling material the effective porosity of the rehabilitated opencast pit may vary between 20% and 30%.

Any user of a groundwater or surface water resource that is affected by drawdown of the groundwater level or pollution from any of the above mentioned sources is defined as a receptor.
The following receptors may be found:

- Groundwater users by means of borehole abstraction.
- '*Dwars in die Wegvlei*' wetland system (Present Ecological Status = C).

- Water courses: water users, fauna and flora.
- Privately owned boreholes DN21 and DN25.
- Aston Lake.

The main water uses in the vicinity of the mine are domestic and agricultural, while the nearby *'Dwars-in-die-Wegvlei'* is a sensitive water course, classified as a Type C wetland (Limosella Consulting, September 2013). The wetland/stream is likely to be a gaining and losing stream depending on the season. A lowering of the groundwater level could result in a total local reduction of inflow to the wetland impacting its functionality. Furthermore, contaminated surface and groundwater is likely to impact on the *'Dwars-in-die-Wegvlei'* water quality. If the stream is gaining after mine closure then potential pollution (ARD) emanating from the mine activities may impact on its integrity and quality. During wet seasons surface water from the stream flows towards the Aston Lake which is used for recreational activities. If substandard quality decants into the drainage line, which is generally expected from coal mines, the dam may be at risk of water quality deterioration

3.4 State specifically whether or not there is a risk of acid mine drainage or potential groundwater contamination associated with the mineral to be mined

Acid base accounting showed that a strong possibility exist for ARD development in the Droogefontein open pit area from the overburden and coal seams. During the construction and operational phases of mining, the impact on pit and the return water dam quality is believed to be moderate/negligible given the short residence time and contact with carbonaceous material of water in the pit. If the pollution control dam/s is unlined contamination of the upper weathered or perched aquifer may occur but migration thereof will be limited given the hydraulic conductivities of the Karoo type aquifer.

The operational open cast mine will represent a groundwater sink and therefore it is not possible that lateral migration of the contaminated water will occur from the operational open cast mines. The movement of ground water during the operational phase will always be towards the open cast mines. Post mining, the groundwater will return to pre-mining levels, or even above pre-mining levels in the lower sections of the opencast. This is due to the very high hydraulic conductivity & preferential groundwater flow paths of the backfilled material in comparison to the undisturbed bedrock material that will tend to flatten the water level in the opencast. Should the water level in the lower sections rise above the surface level, decanting will result at the lowest topographical point. Furthermore, normal groundwater flow from the backfilled opencast to the seasonal/intermittent stream/wetland will resume. ABA analyses of overburden and coal revealed a strong possibility of ARD development consequent to oxidation and hydration. In time acidifying minerals may exhaust neutraling minerals in the substrate resulting in the acidification of water. The quality of decant may therefore be acidic and saline with high levels of heavy metals in solution.

The following impacts may be expected:

- Deterioration of groundwater quality within the back-filled opencast mine workings due to ARD reactions.
- Downstream movement of a deeper groundwater pollution plume.
- Opencast pits will decant into the shallow aquifer or onto the surface/wetland area at the lowest surface elevations intersected by the pits.

Decant of backfilled open pits can in most cases not be prevented and the risk of ARD in coal mining operations remain a significant hazard towards the surface and groundwater regimes. The limiting factor controlling ARD is oxidation of sulphidic minerals such as pyrite. Rehabilitation of the opencast pit areas should aim at duplicating the pre-existing *in situ* soil profile and entails tipping of coal spoils and other carbonaceous material in the bottom of mined-out cuts. This will be followed by placement of clayey overburden in a dry state, compacted by frequent traversing of the surface after flattening by graders, and a final cover of topsoil. The low permeability clay layer encapsulates the carbonaceous material placed at the bottom of the mined out cuts. The carbonacsous materials should be placed below the regional groundwater level in order to create a reducing redox environment and eliminate contact with oxygen, thus reducing ARD to a minimum. Although the carbonaceous materials will be submerged, horizontal groundwater seepage of clean water as well as limited infiltration of surface water will occur and some contamination will ensue over the medium and long-term.

Regulation 50 (b)

4 The alternative land use or developments that may be affected

4.1 Concise description of the alternative land use of the area in which the mine is proposed to operate

The area capability of Portion 26 of the farm Droogefontein is classified as high potential farm land. As described in the Agricultural Impact Assessment study, the agricultural potential is high due to an ideal climate, topography and high potential soil.

The level of sophistication in agricultural methods practiced on Portion 26 is high. The soil is well cultivated and well fertilised.

Land in the wider area currently used for agriculture has been rezoned for mining purposes.

4.2 List, description and plan showing the main features and infrastructure related to the alternative land uses or developments

Portion 26 of the farm Droogefontein consists of 135 hectares. The present land use on the Droogefontein site is arable crop production due to the presence of high potential soil. The proposed development area consists of cultivated maize fields, a wetland area and a Pan. This soil potential on the cultivated soil of site has been improved with sophisticated fertilising methods, which is applied every season. The average rainfall on the farm Droogefontein is 800-900mm per year. The current average production according to the owner is detailed in Table 28 below.

Table 28: Arable Crop production

Product	Tons per hectare	Potential yield per crop
Maize	9	673
Beans	3.5	235
Soya	3.5	235

(The above yield is was calculated at a conservative 50% of the actual land size to provide for the unused wetland) The land use of Portion 26 of the farm cannot be seen in isolation, as it is part of a bigger production unit. The area is serviced by farm roads.

Figure 26: Plan showing the main features and infrastructure related to the alternative land uses or developments

5 The Potential Impacts of the Alternative Land Use or Development

5.1 List of the potential impacts of each of the aforesaid main features and infrastructure related to the alternative land use or development and related listed activities

The following land use alternatives have been identified and were investigated and are briefly compared in Table 29 below:

- Utilise the surface area for grazing of livestock.
- Utilise the surface area for crop production.

Table 29 : Comparative assessment of land use alternatives

Environmental component	Grazing	Crop production
Geology	No impact.	No impact.
Topography	No impact.	Topography will be levelled.
Soil	Soils will be eroded.	Soils will be chemically and physically modified.
Land use	Land use will stay agriculture.	Land use will stay agriculture.

Environmental component	Grazing	Crop production
Land capability	Land capability may be lowered if overgrazing occurs.	Land capability may be impacted on if poor farming techniques are employed.
Flora	Natural vegetation will be impacted on if overgrazing occurs.	Natural vegetation will be destroyed in all crop areas.
Fauna	No impact.	Fauna will be impacted on as habitats are destroyed.
Surface water	No impact.	Surface and groundwater may be used for irrigation.
Groundwater	No impact.	Groundwater may be used for irrigation.
Air quality	Dust will be generated if overgrazing occurs.	Dust will be generated after the harvest season.
Noise	No impact.	Noise will be generated during planting and harvesting seasons.
Visual	No impact.	The planting of crops will alter the visual environment.
Sensitive landscapes	Sensitive landscapes will be altered or destroyed if overgrazing occurs.	Sensitive landscapes will be altered or destroyed.
Sites of archaeological and cultural interest	No impact.	No impact.
Socio-economic	No impact.	Some jobs may be created.
Interested and affected parties	No impact.	No impact.

Major impacts associated with each land use alternative have been summarised for comparative purposes. Each proposed land use alternative will impact on the natural environment at the proposed site.

5.2 Description of all potential cumulative impacts of the main features and infrastructure related to the identified alternative land uses or developments

Table 30 : Description of potential cumulative impacts

Environmental component	Grazing	Crop production
Cumulative impacts	Destruction of the natural	Destruction of the natural

Environmental component	Grazing	Crop production
	environment will be compounded if overgrazing takes place.	environment will be compounded if over- fertilisation occurs or poor farming techniques are employed.

Regulation 50 (c)

6 Identification of potential social and cultural impacts

6.1 List of potential impacts of the proposed mining operation on the socio-economic conditions of other parties' land use activities

Refer to sub-section 7.1 of Section 1 (EIA), for a complete list of impacts, on environmental aspects separately in respect each of the aforesaid mining activities, ore processing activities, support services, general activities and mine-wide impacts.

6.2 Description of the cultural aspect that will potentially be affected, and describe the potential impact on such cultural aspect

Refer to sub-section 7.1 of Section 1 (EIA), for a complete list of impacts, on environmental aspects separately in respect each of the aforesaid mining activities, ore processing activities, support services, general activities and mine-wide impacts.

6.3 Description of heritage features and the potential impact on such heritage feature

Refer to sub-section 7.1 of Section 1 (EIA), for a complete list of impacts, on environmental aspects separately in respect each of the aforesaid mining activities, ore processing activities, support services, general activities and mine-wide impacts.

6.4 Quantification of the impact on the socio-economic conditions of directly affected persons, as determined by the findings and recommendations of a specialist report in that regard

6.4.1 The amount of the quantified potential impact on property or infrastructural assets

Negative financial impact could occur in various scenarios. The owner of Portion 26 could suffer significant financial losses due to a loss in productive agricultural land. One of the broiler chicken structures is located directly across the dirt road from Portion 26 where the mining is proposed, and would definitely need to be relocated if the owner wants to continue housing chickens. According to the owner it would costs approximately R30 000 000.00 to construct such an alternative structure, and would therefore have significant financial implications.

6.4.2 State the amount of the quantified potential impact on commercial, economic or business activity which will be impacted upon as a result of the mining activity

According to the SLP, the total costs for social & labour development will be R 757,890,00 up to 2018.

6.4.3 The sum of the amounts, referred to in sub-sections 6.4.1 and 6.4.2 above

According to the Social Labour Plan for Ngululu Resources, the total amount of positive impacts will be R757 890 00. According to the Social Impact Assessment, compiled by H. Bezuidenhout, dated November 2013, the total amount of negative impacts will include the following:

- The broiler chicken structures located directly across the dirt road from Portion 26 would need to be moved if the farmer wants to continue housing chickens. It would costs approximately R30 000 000.00 to construct such a structure elsewhere. In addition, some farm employees will have to be laid off, which in turn would lead to financial losses to these families due to sudden loss of employment.
- There are houses and stores located right across the dirt road from the proposed mining site, housing four farm workers and their families and seven individual farm workers. These people will have to be relocated to elsewhere on the farm, having additional negative financial implications.
- The owners of adjacent land could also suffer potential financial losses due to a possible drop in property values as a result of the presence of the proposed mine. Other financial losses could include damage to structures due to blasting. Being unsure of what the outcome of the application will be may also lead to farmers in the area being hesitant to invest in some agricultural activities that they normally would; this could lead to financial losses.

7 Assessment and evaluation of potential impacts

7.1 List of each potential impact identified in Paragraphs 3 and 6 above

This section is divided into 3 sub-sections. Section 7.1.1 includes all mining activities from construction phase to decommissioning phase. Section 7.1.2 includes support services such as waste, water, storage areas, transport, etc. from construction phase to decommissioning phase. Section 7.1.3 includes all additional, general activities. These activities are therefore not included in the other sections. No ore processing activities will take place; therefore there is no risk register for these activities. A detailed description of monitoring is given in sub-section 15 of section 1 (EIA); a detailed description of environmental emergencies is given in sub-section 7 of section 2 (EMP). Refer to sub-section 7.2 of section 1 (EIA) for the significance rating methodology.

7.1.1 Site preparation activities

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Activity[2]: Planning and design												
Aspect[3]: Potential inadequate planning and design												
Planning	Impacts on the environment that could potentially have been avoided.	3	4	H	To effectively plan and design the proposed mine and associated infrastructure taking the on-site environment into consideration	Site selection for the proposed activities will include consideration of the following: • Sloping / gradient factors. • Contractor requirements and communication. • Design and construction requirements for spillage control, stormwater management and erosion control measures. • Environmental legal requirements. • Water reticulation system (water balance). • Access to and from the proposed site. • The location of nearby drainage systems, watercourses and sensitive landscapes. • The habitats of fauna and flora species. • Protected plant and tree species. • Available water supplies. • Fire protection services and their reaction times. • Security and general service facilities in the area. • Future expansions (if applicable). • General housekeeping practices. • Existing mine procedures, Government Authority requirements and permit conditions. • Possible heritage or archaeological resources on-site. • Soil types and land capability. • Surface water quality (pre-project status) and possible impacts that would result from proposed activities. • The above listed information will be recorded before the construction at the site commences and will be used for future monitoring purposes.	Complete prior to construction phase	Mine engineer Environmental manager Specialists (where required)	2	2	L	Summary of legislation and documentation used. Note a breakdown is given below in risk register. NEMA, NWA, MPRDA, NEMAQA, NEMBA, NHA, All specialist studies
Construction, operational, and decommissioning	The activity is not applicable to the construction, operational, or decommissioning phases											

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Activity[2]: Site preparation and opening of the pit, construction of the weighbridge, PCD, and chemical toilets.												
Aspects[3]: Removal of vegetation, topsoil, and overburden.												
Construction (the activity is not applicable to the operational and decommissioning phases; however, impacts will be ongoing until after rehabilitation and closure)	Loss of **topsoil** resource. Soil compaction and topsoil loss leading to reduced fertility.	5	4	H	To conserve topsoil resources	• The A and B-horizon will be stripped and stockpiled separately. • The A and B-horizon sections will be marked with a signboard. • A topsoil balance and topsoil management plan will be developed.	During construction phase	Environmental manager Mine manager Human resources	3	3	M	• Section 28 NEMA • Section 37, 38, 39 MPRDA • Regulation 70 MPRDR i.t.o MPRDA • Agricultural impact assessment report
	Soil erosion due to bare areas. The intensity of erosion is increased by rainfall, (which is high in the Delmas region at approximately 750mm per year) and heavy winds.	3	3	M	To prevent soil loss and erosion	• Site clearance and alteration activities will be planned for the dry season • The period of exposure of soil surfaces will be minimised through dedicated planning. • All sloped areas will be terraced or with the necessary stormwater diversion and control berms, to avoid intensified run-off. • Stripping operations will be done when soil moisture content is low, during dry seasons to minimise the risk of compaction. • If dust mitigation measures cannot be applied, working on windy days will be minimised.			2	2	L	• Section 28 NEMA • Section 37, 38, 39 MPRDA • Regulation 70 MPRDR i.t.o MPRDA • Agricultural impact assessment report
	Destruction of moist grassland area and the 'declining' **plant** species (*Crinum bulbispermum*) and possibly *Kniphofia typhoides* (near threatened),	5	4	H	To prevent the loss of vegetation and if not possible minimise the area of disturbance To replant and rehabilitate disturbed land to a similar and sustainable state.	• The amount of vegetation removed will be limited to the least amount possible and any disturbance to the adjoining natural vegetation cover will be avoided. • The presence of *K typhoides* in surrounding wetland areas and portion 26 will be confirmed during its flowering time (likely February) • Where possible, the *Crinum bulbispermum* plants will be conserved in situ and their survival monitored during spring and summer for the duration of the operation and at least 5 years after closure. • Should in situ conservation of the *Crinum bulbispermum* not be possible, a permit will be obtained to relocate the plant. • A 'Plant Rescue and Rehabilitation Plan' will be implemented.			5	3	H	• Section 28 NEMA • Section 37, 38, 39 MPRDA • Vegetation assessment report • Wetland and riparian functional assessment report
	Destruction of the wetland area. "*Dwars-in-die-Wegvlei*" **wetland** is a sensitive watercourse and classified as a Type C wetland.	5	4	H	To prevent damage to wetland, and if not possible to achieve zero loss through rehabilitation of the wetland at end LoM and off-set project	• Construction activities will be restricted to dryer months. • In the event of impact or destruction of the wetland, a wetland management strategy will be developed, submitted and approved by the DWA prior to commencing with such activities. Where wetland impact is unavoidable, the footprint needed will be kept to a minimum. This is subjected to authorisation by means of a WUL.			5	3	H	• Section 28 NEMA • Section 37, 38, 39 MPRDA • Best practise guideline – Wetland offset

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
												• Wetland and riparian functional assessment report
	Clearing of vegetation communities will alter the current dynamics of **fauna** assemblage and result in a loss of habitat or fragmentation of habitat from similar areas	4	3	H	To conserve animals and prevent disturbance of animal habitats.	• It will be endeavoured to avoid areas identified with high/ medium ecological sensitivity. Where areas of high/ medium ecological sensitivity need to be disturbed, the necessary permits and mitigation measures recommended by the wetland and vegetation specialist will be implemented; • Activities will be restricted to daylight hours to prevent any disturbance to fauna in the area; • Artificial lighting will be restricted to areas under construction; • Yellow sodium lights will be used on site as they do not attract as many invertebrates at night and will not disturb the wildlife; • Fencing will be friendly to faunal species allowing for movement between areas. This can be achieved by applying culverts and an open mesh; • As much of the natural vegetation as possible will be left intact in order to maintain ecological corridors for the movement of faunal species. Ecological corridors will include rivers and wetlands and the associated buffers as per the wetland assessment and will remain undisturbed to provide the structural diversity required for safe movement of faunal species and provide migration corridors • Should the faunal species need to be removed from the study area, a faunal capture and relocation plan will be developed and implemented.			3	2	M	• Section 28 NEMA • Section 37, 38, 39 MPRDA • Faunal assessment report
	Destruction of **graves**. There is a graveyard on portion 26 which contains around 80 graves and the remnants of a possible farm worker settlement in the northeast corner of the site.	2	5	H	To prevent to loss of heritage resources.	• The graveyard will be fenced-in, cleaned and managed within the development. • Access will be provided to descendants and family members to visit their grave sites. • A Graves Management Plan will be drafted and implemented.			1	3	L	• Section 28 NHA • Heritage impact assessment report • Social impact assessment
	Construction undertaken with carbonaceous material may be a potential source of poor quality leachate, polluting the **groundwater** aquifer.	2	3	M	To prevent, cease, modify or control any act or process causing pollution. To eliminate any source of pollution;	• No construction of any water management measures, such as the return water/dirty water dam or the haul roads will be undertaken with carbonaceous material.			1	2	L	• Section 28 NEMA • Section 37, 38, 39 MPRDA • Regulation 68 MPRDR i.t.o MPRDA • Section 19 NWA • Geohydrologic

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
												al investigation report
	Change to the pre-mining **land use** and land capability and loss of infrastructure.	4	4	H	Investigate the possible post-mining land use and set objectives for rehabilitation and closure	• Correct rehabilitation will take place to obtain farming as end land use.			4	3	H	• Section 28 NEMA • Section 37, 38, 39 MPRDA • Social impact assessment report
	The change to the pre-mining land use and land capability will further lead to **loss** of **jobs** of the farm workers and likely the **farmers** in the area.	4	4	H	To prevent the loss of jobs and likelihood of community To the meet requirements of SLP	• An agreement for compensation with the farmers and farm workers in the area will be proposed. • Farm workers will be employed as far as is reasonably possible.			3	3	M	• Section 28 NEMA • Constitution of the Republic of South Africa • Section 2(h), 3(3) & 100MPRDA • Social impact assessment report • SLP
• Activity[2]: Site preparation and opening of the pit, construction of the weighbridge, PCD, and chemical toilets.												
• Aspect[3]: Siltation and affected water run-off from construction areas												
Construction (the activity is not applicable to the operational and decommissioning phases; however, impacts will be ongoing until after rehabilitation and closure)	Deterioration of **vegetation** in moist grasslands and **wetland**.	3	4	H	To prevent damage to wetland, and if not possible to achieve zero loss through rehabilitation of the wetland at end LoM and off-set project To prevent the loss of vegetation and if not possible minimise the area of disturbance To replant and rehabilitate disturbed land to a similar and sustainable state.	• No construction activities will take place within the moist soils until a Water Use License is granted by the DWA. • Retain vegetation and soil in position for as long as possible and only remove it immediately ahead of construction / earthworks in that area. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to work areas. • Contain sediment and turbidity at the open cast and work sites by installing diversion or containment structures. • Place and maintain erosion control barriers where appropriate to prevent sedimentation into the watercourse and moist grasslands. • Keep sediment barriers in place until restoration is complete.	During construction phase	• Environmental manager • Mine manager	2	2	L	• Section 28 NEMA • Section 37, 38, 39 MPRDA • Vegetation assessment report • Wetland and riparian functional assessment report • Vegetation assessment report
	Loss of **ecological function** of the watercourse and moist grasslands.	3	4	H					2	2	L	
• Activities[2]: • Site preparation and opening of the pit, construction of the weighbridge, PCD, and chemical toilets. • Deposition of carbonaceous and non-carbonaceous mine residue material in designated areas. Carbonaceous and non-carbonaceous material will be separated. Refer to 'site preparation activities' for the removal of non-carbonaceous material as part of the mine-wide construction activities. Carbonaceous and non-carbonaceous material from the first seam will be placed adjacent to the mining activities. During the opening of the second seam, non-carbonaceous material will be placed adjacent to the second seam and the carbonaceous material will be backfilled into the first seam along with carbonaceous material of the first seam. Non-carbonaceous material of first seam will then be placed onto the backfilled carbonaceous material. These backfilling activities will be ongoing concurrently throughout LoM.											

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
• Aspect[3]: Establishment of alien vegetation.												
Construction (site preparation is not applicable to the operational and decommissioning phases; however, impacts for site preparation and mine residue will be ongoing until after rehabilitation and closure)	Invasive plant might be established. This may lead to: Displacement of indigenous vegetation; Change in plant species composition; Change in vegetation composition and structure; Competition for sunlight and 'living space' will increase between indigenous and alien species; Competition for water and minerals between alien and indigenous vegetation; Change in plant-pollinator composition; Loss of habitat; Change in flammability of existing vegetation structure – pending the introduction of the alien species; The spread of alien vegetation in areas previously free from such species causing a change in biodiversity.	4	2	M	To control and eradicate all listed invasive species by means of methods that are appropriate for the species concerned and the environment in which it occurs.	• Alien invasive species that were identified within the study area will be removed prior to ripening of seeds. By removing these species, the spread of seeds will be prevented into disturbed soils; which could thus have a positive impact on the surrounding natural vegetation. • All alien seedlings and saplings will be removed immediately for the duration of the mine operation and after closure. • Manual / mechanical removal is preferred to chemical control. • An alien invasive eradication plan will be compiled and implemented on site.	Throughout LoM	Environmental manager	3	1	L	• Section 5 & 6 of CARA • Regulation 15 of CARR • Regulation 61 & 62 of MPRDR • Guidelines for the rehabilitation of mined land • Vegetation assessment report • Alien invasive eradication plan
Activity[2]: Topsoil and subsoil temporary storage and stockpiling from the constructed areas.												
Aspect[3]: Incorrect placement of topsoil stockpiles.												
Construction and operational	Erosion of stockpiles leading to reduction of fertility of **soil**.	3	3	M	Establish and implement an effective soil conservation and management plan	• A topsoil management plan will be developed. • Topsoil stockpiles will be placed on a free draining location to limit erosion loss and waterlogging; • Topsoil stockpiles will be vegetated to avoid wind and water erosion loss; • Looseness of topsoil stockpiled soil will be maintained by fertilising and seeding the soil by hand; • Topsoils stockpiles will be monitored for fertility by sampling and testing; • Topsoil and organic surface material such as root mats will be stockpiled separately from overburden and return it to the surface of the restored site where feasible.	During construction and operational phase.	Environmental manager	2	2	L	• Section 28 NEMA • Section 37, 38, 39 MPRDA • Regulation 70 MPRDR i.t.o MPRDA • Agricultural impact assessment report
	Leaching of minerals due to inadequate maintenance of stockpile, resulting in infertile **soils**.	3	3	M					2	2	L	
Decommissioning	Not applicable during decommissioning.											

7.1.2 Mining activities

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Activity[2]: Removal of coal ore resource, and associated rock material. The planned production rate will differ throughout the LoM and will be between 414ktpa to 1.3Mtpa, with an approximate total of 45.4Mt to be removed at the end of LoM.												
Aspect[3]: Removed ore resource, and associated rock material as waste rock or product. This could be increased due to incorrect mining plan or not following the mining plan.												
Operational and decommissioning	The loss of **geology**. Mining will cease during the decommissioning phase, however, the loss of **geology** will be ongoing throughout the decommissioning phase until concurrent backfilling is completed. This activity will not take place during the construction phase.	5	3	H	To prevent unnecessary loss of geology.	• Roll-over mining practices will be applied according to approved mining plan depicting geological features that could affect mining to reduce waste rock. • Concurrent backfilling of open pit will take place. • Refer to backfilling of open pit in rehabilitation section.	During mining activities - operational phase until backfilling of open pit is completed.	Mine manager Environmental manager	5	2	M	• Section 25(c) MPRDA
Activity[2]: Removal of coal ore resource, and associated rock material. Mining within / around wetland.												
Aspect[3]: Total destruction of wetland, altering, diverting or impeding flow.												
Operational and decommissioning	Physical destruction of **wetland** Mining will cease during decommissioning phase, however, the impact will be permanent. The removal of coal will not take place during the construction phase.	5	5	H	To prevent damage to wetland, and if not possible to achieve zero loss through rehabilitation of the wetland at end LoM and off-set project	• It will be endeavoured to avoid mining of the wetland. Where wetland impact is unavoidable, the footprint needed will be kept to a minimum. This is subjected to authorisation by means of a water use license. • Where possible, operations (that is authorised by a water use license) within the wetland will be restricted to the drier winter months. • In the event of impact or destruction of the wetland, a wetland management strategy will be developed, submitted and approved by the Department of Water Affairs prior to commencing with such activities.	During mining activities - operational phase until backfilling of open pit is completed.	Environmental manager	5	5	H	• Best practise guideline – Wetland offset • Wetland and riparian functional assessment report
Activities[2]: 1. Removal of coal ore resource, and associated rock material. The planned production rate will differ throughout the LoM and will be between 414ktpa to 1.3Mtpa, with an approximate total of 45.4Mt to be removed at the end of LoM. 2. Deposition of carbonaceous and non-carbonaceous waste material in designated areas. Carbonaceous and non-carbonaceous material will be separated. Refer to 'site preparation activities' for the removal of non-carbonaceous material as part of the mine-wide construction activities. Carbonaceous and non-carbonaceous material from the first seam will be placed adjacent to the mining activities. During the opening of the second seam, non-carbonaceous material will be placed adjacent to the second seam and the carbonaceous material will be backfilled into the first seam along with carbonaceous material of the first seam. Non-carbonaceous material of first seam will then be placed onto the backfilled carbonaceous material. These backfilling activities will be ongoing concurrently throughout LoM. 3. Deposition of RoM. The RoM will be deposited in the south-western corner of the site. There is no information regarding the size of the RoM stockpile.											
Aspects[3]: 1. Change in topography due to removed ore resource, and associated rock material as mine residue or product. This could be increased due to incorrect mining plan or not following the mining plan. The total removal of ore material will lead to a depression in the topography. 2. Change in topography as a result of the deposition of carbonaceous and non-carbonaceous mine residue. It is unknown at this stage where the carbonaceous and non-carbonaceous waste material will be stored prior to backfilling. 3. Change in topography as a result of the deposition of RoM There are little prominent topographical manifestations in close proximity to the project site. On a local scale, as a result of the undulating nature of the area, a local ridgeline is formed in the centre of the site.											
Construction operational and decommissioning	**Visual** impact due to change in topography from the mine residue. There is no information regarding height specifications of the stockpiles. The proposed infrastructure associated with the mining activities will be visible from the rural settlement of Aston Lake, some 3.3km south-west of the project site as well as Prosperity area. The **visual** impact	4	2	M	To minimise the visual impact of the open pit as far as possible.	• Visual screening berms, other structures, or trees (where possible) will be used in areas where there are sensitive receptors. • The proposed mine will institute a rigorous planting regime along the northern, southern and western boundaries of the project site. • A vegetated berm of 20m in width will be established along the latter boundaries in order to limit direct views onto the project site.	During mining activities - construction phase until backfilling of open pit is completed.	Mine manager Environmental manager	2	2	L	• Guidelines for involving visual and aesthetic specialists in the EIA process • Visual impact assessment report

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	will change during LoM due to change in location of mine residue and will be ongoing throughout the decommissioning phase until concurrent backfilling is completed.											
Construction and operational	**Visual** impact due to change in topography from the RoM There is no information regarding height specifications of the stockpiles. The proposed infrastructure associated with the mining activities will be visible from the rural settlement of Aston Lake, some 3.3km south-west of the project site as well as Prosperity area. **Visual** impact due to change in topography from the RoM will cease in the decommissioning phase.	4	2	M					2	2	L	
Operational and decommissioning	The removal of coal will have a **visual** impact due to depression in topography. Mining will cease during the decommissioning phase, however, the visual impact will be ongoing throughout the decommissioning phase until concurrent backfilling is completed. The removal of coal will not take place during the construction phase.	4	2	M					2	2	L	
Activities[2]: 1. Removal of coal ore resource, and associated rock material. The planned production rate will differ throughout the LoM and will be between 414ktpa to 1.3Mtpa, with an approximate total of 45.4Mt to be removed at the end of LoM. 2. Deposition of carbonaceous and non-carbonaceous waste material in designated areas. Carbonaceous and non-carbonaceous material will be separated. Refer to 'site preparation activities' for the removal of non-carbonaceous material as part of the mine-wide construction activities. Carbonaceous and non-carbonaceous material from the first seam will be placed adjacent to the mining activities. During the opening of the second seam, non-carbonaceous material will be placed adjacent to the second seam and the carbonaceous material will be backfilled into the first seam along with carbonaceous material of the first seam. Non-carbonaceous material of first seam will then be placed onto the backfilled carbonaceous material. These backfilling activities will be ongoing concurrently throughout LoM. 3. Deposition of RoM. The RoM will be deposited in the south-western corner of the site. There is no information regarding the size of the RoM stockpile.											
Aspects[3]: 1. Change in topography due to removed ore resource, and associated rock material as mine residue or product. This could be increased due to incorrect mining plan or not following the mining plan. The total removal of ore material will lead to a depression in the topography. 2. Change in topography as a result of the deposition of carbonaceous and non-carbonaceous waste mine residue. It is unknown at this stage where the carbonaceous and non-carbonaceous waste material will be stored prior to backfilling. 3. Change in topography as a result of the deposition of RoM 4. Inadequate stormwater management systems around the mine residue stockpiles and/or RoM. There are little prominent topographical manifestations in close proximity to the project site. On a local scale, as a result of the undulating nature of the area, a local ridgeline is formed in the centre of the site.											
Operational and decommissioning	The change in topography from removal of coal will results in a change in **surface water** flow patterns and loss of **surface water** to	4	4	H	To minimise the disturbance of the natural flow of watercourse.	• Develop a SWMP for the open pit, mine residue stockpiles and RoM area. • Implement minimum design flood specifications as part of the SWMP.	During mining activities - operational phase until backfilling of open pit is completed.	Mine manager Environmental manager	3	3	M	• Regulation 6 & 7 GN704 i.t.o NWA

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	the open pit. This water will be removed as affected water. Mining will cease during the decommissioning phase, however, the change in **surface water** flow patterns and loss of **surface water** will be ongoing throughout the decommissioning phase until concurrent backfilling is completed. There will potentially also be a permanent void after concurrent backfilling is completed. The removal of coal will not take place during the construction phase.				To minimise impacts on the wetland area.	• Implement the SWMP. • Drains and cut-off trenches as part of the SWMP around the proposed opencast will be implemented before commencing with pit development to prevent clean run-off water from entering the pit. • Closure objectives will include strategies to manage the open void at closure. • Draft a surface water monitoring programme.	Surface water monitoring to be done monthly.					• Section 19 NWA • Section 28 NEMA • Section 37, 38, 39 MPRDA • Regulation 63 & 68 MPRDR i.t.o MPRDA • Wetland and riparian functional assessment report • Hydrological assessment report
	A change in surface water flow patterns from removal of coal may reduce water flow in the "*Dwars-in-die-Wegvlei*" **wetland**, a sensitive water course and classified as a Type C wetland. Mining will cease during the decommissioning phase, however, the change in surface water flow patterns and the impact on the **wetland** will be ongoing throughout the decommissioning phase until concurrent backfilling is completed. There will also be a permanent void after concurrent backfilling is completed.	4	5	H					3	4	H	
Construction, operational	The change in topography from the mine residue will result in a change in **surface water** flow patterns. Mine residue stockpiles will be removed once backfilling is completed.	4	4	H					3	3	M	
	A change in surface water flow patterns from non-carbonaceous mine residue may reduce water flow in the "*Dwars-in-die-Wegvlei*" **wetland**, a sensitive water course and classified as a Type C wetland.	4	5	H					3	4	H	
Operational	Changes in **surface water** flow from RoM will take place in the operational	3	4	H					3	3	M	

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	phase. There will be no RoM during decommissioning phase. The deposition of RoM will not take place during construction phase.											
	Impact on the **wetland** water quantity from RoM will take place in the operational phase	3	5						3	4	H	
	Carbonaceous mine residue will only be stored as part of the operational phase. **Soil** pollution due to run-off from carbonaceous mine residue stockpiles will take place in the operational phase.	4	3	H					3	2	M	
	Surface water pollution due to run-off from non-carbonaceous mine residue stockpiles will take place in the operational phase	4	4	H					3	3	M	
	Pollution of the "*Dwars-in-die-Wegvlei*" **wetland** due to run-off from non-carbonaceous mine residue stockpiles will take place in the operational phase	4	5	H					3	4	H	
Activities[2]: Exposure of underlying geology. Deposition of carbonaceous and non-carbonaceous waste material in designated areas. Carbonaceous and non-carbonaceous material will be separated. Refer to 'site preparation activities' for the removal of non-carbonaceous material as part of the mine-wide construction activities. Carbonaceous and non-carbonaceous material from the first seam will be placed adjacent to the mining activities. During the opening of the second seam, non-carbonaceous material will be placed adjacent to the second seam and the carbonaceous material will be backfilled into the first seam along with carbonaceous material of the first seam. Non-carbonaceous material of first seam will then be placed onto the backfilled carbonaceous material. These backfilling activities will be ongoing concurrently throughout LoM. Deposition of RoM. The RoM will be deposited in the south-western corner of the site. There is no information regarding the size of the RoM stockpile.											
Aspect[3]: Contact of groundwater with underlying geology. Recharge of groundwater due to mine residue. Recharge will be increased along porous groundwater zones due to an increased head of open water collecting the pit. The creation of stockpiles will result in the development of mounding of water within them. This will result in infiltration of mounding water into the phreatic zone. Seepage from RoM stockpile.												
Operational and decommissioning	Exposure of geological strata and reactions resulting in potential impacts on the quality of **groundwater** will be ongoing until backfilling is completed. *In situ* the natural rates of chemical reaction that affect groundwater chemistry are reduced by low flow rates or anoxic conditions. However,	4	4	H	To prevent, cease, modify or control any act or process causing pollution; To remedy the effects of pollution; To eliminate any source of the pollution;	• Dewatering of the pit will take place as soon as water ingression takes place. • Minimise the retention time of infiltrated water in the excavated areas to prevent acidification of large volumes of water in the active cuts. • Minimise surface area where operations would contaminate water (smaller disturbed areas mean smaller manageable volumes). • Continuous rehabilitation will form part of the active mining progress	During mining activities - operational phase until backfilling of open pit is completed. Groundwater quality monitoring to take place on quarterly basis.	Mine manager Environmental manager	3	4	H	• Regulation 6 & 7 GN704 i.t.o NWA • Section 19 NWA • Section 28 NEMA

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	the same rock crushed at the surface to produce fine material with a significantly higher surface area in an oxidising environment can produce poor quality leachates. Ore removal and deposition of carbonaceous mine residue and RoM will not take place during the construction phase.				To contain or prevent the movement of pollutants. To prevent pollution of water used by community. To minimise impacts on the wetland area. To reduce the change in groundwater quality.	which will include backfilling and capping of the backfilled area. • Closure objectives will include strategies to manage the open void at closure. • Substrate will be sealed prior to placement of carbonaceous material adjacent to the seam. • Carbonaceous material will be characterised according to mineralogy and toxicology. This characterisation will be included in the Code of Practice (CoP) of the Mine Residue Deposits. • Sufficient lined storage space will be available in order that no stockpiling of coal will take place on natural soils. • Roll-over practices will be applied, whereby backfilling of mine residue will take place as per rehabilitation plan. • Any remaining RoM stockpiles and mine residues will be removed and backfilled into the pit. • Groundwater quality monitoring will take place within a 1km radius of any mining activities. • Alternative water supply will be provided to external users in the event that their groundwater resources have been detrimentally affected.						• Section 37, 38, 39 MPRDA • Regulation 63, 68, 69 & 73 MPRDR i.t.o MPRDA • Geohydrological investigation report • Groundwater monitoring results • Social impact assessment
	Change in groundwater quality to **community** from exposure of geological strata. The mine voids generally act as groundwater sink areas and a flow gradient is created towards the mine voids – a cone of depression is formed by the mine voids. Groundwater flows towards the mine from all directions and it is highly unlikely that groundwater users around the mine can be affected by poor quality water from the mine itself.	3	4	H					2	3	M	
Operational	**Groundwater** pollution from carbonaceous mine residue stockpiles can migrate downstream if they fall outside the cone of depression of the pit. Not applicable in construction and decommissioning phases.	4	4	H					2	3	M	
	Groundwater pollution from the mine residue stockpiles falling outside of the cone of depression could impact groundwater use to **community**.	3	4	H					2	3	M	
	Groundwater pollution from the mine residue stockpiles falling outside of the cone of depression could impact **land capability** in the form of agriculture.	3	4	H					2	3	M	
	Groundwater pollution from RoM can migrate downstream if they fall outside the cone of depression of the pit.	4	4	H					2	3	M	
	Groundwater pollution from the RoM falling outside of the cone of depression could impact groundwater	3	4	H					2	3	M	

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	use to **community**.											
	Groundwater pollution from the RoM can migrate downstream if they fall outside the cone of depression of the pit and impact **land capability** in the form of agriculture.	3	4	H					2	3	M	
After closure	After closure, the final void will fill with water to equilibrium. Affected water will decant after approximately 50 years. In time acidifying minerals may exhaust neutralising minerals in the substrate resulting in the acidification of water. The quality of decant may therefore be acidic and saline with high levels of heavy metals in solution. This may lead to deterioration of **groundwater** quality.	4	4	H					4	4	H	
	Polluted groundwater form decanting may potentially impact water **users** downwards of the pollution plume.	3	4	H					3	4	H	
	Affected water will decant after approximately 50 years at the lowest point which will be the southern part of the pit, adjacent to the **wetland**, thereby polluting the **wetland**.	3	5	H					3	5	H	
Activities[2]: Drilling of rock for blasting. Blasting activities. Loading, unloading, stockpiling and hauling of overburden and coal ore. Temporarily stockpiling of ore.												
Aspects[3]: 1. Generation of total suspended particulates (dust fall rate) 2. Generation of PM_{10} and $PM_{2.5}$												
Construction, operational and decommissioning	**Air** pollution, dust fall-out nuisance and impact on adjoining **agricultural** areas agric through total suspended particulates.	5	4	H	To reduce dust generation To limit public exposure to unacceptable health risks.	• A feasibility study will be conducted to determine the cost and management implications of dust suppression on the different mine haul roads an open pit operations using water or other chemical suppressants; • An increase in vehicle speed results in an increase in particulate emissions generated. Appropriate speed limits will be set for the mining operation; • Particulate emissions can be reduced by increasing the truck payload, as fewer trips will be required to transport the same amount of material; • The surface of unpaved roads will be properly maintained by grading and	Throughout LoM Continuously monitor PM10 and PM2.5 Monthly monitoring dust fall-out	Environmental manager	5	2	M	• Section 5 & 11 MHSA • Section 28, 32, 33, 63 NEMAQA • Regulation 64 MPRDR i.t.o MPRDA • HPAAQMP • NFAQM
	Health hazard to **community** and **livestock** from PM_{10} and $PM_{2.5}$	4	4	H					4	3	H	
	Impact on wetland vegetation through total suspended particulates. Dust may have physical effects on plants such as blockage and damage to	5	4	H					5	3	H	

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	stomata, shading, abrasion of leaf surface or cuticle, and cumulative effects e.g. drought stress on already stressed species.					shaping for cross sectional trimming; • Wind breaks and establishment of vegetation on overburden stockpiles will be constructed to prevent wind erosion from these areas; • Stockpiling of overburden and coal will take place according to the guidelines for rehabilitation of mined land developed by the Chamber of mines of South Africa/CoalTech; • A fugitive emission monitoring plan which consists of continuous monitoring of ambient PM10 and PM2.5 and dust fall out monitoring of TSP will be implemented. • Monitoring will take place prior to establishment of the mining operations as well as throughout the LoM, to collect baseline information and record any increase as a direct result of the mining operations; • The PM10 and 2.5 monitoring station will also record basic hourly average meteorological measurements of the following parameters: □ Wind direction □ Wind speed □ Temperature □ Rainfall □ Solar radiation/Surface heat flux • Dust deposition will be measured according to the Society for Testing and Materials standard 1739- 98 method recommended in SANS 1929-2004. This involves exposure of a standard bucket for a month, with weighing and chemical analysis of the dust collected. Weighing and chemical analysis is to be done by a suitable offsite or onsite laboratory; and • Dust buckets as well as PM10 and 2.5 monitoring stations will initially be placed as per the Atmospheric Impact Report, based on simulated impacts and prevalent wind fields recorded in the area. The fugitive emission monitoring plan and subsequent placement of dust buckets and PM10 and 2.5 monitoring stations should be revised after the first monitoring year. • Background ambient air quality will be requested from the South African Air Quality Information System (SAAQIS) to be used in the revision of the fugitive emission monitoring plan as well as the determination of the mining operations cumulative impact contribution to the Highveld Airshed Priority area. • The authorities will be informed if the incidence of respiratory disease in the area increases. • Should any out-of-the-ordinary risks to health and safety arise it will be widely communicated to the surrounding community, including employees, farmers and all other stakeholders.						• SANS 1929 • Declaration of the Highveld Priority area • Basic atmospheric impact assessment report • Social impact assessment
Activity[2]: Removal of coal ore resource, and associated rock material. The planned production rate will differ throughout the LoM and will be between 414ktpa to 1.3Mtpa, with an approximate total of 45.4Mt to be removed at the end of LoM.												
Aspect[3]: Pit instability and void												
Construction,	Safety hazard to **community** and	2	5	H	To prevent hazards to	• The pit stability will be monitored.	Throughout LoM	Mine manager	1	5	M	• Regulation 73

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
operational and decommissioning	livestock				community, livestock and damage to infrastructures	• Berms, fencing and signs will be erected around the pit. • additional management measures will be included in the CoP.	Pit stability monitoring will be assessed as p[art of CoP					MPRDR i.t.o MPRDA • Section 5 & 11 of the MHSA
	Damage to **infrastructure**.	2	4	M					1	3	L	
Activities[2]: Dewatering of pit. The rate of dewatering is unknown at this stage. Removal of coal ore resource, and associated rock material. The planned production rate will differ throughout the LoM and will be between 414ktpa to 1.3Mtpa, with an approximate total of 45.4Mt to be removed at the end of LoM.												
Aspects[3]: Removal of groundwater from dewatering. The removal of geology will increase fracturing of the rock material.												
Construction and operational	With the construction of the initial box-cut, dewatering of the **aquifer** will begin to occur, but only within the immediate vicinity of the box-cut. The aquifer structure will be destroyed wherever the box-cut intersects the aquifer. During the operational phase, the mine voids generally act as groundwater sink areas and a flow gradient is created towards the mine voids – a cone of depression is formed by the mine voids. **Groundwater** flows towards the mine from all directions. The aquifer properties allow for formation depression cones that are usually very limited in extent. The main reasons for the limited extent are the low aquifer transmissivity and the limited aquifer thickness. Dewatering and fracturing of rock will cease in the decommissioning phase. Post mining, the groundwater will return to pre-mining levels, or even above pre-mining levels in the lower sections of the opencast. This is due to the very high hydraulic conductivity & preferential groundwater flow paths of the backfilled material in comparison to the undisturbed bedrock material that will tend to flatten the water level in the opencast.	4	3	H	To minimise the impact of groundwater quantity on the environment and users in the area.	• Groundwater pumped from the open pit is deemed affected and will be contained within the PCD. • Water pumped from the mine will be monitored by means of a water balance. • All external users' boreholes within a 2km radius of any mining activities will be monitored for water level response. • Alternative water supply will be provided to external users in the event that their groundwater resources have been detrimentally affected. • If the wetland will be mined, clay soils from wetland area will be stored separately from other topsoils. • During rehabilitation of wetland at end LoM, a clay layer will be reinstated to reduce seepage of water from wetland into the mined-out area and vice versa.	During mining activities - operational phase until backfilling of open pit is completed. Groundwater levels monitoring to take place on monthly basis.	Environmental manager	4	3	H	• Regulation 7 GN704 i.t.o NWA • Section 28 NEMA • Section 37, 38, 39 MPRDA • Regulation 68 MPRDR i.t.o MPRDA • Geohydrological investigation report • Groundwater monitoring results • Social impact assessment
	The fracturing of the rock material will	4	3	H					4	3	H	

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	change the flow characteristics of the **aquifer**. This could result in a decrease in **groundwater** quantity due to the changed flow characteristics of the aquifer.											
	Groundwater users can mostly be affected by groundwater level drawdown due to the formation of the cone of depression. The aquifers affected by the cone of depression will depend on the final depth of the pit. It is expected that the pit will not exceed a depth of 45m which is the depth of the Dwyka tillite. Boreholes drilled through the Dwyka tillite aquifer into the Malmani dolomite should not be affected by the cone of depression even if they are situated within the 1km radius (cone of depression worst case scenario). The effect of dewatering will not have an effect on receptor boreholes (Karoo aquifer) further from 1km from the mine (worst case scenario) and further than 600 m the impact will be negligible. Two boreholes were identified to fit the above-mentioned criteria and include boreholes DN21 (small scale garden irrigation) and DN25 (domestic use).	3	3	M					3	2	M	
	Groundwater drawdown and the associated impact towards the natural surface water drainage and **wetland** is a serious concern. The wetland/stream is likely to be gaining and losing stream depending on the season. A lowering of the groundwater level could result in a local reduction of inflow to the wetland impacting its functionality. The drawdown model indicates that at the time of closure the drawdown in vicinity of the wetland will be approximately 40mbgl. This will be the result of water draining from beneath	4	5	H					4	5	H	

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	the wetland into the areas of lower hydraulic head to the north and northwest.											
Activity[2]: Storage and pumping of affected water in and towards the PCD. The site of the PCD is unknown at this stage. The PCD will only be used during operational phase. It is unknown at this stage whether this dam will be used after closure.												
Aspects[3]: Spillages due to inadequate capacity to contain affected water. Seepage due to incorrect sealing of dam. Spillages from damaged pipelines due to lack of maintenance.												
Operational	**Soil** pollution form affected water.	2	3	M	To prevent, cease, modify or control any act or process causing pollution; To remedy the effects of pollution; To eliminate any source of the pollution; To contain or prevent the movement of pollutants. To prevent pollution of water used by community. To minimise impacts on the wetland area. To reduce the change in groundwater quality.	• Professional input regarding the capacity of the dam will be sought from a hydrologist and an engineer, and used during the construction of the dam. • The dam capacity will allow for normal operation and be maintained with a freeboard of 0.8m plus a 1:100 year rainfall event. • The water balance will be updated to monitor the quantity of water to be pumped to the dam. • The dam will be maintained (reeds removed and de-silted – when and where applicable). • The dam will be sealed adequately during construction. • Care will be taken to ensure that the lining of the dam is not damaged when de-silting takes place. Should this occur, the extent of the damage will be determined and damaged areas will be repaired immediately. • All pipes will be kept in a good condition to prevent leaks. • All leaks will be reported and remediate immediately. • All pipelines that cannot be repaired will be replaced. • All water system will be kept free from any matter or obstruction, which may affect the efficiency thereof. • Flow-meters will be installed, maintained and replaced on and on-going basis to allow for an accurate water balance compilation. • Trenches will be inspected to ensure that it has adequate capacity for water flow.	During mining activities - operational phase until backfilling of open pit is completed. Groundwater quality monitoring to take place on quarterly basis. Surface water quality monitoring to take place on monthly basis.	Mine manager Environmental manager	1	3	L	• Regulation 6 & 7 GN704 i.t.o NWA • Section 19 NWA • Section 28 NEMA • Section 37, 38, 39 MPRDA • Regulation 63, 68, 69 & 73 MPRDR i.t.o MPRDA • Geohydrological investigation report • Groundwater monitoring results
	Pollution of surface water. This can be through direct pollution of surface water during rain events or surface water run-off from polluted soils.	2	3	M					1	3	L	
	Groundwater pollution from seepage of dam. If the dam is unlined contamination of the upper weathered or perched aquifer may occur but migration thereof will be limited given the hydraulic conductivities of the Karoo type aquifer.	2	3	M					1	3	L	
Activity[2]: Deposition of carbonaceous and non-carbonaceous waste material in designated areas. Carbonaceous and non-carbonaceous material will be separated. Refer to 'site preparation activities' for the removal of non-carbonaceous material as part of the mine-wide construction activities. Carbonaceous and non-carbonaceous material from the first seam will be placed adjacent to the mining activities. During the opening of the second seam, non-carbonaceous material will be placed adjacent to the second seam and the carbonaceous material will be backfilled into the first seam along with carbonaceous material of the first seam. Non-carbonaceous material of first seam will then be placed onto the backfilled carbonaceous material. These backfilling activities will be ongoing concurrently throughout LoM.												
Aspect[3]: Foundation and/or slope instability of stockpiles. There is no CoP currently in place to assess the environmental and safety classification of the mine residue deposits												
Construction, operational, and decommissioning	Safety hazard to **community** will be ongoing until backfilling is completed.	2	4	M	To maintain and use the stockpiles so that the water or waste therein, or falling therein, will not result in the failure thereof or impair the stability thereof.	• Compile COP for the mine residue deposits. • Safety aspects will be taken into consideration during the initial stages of material deposition planning. • Regular site inspections will be done in order to verify the correct deposition methods / phases as well as in relation to the approved footprint area. • Strict access control will be implemented in the vicinity of the stockpiles.	During mining activities - construction phase until backfilling of open pit is completed.	Mining engineer	2	3	L	• Regulation 73 MPRDR i.t.o MPRDA • Section 5 & 11 of the MHSA
Activity[2]: Blasting activities. Blasting to access the mineral ore typically involves the use of ammonia-based explosives.												

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Aspect[3]: Blasting residues can be converted into toxic NO_3^- and NH_4^+.												
Construction, and operational	Blasting activities may impact negatively on the **groundwater** quality if significant amounts of explosive are spilled or incompletely detonated. The chemical residues in the form of NO_3^- and NH_4^+.may potentially leach to the groundwater table. There will be no blasting activities during the decommissioning phase.	3	3	M	To prevent, cease, modify or control any act or process causing pollution; To remedy the effects of pollution; To eliminate any source of the pollution; To contain or prevent the movement of pollutants.	• Blasting holes will be charged according to mine standard in accordance with the EA • Train staff and implement correct procedures for the handling of blasting material. • Only qualified staff will handle explosives. • All affected water in open pit will be pumped to the PCD.	During mining activities - construction phase until end of operational phase.	Mining engineer	2	2	L	• Section 28 NEMA • Section 37, 38, 39 MPRDA • Regulation 63, 68 & 73 MPRDR i.t.o MPRDA • Section 19 NWA • Regulation 7 GN 704 (1999) i.t.o NWA • Section 10 EA • Geohydrological investigation report • Groundwater monitoring results
Activity[2]: Blasting activities. Blasting to access the mineral ore typically involves the use of ammonia-based explosives.												
Aspect[3]: Vibrations form blasting activities.												
Construction, and operational	Damage to **infrastructure** in the surrounding area. There will be no blasting activities during the decommissioning phase.	2	4	M	To prevent damage to infrastructure.	• Blasting holes will be charged according to mine standard in accordance with the EA • An assessment of the impacts relating to blasting, vibration and shock management will be conducted during each blast.	During mining activities - construction phase until end of operational phase.	Mining engineer	1	3	L	• Section 28 NEMA • Section 37, 38, 39 MPRDA • Regulation 63, 68 & 73 MPRDR i.t.o MPRDA • Section 19 NWA • Regulation 7 GN 704 (1999) i.t.o NWA • Section 10 EA
Activities[2]: Deposition and temporary storage of carbonaceous mine residue deposits. Deposition and temporary storage of RoM stockpile.												
Aspect[3]: Spontaneous combustion.												
Operational	**Air pollution** due to spontaneous combustion.	3	3	M	To prevent spontaneous	• Mine residue will be backfilled as soon as reasonable possible.	During operational phase.	Mine manager	2	3	L	• Guideline

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	Carbonaceous mine residue deposits RoM will not be stored during construction or decommissioning phase.				combustion.	• Backfilled area will be compacted and covered by material, which does not cause spontaneous combustion. • RoM will not be left longer than the incipient heating period. • The deposition of coarser material at the base and edges of RoM stockpiles will be prevented as this aggravates the possibility of spontaneous combustion. • RoM stockpiles will be sheltered from wind.						document for the implementation of regulations on use of water for mining and related activities aimed at the protection of water resources • Best practice guidelines for surface coal mines in South Africa
	Safety to nearby **community** due to spontaneous combustion.	2	3	L					1	3	L	

7.1.3 Support Services

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Section[1]: General and hazardous non-mining waste												
Activity[2]: Waste sorting. Waste sorting will not take place during the decommissioning phase.												
Aspects[3]: Spillages of hazardous materials mixed with general waste during transportation due to the incorrect separation of non-hazardous and hazardous waste at all sources throughout the mine. Excess waste transported to waste site, due to the incorrect separation of non-hazardous and hazardous waste at all sources throughout the mine. Waste contaminated by hazardous substances disposed at the domestic waste landfill site, due to the incorrect separation of non-hazardous and hazardous waste at all sources throughout the mine.												
Construction and operational	Pollution of **soil**.	3	2	L	To separate waste correctly. To avoid as far as possible the generation and production of waste. Where the generation and production of waste cannot altogether be avoided, to minimise, re-use or recycle.	• A waste inventory will be developed, reflecting all waste streams, general and hazardous, area of generation, temporary storage requirements, classification if hazardous, contractor for removal, and disposal methodology. • An 'at-source' waste separation system will be implemented. • General waste bins will be available in all areas including along walkways, at security, the parking area, offices, workshops, etc. • Hazardous waste bins will be available everywhere where oil / grease / diesel / paint or chemicals are used.	During mining activities. Surface water quality monitoring to take place on monthly basis.	Environmental manager. All employees. Contractors	2	2	L	• Section 16 & 17 NEMWA • Regulation 4 & 5 GN R634 i.t.o NEMWA • Section 20 of ECA • Minimum Requirement
	Pollution of **surface water**. This can be through direct pollution of surface water during rain events or surface water run-off from polluted soils. Surface resources along transportation routes not known at this stage. Domestic waste	3	2	L					2	2	L	

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	landfill site to be used not known at this stage.				When recycling or re-use, to use fewer natural resources than disposal of such waste, and to the extent that it is possible, is less harmful to the environment than the disposal of such waste. To prevent the waste from being used for an unauthorised purpose To dispose waste in a responsible and sustainable manner – environmentally sound manner. To dispose waste, liquid or solid, at an approved demarcated site. To prevent, cease, modify or control any act or process causing pollution; To remedy the effects of pollution; To eliminate any source of the pollution; To contain or prevent the movement of pollutants.	• Bins and skips will be labelled and/ or coloured according to the relevant types of wastes to be disposed of into the bins / skips. • All waste will be removed by a certified contractor to a licensed landfill site. • The hazardous containers will be labelled with the correct name and description of the contents. Labelling of hazardous substances will be done according to the SABS Code 0233. When Hazardous Waste is transported, further labelling of bulk containers and placarding of the vehicle is also required. • Vehicles will be licensed as hazardous transporting vehicles. • Driver will be trained on the hazardous waste transporting, have the correct driver's license and be aware of he / she responsibilities. • The load will be secured when loading. • Every employee will be responsible to put waste into the correct bins. • Environmental awareness training will be continued with through posters, and training. • Surface water monitoring will take place.						s for the handling, classification and storage of hazardous waste – Second Edition • Chapter VIII NRTA GN R225 (2000) i.t.o NRTA • SANS 10231:2006 – Transport of dangerous goods – Operational requirements for road vehicles • SANS 10232–1:2007– Transport of dangerous goods – Emergency Information Systems, Part I: Emergency information system for road transport • Section 28 NEMA • Section 37, 38, 39
	Depletion of **landfill** sites. Landfill site to be used not known at this stage.	3	2	L					2	2	L	
	Potential wastage of **recyclable** material.	3	2	L					2	2	L	

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
												MPRDA • Regulation 63, 68, 69 & 73 MPRDR i.t.o MPRDA • Section 19 NWA • Regulation 7 GN 704 (1999) i.t.o NWA • Wetland and riparian functional assessment report • Hydrological assessment report • Surface water quality results
Activity[2]: Temporary storage of general waste. Waste will not be stored during the decommissioning phase.												
Aspect[3]: Littering by windblown waste due to ineffective or incorrect storage of general waste and/or illegal dumping of waste on mine.												
Construction and operational	**Visual** impact.	2	1	L	To prevent the waste from being used for an unauthorised purpose.	• All waste material will be placed into the correct bins. • These areas will be clearly demarcated and inaccessible to un-authorised persons.	During mining activities. Surface water quality monitoring to take place on monthly basis.	Environmental manager. All employees. Contractors	1	1	L	Section 16 & 17 NEMWA Regulation 4 & 5 GN R634 i.t.o NEMWA Section 20 of ECA Minimum Requirements for the handling, classification and storage of hazardous

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
												waste – Second Edition Section 28 NEMA Regulation 63, 68, 69 & 73 MPRDR i.t.o MPRDA Guidelines for involving visual and aesthetic specialists in the EIA process Visual impact assessment report
Activity[2]: Temporary storage of general and/or hazardous waste. Waste will not be stored during the decommissioning phase.												
Aspect[3]: Fire hazard from stored waste, due to fire accident, inadequate fire fighting equipment, and/or inadequate emergency preparedness and training.												
Construction and operational	**Air** pollution.	2	1	L	To limit public exposure to unacceptable health risks. To identify the relevant hazards and assess the related risks to which the community may be exposed.	• Storage of waste from other process chemicals or products will be separated. • Non-compatible wastes stored together, will be separated. • Fire fighting equipment will be available and maintained on site. • Emergency preparedness and response procedures and codes of practices will be established and implemented. • Regular fire drills will be conducted. • The authorities will be informed if the incidence of respiratory disease in the area increases. • Should any out-of-the-ordinary risks to health and safety arise it will be widely communicated to the surrounding community, including employees, farmers and all other stakeholders.	During mining activities - operational phase	Environmental manager. All employees. Contractors	1	1	L	Section 2 NEMAQA Regulation 64 MPRDR i.t.o MPRDA National Framework for Air Quality Management in South Africa 2007
	Health/safety hazard to nearby residential areas.	2	2	L					1	2	L	
	Damage to **infrastructure** and **agricultural** areas.	2	2						1	2	L	
Activity[2]: Temporary storage of hazardous waste. Waste will not be stored during the decommissioning phase.												
Aspect[3]: Spillages of hazardous substances: due to incorrect handling of hazardous waste while off-loading and storage at non-designated areas and/or incorrect design and inadequate maintenance of the bunded area for hazardous waste.												
Construction and operational	Pollution of **soil**.	3	2	L	To prevent, cease, modify or control any act or process causing pollution; To remedy the effects	• All waste material will be placed into the correct bins • Hazardous waste (including drums containing old oil) will be stored on an impermeable cement slab surrounded by a bund wall and will be covered or placed under a roof (at each temporary waste	During mining activities. Surface water quality monitoring to take place on monthly basis.	Environmental manager. All employees. Contractors	2	2	L	Section 16 & 17 NEMWA Regulation 4 & 5 GN R634 i.t.o NEMWA
	Pollution of **surface water**. This can be through direct pollution of surface water during rain events or surface water run-	3	2	L					2	2	L	

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	off from polluted soils.				of pollution;	storage area) to prevent rainwater from coming into contact with the hazardous waste. • Only closed, marked oil drums containing old oil will be received by the temporary waste storage areas. • Stormwater control / management measures will be established and implemented around the temporary waste areas. • Rainwater from the area surrounding the temporary waste storage areas will be diverted away from the temporary waste areas. • Rainwater falling within the temporary waste storage areas will be contained as process water. • These areas will be clearly demarcated and inaccessible to un-authorised persons. • A weatherproof, durable and clearly legible notice-board in official languages will be placed at the entrance of the temporary waste area with the words “Hazardous Waste: un-authorised entry prohibited” will be erected.						Section 20 of ECA Minimum Requirements for the handling, classification and storage of hazardous waste – Second Edition Section 28 NEMA Section 37, 38, 39 MPRDA Regulation 63, 68, 69 & 73 MPRDR i.t.o MPRDA Section 19 NWA Regulation 7 GN 704 (1999) i.t.o NWA Wetland and riparian functional assessment report Hydrological assessment report Surface water quality results
	Pollution of the natural channel valley-bottom **wetland**.	3	2	L	To eliminate any source of the pollution; To contain or prevent the movement of pollutants.				2	2	L	
Activity[2]: Production of building rubble during decommissioning. Only applicable to the decommissioning phase.												
Aspect[3]: Incorrect disposal of buildings rubble due to inadequate rehabilitation plan and implementation of plan.												
Decommissioning	Depletion of **landfill site**.	3	3	M	To minimise the depletion of landfill sites through correct	• Building rubble will be removed to a licensed waste disposal facility.	During decommissioning phase.	Environmental manager.	2	2	L	Section 16 & 17 NEMWA Regulation 4 & 5

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	Destruction of natural **vegetation**.	3	3	M	decommissioning and rehabilitation.				2	2	L	GN R634 i.t.o NEMWA Section 20 of ECA
Section[1]: Additional (non-mining) water management												
Activity[2]: The use of municipal water for potable water.												
Aspect[3]: Over utilisation of raw water from municipality due to leaking pipes, taps, etc.												
Construction, operational and decommissioning	Depletion of potable **water resource**.	3	3	M	To ensure that the mine's use of water does not impact on the availability of water to lawful water users.	• All pipes will be kept in a good condition to prevent leaks. • All leaks will be reported and remediate as soon as possible. • Employees will be made aware to conserve water as a natural resource.	Throughout the LoM.	Environmental manager All employees	2	2	L	Section 21 NWA
Activity[2]: The use of chemical toilets and cleaning of chemical toilets.												
Aspect[3]: Spillages of affected water during usage and cleaning of chemical toilets.												
Construction, operational and decommissioning	Pollution of **soil**.	3	3	M	To prevent, cease, modify or control any act or process causing pollution; To remedy the effects of pollution; To eliminate any source of the pollution; To contain or prevent the movement of pollutants.	• Sufficient ablution facilities will be provided. • The contractor's camp will be in close proximity to the ablution / toilet facilities. • The mine, as well as the contractor, will ensure that no spillage occurs and that the contents are removed from site according to approved methods.	Throughout the LoM. Surface water quality monitoring to take place on monthly basis.	Environmental manager All employees	2	3	L	Section 28 NEMA Section 37, 38, 39 MPRDA Regulation 63, 68 & 73 MPRDR i.t.o MPRDA Section 19 NWA Regulation 7 GN 704 (1999) i.t.o NWA Wetland and riparian functional assessment report Hydrological assessment report
	Pollution of **surface water**. This can be through direct pollution of surface water during rain events or surface water run-off from polluted soils.	3	3	M					2	3	L	
	Pollution of the natural channel valley-bottom **wetland**.	3	3	M					2	3	L	
Section[1]: Transport and conveyance												
Activity[2]: Driving on roads, this includes all transportation activities on road.												
Aspect[3]: Hydrocarbon leakages or spillages from vehicles due to **i**neffective maintenance of vehicles and machinery.												

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction, operational and decommissioning	Pollution of **soil**.	3	3	M	To prevent, cease, modify or control any act or process causing pollution; To remedy the effects of pollution; To eliminate any source of the pollution; To contain or prevent the movement of pollutants.	A planned maintenance system for vehicles and equipment will the developed and effectively implemented. A spill management procedure for the clean-up of leakages and spillages of hydrocarbons will be developed and effectively implemented. Trucks and equipment will only be washed in dedicated areas and the dirty water is not allowed to discharge into the watercourse or surrounding natural vegetation.	Throughout the LoM. Surface water quality monitoring to take place on monthly basis.	Environmental manager	2	3	L	Section 28 NEMA Section 37, 38, 39 MPRDA Regulation 63, 68 & 73 MPRDR i.t.o MPRDA Section 19 NWA Regulation 7 GN 704 (1999) i.t.o NWA Wetland and riparian functional assessment report Hydrological assessment report Surface water quality results
	Pollution of **surface water**. This can be through direct pollution of surface water during rain events or surface water run-off from polluted soils.	3	3	M					2	3	L	
	Pollution of the natural channel valley-bottom **wetland**.	3	3	M					2	3	L	
Activity[2]: Driving on roads, this includes all transportation activities on road.												
Aspect[3]: Elevated surface water run-off due to inadequate or lack of stormwater control, and linear structures.												
Construction, operational and decommissioning	Increased **surface water** runoff	3	3	M	To protect watercourses and prevent alteration of these habitats directly and indirectly through sedimentation and pollution. To protect soil resources.	The condition of all unpaved roads will be monitored for potential water runoff and erosion on unpaved roads, especially during the rainy season.	Throughout the LoM. Monitoring as necessary.	Environmental manager	2	3	L	Section 28 NEMA Section 37, 38, 39 MPRDA Regulation 70 MPRDR i.t.o MPRDA Agricultural impact assessment report
	Soil erosion due to surface water run-off.	2	3	L					1	2	L	
Activity[2]: Driving on roads, this includes all transportation activities on road.												
Aspect[3]: Emissions from driving on dirt roads.												
Construction,	**Air** pollution	3	3	M	To ensure that the	Service / maintenance data / annual roadworthy inspections of all	Throughout the LoM.	Environmental	2	2	L	Section 2

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
operational and decommissioning					mine remains compliant with air quality legislation.	vehicles will be reflected. Visual inspections on vehicles for black smoke will be undertaken. Vehicles will be prioritised from oldest vehicles to newest. Vehicles will be submitted for vehicle emission testing as per GN R 1651 Contractors undertaking transporting on behalf of the mine will be requested to provide evidence of their vehicle emission levels compliance to the maximum levels set out in GN R1651 or at least proper maintenance on their vehicles.		manager				NEMAQA Regulation 64 MPRDR i.t.o MPRDA
Activity[2]: Driving on roads, this includes all transportation activities on road.												
Aspect[3]: Noise generation. This will increase due to inadequate maintenance of vehicles.												
Construction, operational and decommissioning	Elevated **noise** levels.	4	2	M	To ensure that the mine remains compliant with air quality legislation.	An environmental noise monitoring programme will be implemented. Effective maintenance of vehicles and machinery will take place. Machinery will, where possible, be equipped with silencers. Complaints register will be available for the recording of complaints relating to noise.	Throughout the LoM. Noise monitoring to take place on quarterly basis.	Environmental manager	3	1	L	Regulation 66 MPRDR i.t.o MPRDA Social impact assessment
	Disturbance to nearby **community**.	4	2	M					3	1	L	
	Disturbance of **fauna** assemblages in area.	4	2	M					3	1	L	
Activity[2]: Driving on roads, this includes all transportation activities on road.												
Aspect[3]: Increased traffic on roads due to the use of roads, also used by community.												
Construction, operational and decommissioning	**Safety** hazard to drivers.	3	4	H	To identify the relevant hazards and assess the related risks to which the community may be exposed.	A traffic impact assessment study will be conducted. Recommendations made on the traffic impact assessment will be implemented	Throughout the LoM.	Environmental manager	2	3	M	Regulation 255 i.t.o NRTA
	Damage to **road infrastructure** in the area.	3	3	M					2	2	L	
Activity[2]: Driving in non-designated areas.												
Aspect[3]: Driving in sensitive areas												
Construction, operational and decommissioning	Destruction or damage of **vegetation**	3	4	H	To prevent the destruction or damage of vegetation and wetland area.	A temporary fence or demarcation must be erected around the works area to prevent access to the wetland. Prevent pedestrian and vehicular access into the wetland and buffer areas. Formalise access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas.	Throughout the LoM.	Environmental manager	2	3	M	Section 28 NEMA Wetland and riparian functional assessment report
	Destruction or damage of **wetland**	3	5	H					2	3	M	
Section[1]: Energy supply												
Activity[2]: Electricity supply (mine wide)												
Aspect[3]: Over utilisation of electricity as a result of faulty or old wiring												

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction, operational and decommissioning	Depletion of energy resource.	3	3	M	To prevent over-utilisation of electricity.	All wiring will be regularly inspected and old or faulty wiring will be replaced. Employees will be made aware of energy saving through an environmental awareness campaign.	Throughout the LoM	Maintenance All employees	2	2	L	NEMA
Section[1]: Chemical and hazardous substances and maintenance facilities												
Activity[2]: Storage, handling, transportation, loading and off-loading of hazardous substances (such as chemicals) (mine wide).												
Aspect[3]: Leakages or spillages due to potential incorrect handling, transportation, loading and off-loading of hazardous substances.												
Construction, operational and decommissioning	Pollution of **soil**.	3	2	L	To prevent, cease, modify or control any act or process causing pollution; To remedy the effects of pollution; To eliminate any source of the pollution; To contain or prevent the movement of pollutants.	Off-loading activities of hazardous substances on the mine will be supervised. All supplier details and documentation in terms of Dangerous Goods transportation registrations, emergency cards, spill handling equipment, and vehicle roadworthy and driver competency documentation will be obtained and kept on file at the mine. MSDSs for all hazardous substances used on the mine will be obtained from suppliers and kept on the mine. These will be available to employees on-site. Storage of the hazardous substance will comply with the criteria as set out in the MSDS, which will be displayed at the storage areas. All hazardous substances will be clearly labelled. Notice boards indicating the storage of hazardous chemicals will be placed on storage areas. All new bund walls will have the following specifications: It will be built from reinforced concrete; It will be able to contain at least 110 % the capacity of the fluid that may be spilled; t will be sealed with an impermeable liner; It will have an emergency sump connected to the bunded area, with a lockable stop cock; and An emergency container and pump will be readily available. Spill handling and emergency equipment will be provided on-site in case of spillages or leakages of hazardous substances. In case of spillage the affected area will be cleaned with the appropriate chemicals. The affected water will be disposed of as hazardous waste. The responsible person will check on permeability, cracks and pollution of adjacent areas during monthly inspection of bund walls. All empty hazardous substance containers other than containers that will be returned to the suppliers will be disposed of according to the waste management principles. Drip trays will be readily available and will be used during off-loading	Throughout the LoM. Surface water quality monitoring to take place on monthly basis.	Environmental manager	2	2	L	Section 37, 38, 39 MPRDA Regulation 63 and 68 MPRDR i.t.o MPRDA Section 19 of NWA Regulation 7 GN 704 i.t.o NWA Section 28 of NEMA Regulation 15 GN1048 i.t.o CARA GN 1179 i.t.o OHSA Section 2 & 3 HSA NRTA GN 225 i.t.o NRTA SANS 10231: 2006 Wetland and riparian functional assessment report Hydrological assessment report
	Pollution of **surface water**. This can be through direct pollution of surface water during rain events or surface water run-off from polluted soils.	3	2	L					2	2	L	
	Pollution of the natural channel valley-bottom **wetland**.	3	2	L					2	2	L	

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
						and refuelling activities (to be placed underneath the nozzle position).						Surface water quality results
Activity[2]: Storage, handling, transportation, loading and off-loading of hazardous substances (such as chemicals) (mine wide). Welding and cutting. Not applicable during the decommissioning phase.												
Aspect[3]: Fire hazard due to fire accident, inadequate fire fighting equipment, and/or inadequate emergency preparedness and training.												
Construction and operational	**Air** pollution.	2	1	L	To ensure that the mine remains compliant with air quality legislation. To limit public exposure to unacceptable health risks. To identify the relevant hazards and assess the related risks to which the community may be exposed.	• No smoking or naked flames will be allowed near the storage area. • Only trained persons will use welding, cutting and grinding equipment. • No welding, cutting and grinding will take place in an unventilated area. • Fire fighting equipment will be available and maintained on site. • Emergency preparedness and response procedures and codes of practices will be established and implemented. • Regular fire drills will be conducted. The authorities will be informed if the incidence of respiratory disease in the area increases. • Should any out-of-the-ordinary risks to health and safety arise it will be widely communicated to the surrounding community, including employees, farmers and all other stakeholders.	Throughout the LoM	Environmental manager	1	1	L	Section 2 NEMAQA Regulation 64 MPRDR i.t.o MPRDA
	Health/safety hazard to nearby residential areas.	2	2	L					1	2	L	
	Damage to **infrastructure** and **agricultural** areas.	2	2	L					1	2	L	
Section[1]: Administration and other buildings												
Activity[2]: Paper use and storage												
Aspect[3]: The excessive use of paper for compiling of documents, and the inefficient recycling of the paper.												
Construction, operational and decommissioning	Depletion of **paper resource**.	3	2	L	Establish and implement paper recycling initiatives	The volumes of paper waste will be monitored. Targets will be set for paper recycling. Paper recycling initiatives will be established and implemented.	Throughout the LoM Paper monitoring to take place on monthly basis.	Environmental manager	2	2	L	Section 28 NEMA

7.1.4 Rehabilitation activities

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Activities[2]: Backfilling of seams. Carbonaceous and non-carbonaceous material will be separated. Carbonaceous and non-carbonaceous material from the first seam will be placed adjacent to the mining activities. During the opening of the second seam, non-carbonaceous material will be placed adjacent to the second seam and the carbonaceous material will be backfilled into the first seam along with carbonaceous material of the first seam. Non-carbonaceous material of first seam will then be placed onto the backfilled carbonaceous material. These backfilling activities will be ongoing concurrently throughout LoM.												
Aspect[3]: Seepage of carbonaceous material.												
Decommissioning	**Groundwater** pollution. Decant of backfilled open pits can in most cases not be prevented and the risk of ARD in coal mining operations remain a significant hazard towards the surface and groundwater regimes. The limiting factor controlling ARD is oxidation of sulphidic minerals such as pyrite. Although the carbonaceous materials will be submerged, horizontal groundwater seepage of clean water as well as limited infiltration of surface water will occur and some contamination will ensue over the medium and long-term.	3	5	H	To prevent, cease, modify or control any act or process causing pollution; To remedy the effects of pollution; To eliminate any source of the pollution; To contain or prevent the movement of pollutants.	Ngululu will remove all coal from the opencasts and separate acid and non-acid forming material as identified in this report. Rehabilitation of the opencast pit areas will aim at duplicating the pre-existing in situ soil profile and entails tipping of coal spoils and other carbonaceous material in the bottom of mined-out cuts. This will be followed by placement of clay overburden in a dry state, compacted by frequent traversing of the surface after flattening by graders, and a final cover of topsoil. The low permeability clay layer encapsulates the carbonaceous material placed at the bottom of the mined out cuts. The carbonaceous materials will be placed below the regional groundwater level in order to create a reducing redox environment and eliminate contact with oxygen, thus reducing ARD to a minimum. All opencasts will be backfilled and flooded as soon as possible to limit the ingress of oxygen and oxidising the remaining pyrite or other sulphidic minerals. A post-closure water balance will be developed to determine the risks of decanting, to be developed during the operational phase of the mine and regularly reviewed. A strategy for the collection and treatment of decanting mine water will be developed. This strategy will be submitted to the DWA for approval. Such may include the implementation of low maintenance passive pollution control facilities or artificial wetlands to control or alleviate substandard water quality associated with ARD. Establishment of a network of monitoring boreholes placed in the mining area as well as upslope and downslope is required as part of the monitoring programme that will be reported to DWA and DMR.	During decommissioning phase and after closure.	Qualified consultant. Environmental manager	3	4	H	Section 28 NEMA Section 37, 38, 39 MPRDA Regulation 63, 68 & 73 MPRDR i.t.o MPRDA Section 19 NWA Regulation 7 GN 704 (1999) i.t.o NWA Section 10 EA Geohydrological investigation report Groundwater monitoring results Vegetation assessment Wetland assessment report
	Polluted groundwater could potentially seep to surface and pollute **surface water** courses.	2	5	H					2	4	M	
	Polluted surface could potentially pollute and damage the **wetland** and sensitive **vegetation**.	2	5	H					2	4	M	
	Groundwater flow paths will be disturbed through physical disruption or saturation of backfilled material along path of opencast pit development.	3	5	H	To prevent the disturbance of groundwater flow	There is no mitigation measure.	Not applicable	Not applicable	3	5	H	
Activity[2]: Control of invader plants on area and wetland												
Aspect[3]: Spillages or excessive usage of herbicides												
Decommissioning	Pollution of **soil**.	3	2	L	To prevent, cease, modify or control any act or process	All measures will be taken to ensure operators safety and label recommendations regarding safety are strictly observed. Operators will receives training on the basic pesticide awareness; safe	During invader control	Environmental manager	2	2	L	Section 37, 38, 39 MPRDA Regulation 63 & 68
	Pollution of **surface water**. This can be through direct pollution of	3	2	L					2	2	L	

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
	surface water during rain events or surface water run-off from polluted soils.				causing pollution; To remedy the effects of pollution;	handling of concentrates and spray mixtures, toxicity of the pesticides, PPE and safe disposal; application techniques to prevent waste; and are of equipments – cleaning and disposal of washings						MPRDR i.t.o MPRDA Section 19 NWA
	Pollution of the natural channel valley-bottom **wetland**.	3	2	L	To eliminate any source of the pollution; To contain or prevent the movement of pollutants.	The label will always be read to determine what specific PPE is required for handling and application of a product. The minimum requirement when handling pesticides are adequate eye protection, goggles or a full-face shield; rubber gloves and boots; aprons to protect working clothes; head protection; and respirator or face-mask. Only pesticides with least environmental impact will be used. Precaution will be taken to ensure that these products are safely stored, handled, applied and disposed. During the application, damage to indigenous or other desirable vegetation product will be observed. Care will be taken to prevent contamination of water bodies. Strict precautions will be applied when handling pesticides and the personnel handling the product shall be fully aware of the precautions observed. Absorbent materials will be available during the process to handle accidental spillages. In case of spillage, the spill will be contained immediately with absorbent. The contaminated material will then be disposed of as hazardous waste. Concentrates and mixtures will never be decanted into or be mixed in drinking bottles or other food containers. All containers into which pesticides are decanted will be clearly marked and a copy of the original label secured to the container. Pesticides empty containers will be treated as hazardous waste and correctly and safely disposed. All contaminated material will be placed in a sealable container marked with the following words e.g. “Pesticide/Toxic”. Contaminated soil will be dug up and placed into a suitable container and sealed. The container will be stored in a designated area, along with all other hazardous waste.			2	2	L	Regulation 7 of GN 704 i.t.o NWA Section 28 NEMA Regulation 15 CARR Section 5 CARA Section 3 & 10 FFFARSRA PCOR Guidelines for the rehabilitation of mined land
Activity[2]: Control of red data and indigenous species on area and wetland												
Aspect[3]: Ineffective relocation of indigenous vegetation												
Decommissioning	Lack of indigenous **vegetation** and low **biodiversity**.	3	4	H	To enhance revegetation and biodiversity	The areas will be planted within indigenous vegetation typical of the area. During rehabilitation, colonisation of the disturbed areas by plants species from the surrounding natural vegetation will be monitored to ensure that vegetation cover is sufficient within one growing season. If not, then the areas will be rehabilitated with a grass seed mix containing species that naturally occur within the study area. Monitoring of the rehabilitation success as well as the survival of *Crinum bulbispermum* on the site will take place for at least 5 years and include corrective follow-up action. A Landscape Functional Analysis will form part of the rehabilitation and	During revegetation	Environmental manager	2	4	M	Guidelines for the rehabilitation of mined land Wetland and riparian functional assessment report Faunal assessment report Vegetation

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
						monitoring process. Grazing from livestock will be prevented within the first 2 to 3 years after rehabilitation. Access to rehabilitated areas will be prevented until such time that rehabilitation was successful.						assessment report
Activity[2]: Soil rehabilitation on area and wetland												
Aspect[3]: Inadequate replacement of topsoil												
Decommissioning	Disturbance of the natural balance of the **soil's** physical and chemical characteristics. Soil compaction and topsoil loss leading to reduced fertility.	3	4	H	To adequately replace topsoil	The area will be re-landscaped to resemble the land form prior to the mining activities. The A and B-horizon will be replaced in the same sequence on top of the soft overburden material. The soil fertility status will be determined by soil chemical analysis after levelling (before seeding / re-vegetation) and soil enrichment will be done advised by a soil specialist in order to correct the pH. Topsoil will not be compacted during the rehabilitation process. Sediment barriers will be kept in place until restoration and rehabilitation is complete.	During soil replacement	Environmental manager	2	2	L	Guidelines for the rehabilitation of mined land Vegetation assessment report Agricultural impact assessment report
Activity[2]: Infrastructure rehabilitation												
Aspect[3]: Ineffective removal of infrastructure												
Decommissioning	The inadequate or no dismantling of structures could result in a permanent **visual** impact.	2	2	L	To adequately remove all redundant infrastructure	Infrastructure will either be used or removed during decommissioning. Removal of concrete foundations will be done to 1m below natural ground level Planned demolition of concrete foundations and removal of contaminated soil will take place in a phased and structure manner as to prevent 'cross-contamination' (i.e. contamination of clean areas) Identification of extent of surface contamination (concrete and soil) and demarcation of such will be done.	During infrastructure removal	Environmental manager	1	2	L	Guidelines for the rehabilitation of mined land
	The inadequate or no dismantling of structures could result in safety hazard to **community**.	2	3	L					1	3	L	Social impact assessment

7.1 5 General activities

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Activity[2]: Presence of mining personnel in the area												
Aspects[3]: Use of vegetation as firewood. Hunting, killing or poaching animals.												
Construction, operational and decommissioning	Removal and destruction of **vegetation**	3	3	M	To prevent the loss of vegetation and if not possible minimise the area of disturbance. To conserve animals and prevent disturbance of animal habitats. To maintain the diversity of species.	Mine staff will not be allowed to remove plant species for any activities such as firewood. Mine staff will not be allowed to hunt, trap, kill or disturb any animal species. Killing of animals that are perceived as dangerous, such as snakes, will be discouraged. Staff will be informed of the Animal Protection Act no. 71 of 1962. Staff will be trained on conservation of fauna and flora in the area and informed of any policies or procedures regarding fauna and flora. Cordon off the main mine infrastructures from the surrounding natural vegetation and wetland areas to prevent any disturbances into the surrounding areas.	Throughout the LoM	Environmental manager All employees	**2**	2	L	Section 28 of NEMA Faunal assessment report Vegetation assessment report
	Loss of **animal** life	3	3	M					**2**	2	L	
Activity[2]: Management of contractors												
Aspect[3]: Ineffective or lack of management of contractors working for or on behalf of the mine												
Construction, operational and decommissioning	Potential for contractors to contrive any management measures as per this report, as well as other legislative and company documents and reports. This could result in various impacts on the environment, such as **soil-, surface** and **groundwater** contamination, **air** quality impacts, **noise** impacts, **erosion**, etc.	3	3	M	Ensure the implementation of an effective Contractors Management System	Environmental requirements will be included in contracts and agreements, thereby making contractors aware of the necessity to prevent environmental impacts by implementing of good housekeeping practices, amongst others. All relevant environmental legal responsibilities and correct operational control practices will be directly communicated to all contractors. Compliance will be evaluated to such legal responsibilities and operational control requirements, e.g. through internal audits, legal compliance audits and EMP Performance Assessments. Copies of proof of compliance to legal responsibilities will also be submitted by the contractor to Ngululu Resources.	Throughout the LoM	Human Resources Environmental manager	2	2	L	Contracts and agreements

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
						A change management process will be in place, whereby new activities, including an evaluation of the environmental risks and responsibilities involved will be identified and recorded. The relevant operational control procedures will be in place to ensure that contractors' activities are controlled to prevent or minimise pollution.						
Activity[2]: Generation of employment. South Africa's mining sector largely depends on migrant labour.												
Aspect[3]: Influx of job seekers to the area where the development will take place												
Construction, operational and decommissioning	**Social** impacts, including an increase in crime, overpopulation, additional burden on service delivery requirements, changes in family dynamics, changes in the spread of diseases.	3	2	L	To discourage the increase in social problems in the area. To implement effective social-related projects	Security measures will be implemented to prevent crime, loitering, etc. Initiatives to address the potential social impacts will be developed and implemented. These initiatives will be taken into consideration as part of the mine's SLP Unreasonable expectations with regards to employment opportunities will not be created. A community forum will be established A communication strategy regarding health and safety aspects will be established	Throughout the LoM	Human Resources Mine security	2	2	L	Social impact assessment report Part 2 MPRDR i.t.o MPRDA SLP
Activity[2]: Generation of employment.												
Aspect[3]: Job creation												
Construction, and operational	The mine will create a much larger number of **jobs** during construction and for a period of 20 years during operational phase.	3	3	M+	To meet requirements of SLP	The SLP measures will be implemented. Unreasonable expectations with regards to employment opportunities will not be created.	Throughout the LoM	Human Resources	3	4	H+	Social impact assessment report Part 2 MPRDR i.t.o MPRDA SLP
Decommissioning	The decommissioning and closure of the mine will bring about a reduction in available employment which could increase the unemployment rate of the area.	3	3	M					3	2	L	
Activity[2]: Socio-economic contributions												
Aspect[3]: Positive contribution to the country's economy												

Impact per phase[4]		Risk rating (before mitigation)[5]			Environmental objective[7]	Mitigatory action plan[8]	Timeframe[9]	Responsibility[10]	Risk rating (after mitigation)[5]			Applicable legislation and other documents
		Probability	Magnitude	Severity					Probability	Magnitude	Severity	
Construction, operational and decommissioning	Contribution to the country's economy.	3	3	M+	Not applicable	Stakeholders and affected parties will be kept informed of any developments during all four the project phases.			3	4	H+	Social impact assessment report
Activity[2]: General mining												
Aspect[3]: Change in sense-of-place												
Construction, operational and decommissioning	Negative visual impact and change to the sense of place of residents in the area	3	3	M	Not applicable.	The applicant should be accessible to the public when concerns, complaints or questions arise.			3	2	L	Social impact assessment report

7.2 Concomitant impact rating for each potential impact listed in Paragraph 7.1 above in terms of its nature, extent, duration, probability and significance

The impact rating is described below:

Step 1: Determine the **PROBABILITY** of the impact by calculating the average between the frequency of the aspect and the availability of a pathway to the receptor and the availability of receptor (thus: Sum of the two column ratings below ÷ 3)

FREQUENCY OF ASPECT / UNWANTED EVENT	SCORE	AVAILABILITY OF PATHWAY FROM THE SOURCE TO THE RECEPTOR	SCORE	AVAILABILITY OF RECEPTOR	SCORE
Never known to have happened, but may happen	1	A pathway to allow for the impact to occur is never available	1	The receptor is never available	1
Known to happen in industry	2	A pathway to allow for the impact to occur is almost never available	2	The receptor is almost never available	2
< once a year	3	A pathway to allow for the impact to occur is sometimes available	3	The receptor is sometimes available	3
Once per year to up to once per month	4	A pathway to allow for the impact to occur is almost always available	4	The receptor is almost always available	4
Once a month - Continuous	5	A pathway to allow for the impact to occur is always available	5	The receptor is always available	5

Step 2: Determine the **MAGNITUDE** of the impact by calculating the average of the factors below (thus: Sum of all six column ratings below ÷ 6)

SOURCE								RECEPTOR			
Duration of impact	**Score**	**Extent**	**Score**	**Volume / Quantity / Intensity**	**Score**	**Toxicity / Destruction Effect**	**Score**	**Reversibility**	**Score**	**Sensitivity of environmental component**	**Score**
Lasting days to a month	1	Effect limited to the site.	1	Very small quantities /	1	Non toxic (e.g. water) / Very low	1	Bio-physical and/or social functions and/or processes	1	Current environmental	1

SOURCE								RECEPTOR			
Duration of impact	**Score**	**Extent**	**Score**	**Volume / Quantity / Intensity**	**Score**	**Toxicity / Destruction Effect**	**Score**	**Reversibility**	**Score**	**Sensitivity of environmental component**	**Score**
		(metres);		volumes / intensity (e.g. < 50L or < 1Ha)		potential to create damage or destruction to the environment		will remain unaltered.		component(s) are largely disturbed from the natural state. Receptor of low significance / sensitivity	
Lasting 1 month to 1 year	2	Effect limited to the activity and its immediate surroundings. (tens of metres)	2	Small quantities / volumes / intensity (e.g. 50L to 210L or 1Ha to 5Ha)	2	Slightly toxic / Harmful (e.g. diluted brine) / Low potential to create damage or destruction to the environment	2	Bio-physical and/or social functions and/or processes might be negligibly altered or enhanced / Still reversible	2	Current environmental component(s) are moderately disturbed from the natural state. No environmentally sensitive components.	2
Lasting 1 – 5 years	3	Impacts on extended area beyond site boundary (hundreds of metres)	3	Moderate quantities / volumes / intensity (e.g. > 210 L < 5000L or 5 – 8Ha)	3	Moderately toxic (e.g. slimes) Potential to create damage or destruction to the environment	3	Bio-physical and/or social functions and/or processes might be notably altered or enhanced / Partially reversible	3	Current environmental component(s) are a mix of disturbed and undisturbed areas. Area with some	3

SOURCE								RECEPTOR			
Duration of impact	**Score**	**Extent**	**Score**	**Volume / Quantity / Intensity**	**Score**	**Toxicity / Destruction Effect**	**Score**	**Reversibility**	**Score**	**Sensitivity of environmental component**	**Score**
										environmental sensitivity (scarce / valuable environment etc.).	
Lasting 5 years to Life of Organisation	4	Impact on local scale / adjacent sites (km's)	4	Very large quantities / volumes / intensity (e.g. 5000 L – 10 000L or 8Ha– 12Ha)	4	Toxic (e.g. diesel & Sodium Hydroxide)	4	Bio-physical and/or social functions and/or processes might be considerably altered or enhanced / potentially irreversible	4	Current environmental component(s) are in a natural state. Environmentally sensitive environment / receptor (endangered species / habitats etc.).	4
Beyond life of Organisation / Permanent impacts	5	Extends widely (nationally or globally)	5	Very large quantities / volumes / intensity (e.g. > 10 000 L or > 12Ha)	5	Highly toxic (e.g. arsenic or TCE)	5	Bio-physical and/or social functions and/or processes might be severely/substantially altered or enhanced / Irreversible	5	Current environmental component(s) are in a pristine natural state. Highly Sensitive area (endangered species, wetlands, protected habitats	5

SOURCE								RECEPTOR			
Duration of impact	**Score**	**Extent**	**Score**	**Volume / Quantity / Intensity**	**Score**	**Toxicity / Destruction Effect**	**Score**	**Reversibility**	**Score**	**Sensitivity of environmental component**	**Score**
										etc.)	

Step 3: Determine the **SEVERITY** of the impact by plotting the averages that were obtained above for probability and magnitude in the table below.

ENVIRONMENTAL IMPACT RATING / PRIORITY					
	MAGNITUDE				
PROBABILITY	1 Minor	2 Low	3 Medium	4 High	5 Major
5 Almost Certain	Low	Medium	High	High	High
4 Likely	Low	Medium	High	High	High
3 Possible	Low	Medium	Medium	High	High
2 Unlikely	Low	Low	Medium	Medium	High
1 Rare	Low	Low	Low	Medium	Medium

7.3 Indication of the phases and estimated time frames in relation to the potential impacts rated

Refer to sub-section 7.1 of Section 1 (EIA), for an indication of the phases and estimated time frames in relation to the potential impacts rated.

Regulation 50 (d)

8 Identification of the alternative land uses which will be impacted upon

The land use alternatives have been identified and assessed in Table 29 and Table 30 of sub-section 5 of Section 1 (EIA).

9 Listed results of a specialist comparative land use assessment

The land use alternatives have been identified and assessed in Table 29 and Table 30 of sub-section 5 of Section 1 (EIA).

Regulation 50 (e)

10 List of all the significant impacts as identified in the assessment conducted in terms of Regulation 50 (c)

Refer to sub-section 7.1 of Section 1 (EIA), for a list of all the significant impacts as identified in the assessment.

Regulation 50 (f)

11 Identification of interested and affected parties

11.1 Introduction

The following Public Participation Process was conducted for the proposed mining activities:

- Identification of key Interested and Affected Parties (all adjacent landowners);
- Identification of key stakeholders;
- Informing the key stakeholders of the process by means of correspondence;
- Placement of a press notice in the Streek Nuus, informing the public of the process as well as inviting them to a public meeting;
- Placement of site notices at the site; and
- Correspondence with I&APs and stakeholders and the addressing of their comments.
- A public meeting was held on the 27th of November 2013 at the Delmas Agri lapa.

11.2 Interested and affected parties database

The following Interested and Affected Parties were identified during the Public Participation Process. Reference can be made to Table 31 below for information pertaining to the Interested and Affected Parties.

Table 31: I&AP's Identified during the Public Participation Process

IDENTIFIED INTERESTED AND AFFECTED PARTY	
Andries Grobler	Johan Fourie
Anke Strydom	Johann Minnaar
Anne Theunissen	Karen Ravencroft
Benjamin van Greuning	Karin Peres
Boet Burger	Lena van der Berg
Brent Parret	Linda Prior
Carl Nel	Lizette Spencer
Charles Mtsweni	Louis van greuning
Christo & Jenny Greeff	Lukas Sibanyoni
Corrie van der Riet	M. Kruger
Daniel C.H van Wyk	Martin Koekemoer & W.P Koekemoer
Debbie van den Heever	Maryke Shearer
Deon & Maria Coetzee	Michael Vereker
Dewald Geldenhuys	Mopale nykale
Dewald Swanepoel	O.J. Bezuidenhout
Emmerentia Van Schalkwyk	Ockie Bezuidenhout
Ernest Gauta Mafoho	Ockie Bezuidenhout
Ernie van Greuning	P. Theunissen
Falko	Paul E. Wipplinger (Total Coal SA

France Gross	Paul Fourie
Frederick Zeelie	Paulo Peres
Gary Hockaday	Pieter Prinsloo
Gideon Steenberg	Pieter Senekal
Gunn Ndebele	Pietie Nel
H. Coetzer	Renier de Vries
Hannes Nagel	Riaan Fourie
Hannetjie Engelbrecht	Ronnie Mlambo
Hendrik van der Berg	Rosalie Hutchons
Hennie Nagel	Roy Shearer
Henry & William Vermeulen	Sampie Venter
Henry Greeff	Sizwe Madondo
J.B. Pretorius	Smanga Mashiene
J.G Visser	Sophia Zeelie
J.J Pretorius	T. De Wet
J.L vd Westhuizen	Tanya Greeff
Jaco Labuschagne	Thinus van Dyk
Jakobus van gruening	Tom de Wet
Jan Hattingh	Wickus du Plessis
Jan Steenberg	Willem Labuschagne
Janus Oosthuizen	Willie Maritz
Joe Mathebula	Yolandi Nel

The following stakeholders were identified:

Table 32: Stakeholders identified during the Public Participation Process

Official	Department
A. Tshivhandekano	DMR - Regional Manager)
Alta Fourie	Delmas Farmers Union)
Commissioner for Restitution of Land Rights	Rural Development and Land Reform
Diane Bath	Victor Khanye Local Municipality - Ward Councillor
Emily Thanti Shabangu	Victor Khanye Local Municipality
Jan Steenekamp	Victor Khanye Local Municipality
Jan Venter	Department of Agriculture
Leigh Combrink	EWT
Lillian Siwelane	Department of Water Affairs – Regional
Lydia Bosoga	DAFF Land use and soil management
Mathe Boetie	Nkangala District Municipality
N.L. Sithole	DARDLA
Okwethu-kuhle Fakude	MDEDET
Paul Bartels	WESSA
Phillip Hine	SAHRA

Official	Department
Sam Lekhuleni	Victor Khanye Local Municipality
Valarie Du Plessis	Department of Water Affairs – National
Vuyiswa Q	DAFF Land use and soil management
Xolisile Nkosi	Victor Khanye Local Municipality

12 The details of the engagement process

12.1 Engagement process for the construction of the proposed pit and associated infrastructure

Registered letters were sent by Shangoni Management Services to the I&AP's on 29 October 2013, containing information about the proposed developments, as well as the contact details to obtain more information and provide comments/ concerns. Follow-up was done after the public participation expiry date on the 30th of November 2013 to confirm further comments and concerns from the I&APs.

Refer to Appendix D1 for copies of the notices issued to I&AP's. The background information document (BID) was also sent to I&APs and Stakeholders containing the locality map of the proposed site.

The opportunity for Stakeholders and I&APs to participate in the environmental assessment process, with specific regard to the proposed coal mine was announced as follows:

- Several copies of a background letter describing the proposed coal mine were distributed to stakeholders and I&APs in the area during 29 October 2013 as a first step to announce the opportunity for comment;
- Site notices were place in and around the project site at strategic location to be as visible as possible (refer to Appendix D2);
- A newspaper advertisement was placed in the Streek Nuus News dated "1st November 2013" (refer to Appendix D3);

Comments and responses were received from I&APs prior to the expiring date of the public participation process. None of the registered letters to the I&APs returned undelivered which is confirmation that all identified parties takes notice of the proposed development.

Two public meetings were held at the Delmas Agri Lapa on Wednesday 27 November 2013, from 15h00 to 16h00 and 17h00 to 18h00 respectively to discuss any comments and issues raised by the public, with regard to the proposed mine. The agenda for the meetings was as follows:

- Purpose of the meeting
- Background to the project
- Project description
- NEMA: Environmental Impact Assessment

- MPRDA: Environmental Management Programme
- NWA: Water Use License
- Feedback on specialist studies
- Expected impacts
- Process to be followed going forward
- Closure

13 Details regarding the manner in which the issues raised were addressed

13.1 Issues raised for the proposed coal mine and associated infrastructure by I&APs

The Table 33 below list the comments received from I&AP's and Stakeholders during the Public Participation Process as well responses from Shangoni. Refer also to Appendix D6 for proof of all the comments received.

Table 33: Comments received from I&AP's and Stakeholders during the Public Participation Process

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
A letter dated 29 August 2013 was received from Mr Johann Minnar who represents NAMUTONI BOERDERY (EIENDOMS) BEPERK, represented by Mr. Thinus van Dyk, the registered owner of the following properties: Portions 26, 31 and 39 of the Farm Droogenfontein 242 IR	Refer to Appendix D6 for a letter received from Mr Johann Minnar.	Refer Appendix D6 for a response letter compiled by Ngululu Resources in response to Mr Minnar's letter.
A letter dated 5 November 2013 was received from Mr Johann Minnar	Refer to Appendix D6 for a letter received from Mr Johann Minnar.	Refer to Appendix D6 for a response letter compiled by Ngululu Resources in response to Mr Minnar's letter.
A letter was received fax on the 6th of November 2013 from Ms Karen Janse van Rensburg who is a trustee holder of the portion plot of Ockie Bezuidenhout. Subsequent to the letter an email was received.	Ms Karen Janse van Rensburg requested confirmation that no mining or water and environmental impact assessment will be done on portion 46 and 47 of Droogefontein. Refer to Refer to Appendix D6 for full details of the letter	Refer to Appendix D6 for a response letter compiled by Ngululu Resources in response to Ms Karen Janse van Rensburg's letter.
	Are you an independent company that do the Environmental Impact Assessment for Ngululu Resources Pty Ltd, I want to get an independent company to assess the portion mention in your letter I identify a specialist that will assist us will send you the reports but I need to see your reports as well after your assessment has been completed. Why do you have the meeting in the week and at five for the public due to the fact that people stay in Sundra is still at work I for one will take leave for that day to	Thank you for your email. We are pleased to inform you that you have been registered as an interested and affected party. Shangoni Management Services is an independent environmental, health and safety consulting company, specialising in providing solutions for management systems, legal compliance, risk management and technical health, safety and environmental management challenges.

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
	attend in time but I cannot see why you decide on this time, I want to be included in the register of interested and affected Parties	We are currently in the initial scoping phase of an Environmental Impact Assessment process on portion 26, 46 and 47 of Droogefontein 242IR. We will circulate a draft scoping report for your perusal subsequent to the initial public participation phase. Unfortunately we are unable to change the date and time for the stakeholder/public meeting. We have taken into consideration that most people have commitments during weekends hence we have scheduled to conduct the meeting during the week. As for the time issue, please note that you are welcome to attend either the 3pm or the 5pm meeting.
An email was received on the 5th of November 2013 from Mr Bradley Gibbons	Please can you register me as an interested and affected party for the Ngululu Resources application for a mining right. I am now working in Leigh Combrink's place for the Threatened Grassland Species Programme of the Endangered Wildlife Trust	Thank you for registering as an interested and affected party for the Ngululu Resources application for a mining right.
An email was received on the 5th of November 2013 from Mr Bradley Gibbons.	See attached Letters (Refer to Appendix D6) in reply to your letter to me dated 30 October 2013 on behalf of my client Namutoni Boerdery (Edms) Bpk. Kindly acknowledge receipt thereof.	We hereby acknowledge receipt of your letter.
A telephone call was received from Mr Jan Steenekamp on the 14th of November 2013	Mr Steenekamp requested that he be registered as an interested and affected party.	Please find attached a letter of notification and background information document regarding the

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
		application for a mining right, water use license and environmental authorisation for Ngululu Resources (Pty) Ltd. Please contact the undersigned for any comments or enquiries.
An email was received from Mr Damian Spargo on the 20th of November 2013	Please find attached hereto our registration as an Interested and Affected Party to your application for a Mining Right, Water Use Licence and Environmental Authorization with reference number MP30/5/1/1/2/10076MR and Environmental Impact Assessment ref nr 17/2/3N-312. Please take note of the following comments that have been scripted on your registration form: 1. Issues of concern include: a. Air quality b. Surface water c. Ground water d. Ecology e. Land Use and Planning f. Waste management g. Security h. Nuisance 2. As indicated in the registration document, portion 26, over which you wish to apply for a mining	We hereby acknowledge receipt of your email and the contents thereof. As per your request, we have registered you as an interested and affected party. Please take note that we will be conducting a public meeting on the 27th of November at 15:00 pm and 17:00 pm at the Agri Delmas Lapa. At the public meeting we will be giving feedback on specialist studies conducted to date. These include: • Noise • Fauna and Flora • Wetland deliniation • Geohydrological • Soil Landuse and Landcapability • Heritage • Visual and; • Social The Air quality and Hydrological assessments are underway.

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	right, is contiguous to our prospecting rights, to the northern and eastern side. 3. We note that you are investigating an opencast operation. Due to the fact that we are the landowner of the properties detailed in the registration document, we require further consultation in this regard. Further, it will be necessary for you to consult with the following tenants: a. Mr Van Dyk may be contacted via smboer@mweb.co.za b. Schoeman Boerdery may be contacted via Hanneke@witklip.co.za 4. Please take note that our information shows that your application straddles environmentally sensitive waterways. Please could you provide us with the following: a. Evidence of investigation the potential surface and groundwater impacts on adjoining properties due to your mining activities; b. Evidence of investigation on the potential dust impacts; c. Demonstrate that adequate environmental (water, dust etc.) monitoring points are in or proposed to be in place to help in determining any possible impacts on nearby properties.	As suggested, we will make contact with the suggested interested and affected parties.

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
	PLEASE NOTE THAT THE COMMENTS ABOVE SHOULD BE READ TOGETHER WITH OUR NOTIFICATION AND REGISTRATION AS AN INTERESTED AND AFFECTED PARTY, ATTACHED (Refer to Appendix D6) HERETO. We trust you find the above and attached in order and look forward to your response.	
An email was received from **Ms Rosa Hutchons** on the 30th of November 2013	Attached is our comment form, stating how we will be affected by the proposed mining activities. We only heard of this on Tuesday evening telling us of the meeting, but we could not attend, as we were in the Drakensberg Mountains and we only returned home yesterday. we are therefore grieved that there has not been any consultation with us in this regard. Our postal address is P.O. Box 480 Sundra, 2200. Please reply to this email with further communication and acknowledgement of receipt of complaints/comments.	We hereby acknowledge receipt of your email and the contents thereof. Please note that you have been registered as an interested and affected party. Your comments and concerns shall be addressed as part of the MPRDA EMP.
	Concerned about water pollution with our borehole; air pollution with all the coal dust; earth tremors with blasting can affect built structures; noise pollution and worsened roads will affect our daily lives and also a decrease in property value.	Refer to sub-section 7.1 of Section 1(EIA) for potential environmental impacts as well as proposed mitigation measures. In addition Ngululu Resources has committed to conducting a blasting as well as a traffic impact assessment as part of the EIA phase.
Ms Diane Bath	Requested registration as an interested and affected party	Please find attached a letter of notification and background information document regarding the

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
		application for a mining right, water use license and environmental authorisation for Ngululu Resources (Pty) Ltd. Please contact the undersigned for any comments or enquiries.
Ms Diane Bath	The road specifically where the mine is expected to mine has been upgraded. Please can I get confirmation who is involved in this, whether it is your client or not? Please it is urgent?	We hereby acknowledge receipt of your email and the contents thereof. Our client was not involved in the upgrading of the roads in question. We were under the impression that the municipality was responsible. We would appreciate it if you can find out for us who was involved. Those roads do not even form part of our EIA application. As already mentioned in the meeting on the 27th of November 2013, our client does not plan to undertake any activities without environmental authorisation
An objection letter was received on the 29th of November 2013 from **Okukama Trust (Ms Karen Janse van Rensburg & Mr Ockert Bezuidenhout)** via email (Refer to Appendix D6) for full contents of this letter.	**Water pollution** One of the largest quality problem associated with coal mining is the acid main drainage (AMD) The first being that the pyrite in the rock gives rise to water with a low pH and the acid water or rain mobilizes heavy metals from and to the surrounding environment. Treating the water afterwards with calcium to raise the ph makes	Refer to sub-section 7.1 of Section 1 (EIA) as well as the Geohydrology study (Appendix C5) and the Hydrology study (Appendix C7) for impacts on surface water as well as groundwater quality and quantity.

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
	the water more saline and this is an expensive process which was not discussed or presented at the meeting. The mine activity would result in polluting the ground water of which most of the farm holdings in Sundra and surrounding areas are using for human consumption, domestic use, animal consumption and farm use. Almost all the farms in the immediate surrounding depend on the quality and availability of underground water and if the mine would use underground water as indicated the community and their livestock will be seriously affected.	
	Unexpected construction work Currently there is clearing of roads in the area of Prosperity near portion 26 which was not cleared for the past 10 years. The question arises as who is cleaning the roads currently?	As mentioned during the public meeting, Ngululu Resources was not involved in the upgrading of the roads in the area of Prosperity near portion 26. Those roads do not form part of the EIA application. Ngululu Resources does not plan to undertake any activities without environmental authorisation.
	Impact on agriculture and plants on portion 26/46/47 According to the consultant portion 26 is vegetation sensitive and has a protected plant species e.g. Orange river lily(Crinum bulbispermum) present there and the mine activity will definitely affect the future of this plant life as the ground is not easily permeable	Refer to sub-section 7.1 of Section 1 (EIA) for impacts on agriculture and plants on portion 26. Please note that specialist's studies were conducted on portion 26 as not mining will take place on portion 46 and 47.

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
	end result of polluted water to flow into the wet land. No procedures in place of the mine to protect this sensitive area. The agricultural cultivation will be seriously affected as result of the air- and water pollution. The life on earth exist in different ecosystems, whether on micro or macro scale and any activity causing an imbalance in the system will have repercussion on these systems ensuring life in a town like Sundra. This type of mining activity will result that the agriculture activities of over 100 years in Sundra will die to be a wasteland over the years.	
	Loss of privacy and property value The lost of agricultural landscaping surroundings and ambience Impact on peri-urban environment- character of area by losing the farming environment to commercial mining The private view of surrounded area for farmers in respect of urban landscape being changed. The loss of investment and value of property due to mining activities. Will the farm owners be remunerated for their lost in value of property due to the mining activities?	As proposed by the social Impact assessment specialist, should the mine be approved the owner of the land must be compensated for any expenses due to the relocation of, for example, the broiler chickens, houses and sheds adjacent to the site. It is proposed that, as the owner requested, an agricultural economist be appointed to investigate and calculate possible economic losses and financial damages that could occur.
	Noise and smell pollution- No noise levels were discussed at the public meeting.	Refer to sub-section 7.1 of Section 1 (EIA) for potential noise impacts as well as Appendix C3 for a noise

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
	The consultant could not provide or did not discuss what the impact of the mining would be due to the increase in truck activity and the using of explosives on the humans and animals in the Sundra area. Definitely the mining activities will have a negative effect on the silent farming surroundings. The noise could be to such extent that all wild life will be chased away. Surely the consultant could provide noise statistics of recent mines operating fully and provide such to the meeting. The statistics should indicate where and when noise levels were measured.	impact assessment study.
	Roads and transport No indication was given what would the traffic congestion impact be in Sundra. Will the current roads be able to carry the additional loads or should the current road network be uplifted? What could we expect the increase and effect of traffic volume be? No indication was given what would be the routes use to transport the coal and what impacts will the noise, dust and crime be on the environment of the community.	Ngululu resources has committed to conducting a traffic impact assessment as part of the EIA phase.
	Discharging explosives The discharging of explosives in order to loosen the coal will result in damage of surrounding farm households and the CBD of Sundra resulting of house	Ngululu resources has committed to conducting a blasting study as part of the EIA phase inorder to identify potential impacts resulting from blasting and related activities.

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
	walls cracking and possible collapsing of walls. This may lead to the lost of human life and families losing their homes. The consultant could not provide or indicate what the impact will be on the surrounding buildings. This is a peri -urban area life will be disturbed which will include of the wildlife e.g. Birds and even the animals on the farm might die due to the shocks and noise caused by the explosives. The explosive shock will cause that some of the groundwater channels will collapse or dry out and result that the farmers not having bore water for domestic and farm use	
	All residents of Sundra according to the Human Rights Act, in particular Protocol 1: Article 1: This states that a person has the right to peaceful enjoyment of all their possessions, which includes the home and other land and Article 8 of the Human Rights Act states that a person has the substantive right to respect for their private and family life. In the case of *Britton vs SOS* the courts reappraised the purpose of the law and concluded that the protection of the countryside falls within the interests of Article 8. Private and family life therefore encompasses not only the home but also the surroundings.	Noted

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
	We as the citizens of Sundra has a right to an environment that is not harmful to our health or well being and have the environment protected for the benefit of present and future generations. Citizens to be protected through legislative and other measures to prevent pollution and ecological degradation and use natural resources(Section 24 in the Bill of Rights, The Constitution of the Republic of South Africa,1996). The activities and pollution caused by the mine in this proposal will negatively affect the health and life of the citizens, animal and plants in Sundra. No economical factors or impact on the CBD of Sundra was discussed at the meeting and labour issues could not be answered by Shangoni at the meeting. The crime in Sundra will definitively increase as we know that mining goes hand in hand with cheap labour (illegal immigrants) and illegal liquor activities. The consultant could not indicate how much of the community will be involved in the mining activity and if the community of Sundra would be used in this project. The question also not answered is what will the community from Sundra benefit from this mining?	

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
	Ground pollution The ground stability and drainage will definitely be affected as such. The consultant also indicated the top and bottom seams had abundance sulphur and possible acid forming. The air pollution will cause acid rain and not increase acid deposit in the ground in the direct surroundings, but also surrounding areas. As most of the land is agricultural the pollution will definitely affect the future of the Sundra community	Refer to sub-section 7.1 of Section 1 (EIA) for impacts on the geology. Refer to sub-section 7.1 of Section 1 (EIA) for agricultural impacts as well to the Agricultural Impact Assessment study (Appendix C1).
	Air pollution Currently the Mapumalanga province has been declared an air polluted area and amongst the worst air quality in the world. The possibility of spontaneous combustion has not been addressed. The community still awaits the feedback from the consultants on the air pollution level and the after effects the mine will have on the air pollution. In November 2008 the DEAT declared the Mpumalanga Highveld a “pollution hotspot”. Climate change could also be caused by coal mining and the impact on the agriculture in this area still needs to be explained. If the mining will have a very negative high Key Observation Points surely indicate the high level of air pollution and the effects on the environment of Sundra	Refer to sub-section 7.1 of Section 1 (EIA) as well as the air quality study (Appendix C2) for effects the mine will have on the air pollution.
Paulo José Peres	We stay on portion 238, not far from the proposed site.	Refer to sub-section 7.1 of Section 1 (EIA) for potential

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
	Our concerns include: water, noise and dust.	water, noise and dust related impacts.
Karin Peres	We stay not far from the mentioned project. Concerned about water, roads, as well as bird and animal life.	Refer to sub-section 7.1 of Section 1 (EIA) for potential water impacts Refer to sub-section 7.1 of Section 1 (EIA) for potential impacts on animal life as well as proposed mitigation measures. In addition a faunal assessment is appended (Appendix C4).
Dremar cc	Plant hire, industrial cleaning, civils etc.	Noted
Jan Steenekamp (Victor Khanye Local Municipality)	Rezoning application was not submitted.	A rezoning application has not been submitted yet. It is not part of Shangoni's work". In a public meeting that was held on the 27th of November 2013, Mr Pierre Briel who is a representative of Ngululu Resources stated that the rezoning application will only be considered if the mining license is granted successfully. The reason for this is the high cost involved in the application.
	Withdrawal of water will affect Municipal water resources. Refer to agriculture for comments. Refer to DWAF for comments.	Noted
Karen Janse van Rensburg (Daughter of Ockie Bezuidenhout)	Property was built up for 25 years as a retirement haven. We are concerned about what will happen to the underground water that is currently used to survive and water the plants and animals. We will not have any water on the plot due to underground water being taken by the mine. Will we get municipal water to	Refer to sub-section 7.1 of Section 1 (EIA) for potential impacts on groundwater as well as to the ground water study (Appendix C5).

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
	assist in this matter?	
Mr P.E. Wipplinger	A research geologist at Total Coal SA (Pty) Ltd. Neighbour to the North). Please add Mr. Gunn Ndebele (Chief Geologist) at Total Coal SA (Pty) Ltd.	We hereby acknowledge receipt of your registration form. As per your request, we have registered you as well as Mr Gunn Ndebele as an Interested and Affected Parties.
Oku-kama Family Trust	How is my Property going to be affected, in terms of: 1. The value of my land. Annexure: Environmentalist's comments and concerns: • Rights of ownership in my property. • Mine planning as it affects my property in terms of ownership and occupation rights.	According to the social impact assessment, negative financial could occur in various scenarios. In the first place the owner of Portion 26 could suffer financial losses due to a loss in productive agricultural land. As one of the broiler chicken structures is located directly across the dirt road from Portion 26 where the mining is proposed the facility would definitely need to be moved if it wants to continue housing chickens. According to the owner it costs approximately R30 000 000.00 to construct such a structure. Should he wish to construct a facility elsewhere on his farm to continue farming in the same capacity it would thus have huge financial implications for him. In addition, there are houses and stores located right across the dirt road from the proposed mining site, housing four farm workers and their families and seven individual farm workers. These people will have to be relocated to elsewhere on the farm, having additional financial implications. Should the proposed mining have negative impacts on water in the area this would affect crop growing, leading to even further financial losses for farmers in the area. The owners of adjacent land

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
		could also suffer potential financial losses due to a possible drop in property values as a result of the presence of the proposed mine. Other financial losses could include damage to structures due to blasting. Being unsure of what the outcome of the application will be may also lead to farmers in the area being hesitant to invest in some agricultural activities that they normally would; this could lead to financial losses. No mining is planned on portion 46 and 47.
	Change in land use affecting property, i.e. physical change as well as potential change to quality of life.	As proposed by the social Impact assessment specialist, should the mine be approved the owner of the land must be compensated for any expenses due to the relocation of, for example, the broiler chickens, houses and sheds adjacent to the site. It is proposed that, as the owner requested, an agricultural economist be appointed to investigate and calculate possible economic losses and financial damages that could occur.
	Compensation: Recourse and Procedures.	
	Loss of economic value of my property, i.e. nobody wants a coal mine in the vicinity of his property.	
	Loss of income from my property.	
	Unacceptable biophysical impacts on: ○ Surface water quality, ○ Underground (borehole) water quality) and, ○ The long term effects thereof on the/my environment. ○ Water quality. ○ Coal pollution causing sickness in	Refer to sub-section 7.1 of Section 1 (EIA) for a complete list of potential biophysical impacts as well as proposed mitigation measures.

INTERESTED AND AFFECTED PARTY	IAP COMMENT	SHANGONI RESPONSES
	animals and occupants. ○ Noise and squatter camps.	
	Destruction of natural habitat and existing diversity (biodiversity).	Refer to sub-section 7.1 of Section 1 (EIA) for proposed mitigation measures as well to the Faunal impact assessment report appended (Appendix C4).
	Dust Generation – It is a fact that animals will not eat grass covered with coal dust. Human health will also be affected by dust.	Noted. Refer to sub-section 7.1 of Section 1 (EIA) for potential impacts on air quality as well proposed mitigation measures
	Noise generation from mining activities and equipment.	Refer to sub-section 7.1 of Section 1 (EIA) for potential noise impacts as well as the noise impact assessment report appended (Appendix C3)
	Blasting impacts may cause damage to property.	Ngululu resources has committed to conducting a blasting study as part of the EIA phase inorder to identify potential impacts resulting from blasting and related activities.
	Traffic impacts from on-site and off-site activity.	Ngululu resources has committed to conducting a traffic impact assessment as part of the EIA phase.
	Social Disturbances – Labour force introduced, social ills spilling over into rural community.	Refer to sub-section 7.1 of Section 1 (EIA) for potential social impacts as well as to the social impact assessment study appended (Appendix XXX)
	Accommodation issues – informal settlements will lead to a probable increase in crime.	
	Impact on the broader environment - Sundra will never be that same, benefiting only a selected few.	Noted
Department of Agriculture, Rural Development and land administration.	Acknowledges receipt of application and would like to register as an interested/affected party.	The Department of Agriculture, Rural Development and land administration was registered as an interested and affected party.

Below are the minutes that were recorded during the 15:00 public meeting.

ISSUES RAISED:	RESPONSES:
Ockert Bezuidenhout asked who Shangoni is and who pays Shangoni. The whole community felt that the meeting should be held closer to site next time.	Jan Nel responded that Shangoni is a private, independent consulting company specialising in Environmental services. He also stated that Shangoni was appointed by Restigen, and Restigen was appointed by Ngululu Resources. Noted: This will be considered subject to the availability of suitable meeting places in the vicinity for future meetings.
Ockie Bezuidenhout inquired when Ngululu got the prospecting permits. He stated that he has never heard anything of the mine. Ockie Bezuidenhout asked where the coal will be processed.	Pierre Briel stated that they received it 3 years ago. Jan Nel stated that there will be no Processing Plant on-site and that the client is investigating the use of an existing Plant in the surrounding area.
Ockert Bezuidenhout asked what processes will be used for coal extraction.	Jan Nel replied that blasting and box-cut (opencast mining) will be used.
Smanga Mashiane asked if a transport contractor for the transport of coal to other Plants for washing and sorting has been issued out. He asked to be informed. He also wanted to know what the requirements are.	Jan Nel answered that contractors have not yet been appointed as they are still in the initial processes for applying for the mining right. He also stated that once the mine has a better idea of whether the right might be issued, the rest of the feasibility process will continue. When the client gets to that stage they will inform the community. The project is still in the early processes of applying for the environmental authorisations. No such negotiations have been put into place. If this stage is reached, negotiations will be made known as wide as possible, so that local people can put their potential inputs into the process.
Mopale Ngakale stated that all the other mines have made promises to them and then displaced them once the right was granted. He also asked how this client is any different from the others as mines do not even comply with their own SLP.	Jan Nel stated that Social and Labour Plan (SLP) requirements have become stricter. In the last few years the concerns of the I&AP's have become more important. All I&AP's have a right to notify the Department of Mineral Resources if the mining companies do not comply with the commitments made in the documents compiled and presented during the application.
Mopale Ngakale enquired whether Ngululu has a	Jan Nel responded that both the MWP and SLP

ISSUES RAISED:	RESPONSES:
Mining works programme (MWP) and SLP.	have been submitted to the Department of Minerals Resources (DMR). The client has to consult with the local municipality on the SLP. The DMR is currently reviewing those documents.
Ernest G. Mafoho suggested that we run with the agenda after which people can be given an opportunity to ask questions.	Jan Nel proposed that we should carry on as is (i.e. people asking questions as the presentation progresses), in fear of people forgetting what they wanted to ask.
Martin Koekemoer asked where the water will go once the mine is there. He stated that the blasting will cause sand in front of their back doors. He will be farming with pigs not far from Portion 26. He also raised concerns in the case of blasting with dynamite which may damage property. He wants to know who is going to pay for the damage.	Jan Nel explained that this will be discussed later in the presentation when expected impacts will be discussed related to blasting, the impacts of dust, and impact on the groundwater.
Ockert Bezuidenhout asked if the internal roads still to be constructed will be tarred or gravel. He also asked how the dust will be managed. Ockert Bezuidenhout also enquired why the mine needs a Pollution Control Dam (PCD).	Jan Nel replied that the roads will be gravel. Jan Nel stated that pollution will be addressed later on. Jan Nel replied that the mine will need a PCD for runoff water from dirty water management areas (such as the waste rock dump) which is perceived to be polluted, as well as for water that is dewatered from the open pit.
Ockert Bezuidenhout asked where the workers are going to stay and what type of toilets will be used by the workers. He also enquired if there are any employment benefits for the residents and if there is a certain percentage of the community which is envisaged to form part of this mining project. He proposed that a set percentage of the community is needed. He says that they prefer that a specific number is used.	Jan Nel responded that no workers will stay on site, and that chemical toilets will be used. Pierre Briel (Restigen) stated that the SLP mentions that local workers will be preferred but there is no set percentage.
Ernest G. Mafoho enquired who Ngululu Resources consulted while compiling the Social and Labour Plan. He also asked whether this independent consultant spoke to the community.	Pierre Briel answered that Thomas Du Ridder is the independent person who was appointed to compile the SLP. He should have consulted with the Local Municipality as this is a requirement.

ISSUES RAISED:	RESPONSES:
Ernest G. Mafoho stated that SLP consultants have a tendency of using information pertaining to other municipalities and not consulting them when compiling the SLP.	Jan Nel replied that if the community was not consulted, the people have the right to lodge a complaint with the relevant Department. He also replied that they were supposed to consult with the local municipality.
Mopale Ngakale asked whether it is fair that the water should be polluted for the sake of profit.	Jan Nel responded that different documents must be submitted. Based on the information, the DMR decides if the mining right must be approved. They can also decide not to grant the mining right based on environmental concerns or that the mine is not profitable enough.
Ockert Bezuidenhout asked who is doing the independent investigation. Ockert Bezuidenhout (in reply) asked, "but Shangoni gets paid by Restigen..." He also stated that the government should have appointed someone to come in and investigate the feasibility and that should be billed to whoever want to use the land. Ockert Bezuidenhout said that "to pay somebody to do something for you is subjective".	Pierre Briel stated that Restigen is the middle man between the client (Ngululu Resources) and consultant (Shangoni). This is done to ensure that everything that is done by the appointed Environmental Assessment Practitioner (EAP) stays independent and that the client has no influence over the appointed EAP. Jan Nel replied that Shangoni and Restigen are independent by law, and referred to a number of companies which have not had their mining rights or water use licenses approved over the past 13 years.
Ockert Bezuidenhout asked if the pipelines are part of the infrastructure.	Jan Nel answered that the pipelines are part of water supply to the change house, administrative buildings, and workshops. There will be piping for drinking water over the site (potable water). This is the only water that they will be using.
Smanga Mashiane asked if the building contractors have been appointed to construct the facilities. He also enquired whether this should be advertised to the public	Jan Nel said that it has not been done at this stage – no contractors have been appointed yet. If the mining right is approved and the mining goes ahead they will get contractors for construction. Jan Nel replied that it is a requirement of the SLP that the municipality be consulted.
Ockert Bezuidenhout enquired where the coal will be transported to.	Hennie Du Rand stated that the possibility exists that Eskom will take 90% of the coal, both by rail and road, to be used to generate electricity. Jan Nel replied that it does not form part of the

ISSUES RAISED:	RESPONSES:
Ockert Bezuidenhout asked if the road constructed adjacent to portion 26 is part of Ngululu Resource's mining right application.	mining rights application and that the client is not aware of who constructed this road. It was indicated that the possibility exists that the municipality was busy constructing the road.
Smanga Mashiane – SLP and transport issues	Jan Nel stated that although it forms part of a mining rights application, this is not an environmental issues. The purpose of the meeting is to focus on environment impacts.
Mopale Ngakale stated that mines always say that the coal will be supplied to Eskom, but then all the first grade coal gets exported, while the second grade coal is left in South Africa. The coal is not meant for South Africa. Mopale Ngakale stated that they have proof of two mines exporting coal.	Hennie Du Rand replied that coal in Delmas will not be exported as the coal in the area is not suited for exportation. He also said that there is not one mine in Delmas that is exporting coal. Jan Nel answered that the mining work programme is submitted with the mining right, and that tells the Department that 90% of the coal is going to go to Eskom. The Department audits that, and if it is not the case, the client will be held liable.
Ockert Bezuidenhout asked where the Plant will be situated. Ockert Bezuidenhout also asked whether the coal railway is running past Sundra.	Jan Nel explained that a Plant will not be construct– no washing and crushing will take place on-site (no processing), subsequently there will also be no slimes dams. Hennie Du Rand clarified that Anglo American is situated just across the street from the proposed site. If they do want to wash, they will use Anglo's Plant (dependant off-course on the outcome of ongoing negotiations). He added that the mine will most likely use use Welgedact, and not Sundra for the loading of the coal. At the moment there are 21 lines at Welgedact and 2 at Sundra. Hennie Du Rand confirmed that the railway is running past Sundra.
Ockert Bezuidenhout asked how deep the coal is located from the surface.	Hennie Du Rand replied that it is approximately 45 m deep and the top seam appears about 18 m from surface.
Ockert Bezuidenhout questioned the timeframe, he was concerned that if the community's comments and concerns are received, the timeframe will exceed the 15th of January – "surely 15 January is	Jan Nel answered that the EMP will be submitted to DMR on 15 January 2014. DMR has 120 days to give their decision. I&AP's will have time to submit their concerns and comments to the Department

ISSUES RAISED:	RESPONSES:
not the correct date?". He asked when the comment period will be and where the comments of the Interested and Affected Parties will come in.	even after the submission of the EMP. This document will thus be available for you to scrutinise and give your comments. He added that this is not the cut-off time for your involvement; it is just the cut-off for us to submit the documentation to DMR.
Ockert Bezuidenhout asked what the Mean Annual Precipitation (MAP) is. He replied that it could not be 700mm, as they had a very dry season the last 4 – 5 years Ockert Bezuidenhout stated that the Sundra is drying out and that there is no water and therefore not many dams Ockert Bezuidenhout also asked where they get water from for the mining. Ockert Bezuidenhout enquired whether you can mine without a water license. He also stated that somewhere in Delmas the mining company of started mining where there were still outstanding water licenses.	Ockie Scholtz stated that it is 700 mm. Jan Nel stated if you have rain water, it is going to gather in the pit, and you cannot mine unless the water from the open pit is pumped out (safety issues). Hennie Du Rand replied that the Municipality will be supplying them with water. Hennie Du Rand stated that in terms of the pit water he is referring to, he drilled 28 holes – found no water. That is why the client applied for water from the municipality. Jan Nel replied that you are not supposed to. Hennie Du Rand replied that there are 180 small types of mines for the past 18 months, and that they get mining rights and then they start mining. Some background information on Ngululu: "we have 16 Properties, so we know what is going on in the mining area – also approximately 12 open casts". He added that Ngululu Resources does not operate a mine without the necessary licenses. He added that Ngululu Resources has not started any mining in the Delmas area without a Water Use License as the company does not have another project yet in the Delmas area.
Ockert Bezuidenhout asked what the width of the affected area is.	Hennie Du Rand stated that the width is 1.2 km.
Mopale Ngakale asked whether it is advisable to mine in Delmas since it has been identified as a hot spot for air pollution.	Jan Nel answered that the air quality specialist report will point out those concerns and the Department will make a decision on whether to allow it or not.

ISSUES RAISED:	RESPONSES:
Ockert Bezuidenhout stated that "we will be the leaders in preventing a large mine 10 km from Droogenfontein, because that is our right". "We will use all means possible to benefit the community, the animals, and the surrounding environment." He added that there are long term consequences that he does not see in this presentation.	Jan Nel replied that what happens after the mining operations cease, is a problem for the country because there are numerous derelict mines all over. He further stated that in the documentation that is being compiled mitigation measures from a decommissioning point of view needs to be included.
Mike Vereker raised a concern regarding the value of their property, with the mines in such close proximity.	Jan Nel responded that the social impact assessment addressed some of the issues with regards to the value of the properties. He also emphasised that all of this must be considered before the Department can issue the right. They will not issue the right if they are worried that the mine will devalue your property.
Ernest G. Mafoho asked where the water for the pit will be pumped to. Ockert Bezuidenhout enquired if the dam will be lined. He also further stated that one can't say it evaporates as later on it comes down as acid rain. Ockert Bezuidenhout then asked where the acid rain comes from if not from evaporation from the PCD. He stated that it is particles of pollution that evaporates together with hydrogen.	Jan Nel stated that it will be pumped to the Pollution Control Dam. Jan Nel replied that it will be lined as it is a requirement from the Departments. Ockie Scholtz replied that only the water evaporates, the pollutants stay behind. Salt and heavy metals cannot evaporate. Ockie Scholtz answered that acid rain will form from emissions from for example stacks. Jan Nel also stated that it is not necessarily the case; it can also be from emissions from vehicles.
Ockert Bezuidenhout stated that never have they been supplied with the facts of the water, soil, noise, etc. You only mention the headings here, but you do not explain what you are actually saying.	Jan Nel replied that the facts are part of the presentation, and that he will discuss the conclusion on each of the specialist studies later on.
As mentioned on Page 2 of these minutes, the 15:00 meeting was adjourned and combined with the 17:00 meeting. Refer also to minutes of the 17:00 meeting held.	

Below are the minutes that were recorded during the 17:00 public meeting.

ISSUES RAISED:	RESPONSES:
Jacobus van Greenen asked why the letter from Shangoni said that there was a chance to comment up to the 30 November 2013.	Jan Nel replied that there are 3 different processes which will be discussed later. Each process has its own timeline. The law provides these timelines in which the client and Environmental Assessment Practitioner (EAP) must hand in documentation from. You still have time to raise your concerns over a

ISSUES RAISED:	RESPONSES:
	longer period.
Jan Hattingh stated that it was said that nothing is moving on until the study is over - he wanted to know why they are already building a road. Hennie Nagel commented that the roads are not being worked on by the municipality. Pop van Schalkwyk seconded that they are busy building a large gravel road. Jan Hattingh stated that "it does not help that all of us are sitting here while the decisions have already been made".	Jan Nel said that he has no knowledge of this. As far as he knows, the municipality was busy upgrading the roads. Jan Nel answered that it is not part of the client's documentation or permit applications. Hennie Du Rand stated that it is not Ngululu Resources constructing the road. Jan Nel replied that no decision has been made to date concerning the mining licenses, water licenses or the environmental authorisations. All of the above processes are still in the initial stages.
Jan Hattingh enquired whether the minutes of today's meeting will be available to them as the public.	Jan Nel responded that the minutes of the meeting will be distributed to everyone whose name is on the list. He added that they will have a chance to scrutinise and comment on any documentation that is sent in to the Department.
Maria Coetzee enquired why they are not distributing letters physically to all the houses in the area where they are going to mine. She stated that not everyone knew about this meeting. Ernie van Gruening also stated that the notice poster was situated at the back end of the field where nobody could see it.	Jan Nel took note of this, and assured all the Interested and Affected Parties (I&AP's) that all the names on the list completed, will all receive the necessary documentation. He stated that the extent to which the invitations went out is very far, and thanked the I&AP's for spreading the word. Noted.
Diane Bath asked how Ngululu Resources knows that Portion 26 of the farm has coal. She wanted to know "why there specifically?".	Jan Nel responded that the Council for Geo-Science in Pretoria has a national map of mineral resources and these maps displays where resources like gold and coal can be found. This information can be accessed by anyone. These maps are used by companies to decide whether they want to prospect in a certain area. The other way to do it is by taking a chance. The company has originally applied for prospecting on Portions 26, 29, 31, 33, 46, 47, 53 and 54, but only Portions 26, 46 and 47 were granted.
Riaan Fourie asked what the process is in applying	Jan Nel stated that the Prospecting Right issues

ISSUES RAISED:	RESPONSES:
for a mining right and prospecting right.	does not form part of this meeting as Shangoni was not part of that process and does not have any information on this. If there are any questions on this, these can be asked to Ngululu Resources.
Ernie van Gruening stated that the yellow and purple colours on the locality map cannot be seen as they are the same colour as other features on the base map. The purple bands can be mistaken for Portion 47.	Jan Nel responded that he understands, but that Portions 46 and 47 are so small that one cannot see the colours unless zoomed in. He noted this and proposed to change the colours on the map. Jan explained that the application is only on Portion 26 and the two small portions of 46 and 47, (nothing else on the map).
Hennie Nagel asked what the size is of the Portion 26 rectangle on the locality map. Hennie Nagel also asked if that portion is going to last the mine 20 years.	Jan Nel answered that it is 1.2 km by 1 km. Jan Nel responded that it consists of three seams. The planned mining activities will be discussed later during the meeting.
Hennie Nagel asked whether the mine will be located over the gravel road, or to the south or north of the gravel road (on the locality map). Also asked if there is more than just you involved in this also Anglo and Total.	Jan Nel responded that the gravel road is the southern border of Portion 26, and that there is nothing on the other side of the gravel road. On the other side is Anglo American's activities and surrounding Portion 26 east, north and west is Total's mining activities. Jan Nel answered that that is not the case; this application has nothing to do with Anglo, Total or any other mining companies.
Ockert Bezuidenhout enquired where Portion 26 will be receiving its products from. "Where will they be driving through: through the other mining area and mine property or is this the start of the whole area becoming a mine area once it is authorised?". Jan Hattingh commented that it is the road they are building.	Jan Nel responded that he carries no knowledge of that. Ngululu Resources indicated that the road does not form part of their activities.
Ernie van Gruening noted that the colours on the map show that purple seams and yellow lines which is the beginning of tunnel vision. It is just the foot in the door.	Jan Nel responded that from his point of view, the application for which the client and EAP are completing the environmental work is only on the two sections displayed on the locality map (Portion 26 and Portions 46 and 47). "We bear no knowledge of any other activities in the area. Anglo American has an old Plant in the area and Total is also busy with activities".

ISSUES RAISED:	RESPONSES:
	"There are other mining applications in the area of which all the I&AP's must be aware, but it is not our responsibility and we can't answer for others".
Diane Bath proposed that the Ward Councillor investigate these other application and let us know. Anne Theunissen stated that she has requested from the town planner a list of all the mines that are prospecting in the area and the municipality is not even informed. They are waiting for the information, and stated that the communication is very bad. Diane Bath further proposed to go to the DMR and expose to them what is going on.	Jan Nel answered that he doubts that he can give this information as it is a process that needs to be followed according to the legal requirements. Noted that a request was made to the Ward Councillor. This falls outside this environmental authorisation process.
Mr Thinus van Dyk is associated with Portion 26 and indicated that he has appointed Johann Minnaar as his consultant. He mentioned that Mr. Minnaar is an advocate who has 17 years of experience in the mining environment and that he can act on behalf of the whole group as a consultant. "He is handling the situation".	Noted.
Mapale Nyakele stated that they are not catered for; they would like to speak in Zulu. They do not want to address the meeting in English.	Jan Nel stated that we will give you an opportunity to discuss this in English.
Paul Fourie stated that the big portion looks like it is in Gauteng and not Mpumalanga.	Jan Nel responded that it falls in the Mpumalanga responsibility area.
Hennie Nagel asked whether there will be any explosives on the site. Not within 200 m from any building or within 500 m from any residential area.	Jan Nel confirmed that there will be. Those specifications will form part of the specifications which they will have to satisfy.
Hennie Nagel stated but then it is mining. The moment that you remove stockpile, you take coal out and then you are mining	Jan Nel responded that these are proposed activities that will happen only if the mining right is granted (as well as a water use licence and an approved impact study).
Ernie van Gruening asked what the dams discussed earlier are and how big these dams will be.	Jan Nel replied that it is a pollution control dam. The dam is there to store dirty water, for in case of the mine continuing, the water will not be able to leave the area. This is only water that falls in the pit and water that falls on the waste rock dump.
Hennie Vogel stated that earlier it was said that the area is 1 km by 1.2 km, and you have a waste rock	Jan Nel responded that he will show them shortly on the map. Note: No Purification Plant will be operated.

ISSUES RAISED:	RESPONSES:
dam, a stockpile and a water purification Plant. He enquired where the mining will then take place on such a small portion.	
Danie van Wyk asked where the water evaporates to. “Is the dam lined?”.	Jan Nel responded that the water evaporates into the air. Yes, the dam must be lined. It is a requirement as part of the water use license process. The Department will not approve the license unless this is in place.
Dolf Oosthuizen stated that when the water evaporates into the air and it comes down as rain- it will pollute the maize.	Jan Nel explained that evaporation does not cause pollution. The minerals and sulphates are too heavy to evaporate. Pollution in air comes from emissions and pollutants from vehicles and chimneys. The origin of acid rain is from emissions and gasses and not from evaporation from a dam. “What may potentially cause problems is dust in the air after a blast”.
Pop van Schalkwyk asked what the impact of the dust will be on the grass, as most of the plot owners have a few sheep or cattle.	Jan Nel responded that he will give another opportunity to talk about this later in the presentation.
Paul Fourie enquired if there was another meeting.	Jan Nel answered that there was a meeting at 15:00 prior to the 17:00 meeting. “It was the same meeting; we just gave an opportunity for people who could attend the earlier meeting. The previous meeting contained the same information and discussions from what we are discussing now and has been combined with this meeting.”
Diane Bath stated that there hasn’t been an application submitted for rezoning and enquired when this must get submitted to the council. She also enquired what the Department of Agriculture’s feedback is on the whole process.	Jan Nel responded that a rezoning application has not been submitted yet. It is not part of Shangoni’s work”. Jan Nel referred the question to the client. Pierre Briel stated that the rezoning application will only be considered if the mining license is granted successfully. The reason for this is the high cost involved in the application. Jan Nel added that without rezoning, the mine cannot continue. Jan Nel replied that the Department of Agriculture was invited to the meeting. They have also sent us comments on some of the issues in the documentation that they would like to be addressed. We are in consultation with them. You will get a full list of all the comments from the Departments.
Hennie Nagel enquired if Jan was saying that there	Jan Nel responded that they require rezoning as

ISSUES RAISED:	RESPONSES:
will be no environmental impact whatsoever until the rezoning is done.	well, before they start mining. This is a separate process.
Pop van Schalkwyk enquired about the underground water, as they do not receive water from the municipality.	Jan Nel replied that they will discuss it later on. "We have done a specialist study on the ground water, and Ockie, our groundwater specialist will give us an idea of what the groundwater studies' outcomes are".
Paul Fourie asked what the noise levels may be like.	Jan Nel responded that they will discuss it in a second. "We have done a baseline of the existing noise level so we can show you what the current noise levels are. As the application process progresses we will start modelling to see what potential noise levels can be and what mitigation needs to be taken to bring those levels down".
Peter Theunissen asked when Social and Labour Plan (SLP) and Mining Works Programme (MWP) studies begun. Peter Theunissen also enquired who was going to be doing the mining, the South Africans or the Chinese. Peter Theunissen also asked if the Press is present.	Jan Nel responded that those two documents have been done. The two documents form part of the mining right application. "We were not involved in this process". Jan Nel stated that he does not have the answer to that. *Note from the client: Mr Theunissen's comment is duly noted and it can be confirmed that the project will be in the hands of South Africans.* Jan Nel looked to the attendees and confirmed that the local newspaper is present as well as the Times Magazine.
Ernie van Gruening asked if the area can go bigger based on the two options Jan discussed. "Also, is it possible for them to change back?"	Jan Nel responded that the right is only issued (if it is issued) for the mineral. It will cover the area where the mining will take place. If any mining takes place outside the area that they have granted, it is illegal. The mine cannot go ahead and mine in other areas if the mining right does not include those areas. They cannot just start mining somewhere without going through the same process.
Ockert Bezuidenhout stated that by his calculations, with reference to Option B, the 1.5 km the pit can be placed anywhere. "This is just a sample". Ockert Bezuidenhout states that from Sundra through to Randburg, basically 2.5 km mining will	Jan Nel responded that there are legal requirements with regard to the boundary area. If the mining right is granted, there is no guarantee that this area on Portion 26 can be mined, because there is a wetland area. Jan Nel replied that this is the size of Portion 26, this

ISSUES RAISED:	RESPONSES:
take place along the railroad.	is not the area.
Ernie van Gruening asked that "although Option B is proposed to be used, can they change back to the option A?"	Jan Nel responded that if they want to change back to the other option they will have to go through the same process again.
Hennie Nagel enquired what the sizes are of the areas.	Jan Nel responded that Portion 26 is the whole farm; the width is 1.2 km and the length 1 km (speaking under correction). The specialist studies contain the specific sizes, will be supplied later. Ockie Scholtz subsequently supplied the dimensions as 1.34 km across and 1 km in length and the distance from the top part of the portion to the Sundra tar road is 4 km.
Ockert Bezuidenhout Snr. stated that around the portion, mining has already been applied for.	Jan Nel recommended that they enquire at DMR whether rights have been granted. "Send DMR a list or go see them over mineral rights and applications". He also said that he can guarantee that there are already prospecting rights granted to the farms surrounding the Portions 26, 46 and 47 (but these do not form part of this application).
Hannetjie Engelbrecht asked if there are houses from Portion 26's border to Sundra and what will happen to the houses along the 4 km stretch. "Are they going to buy out properties?"	Jan Nel responded that there are houses and also a chicken farm. He confirmed that there are houses in the area. No answer in terms of if they are going to buy the houses out, it is a matter between the client and landowner.
Ockert Bezuidenhout enquired what type of soil is the bottom soil.	Jan Nel responded that the information will be in the soil report, and that he will check.
Ockert Bezuidenhout stated that the previous question which referred to the dam and the pollution of the toxic water into the ground. "Now we have got a hole, I don't know how big, maybe 1 km big and 60 km deep and it is covered by 10 m of water if it is raining very well. The water is taking all the pollution from the coal to the bottom, the water is then filtrating through to our ground water, circulating through to Delmas and Sundra or wherever the water is going. Nobody is looking at that". Ockert Bezuidenhout replied that he thinks it is impossible. "While digging a hole, and if you are filling in at the side, what is going to keep the ground	Jan Nel responded that it is part of the geo-hydrological study. "We have looked at what will happen to this water, where it is going to and what are the volumes and quality – we have assessed that in the impact assessment". Jan Nel also reminded all that at the end there is not going to be a deep hole. The mine will backfill as they mine – that is what they are supposed to do. It will be a requirement in the EMP, water use license and EIA. So in the end they will sit with a slight void, which is basically the volume of coal that was taken out of the mine. Jan Nel responded that "you must remember that there is a mining sequence. For example they are mining from left to right and as it is removed in the

ISSUES RAISED:	RESPONSES:
up?" He also enquired where they are going to get the ground from to replace the stone. Hennie Nagel enquired about the rehabilitation of that hole. Hennie Nagel asked if that is totally acceptable rehabilitation.	front, it is moved to the back and filled in there. It is known as roll over mining. You will not sit with a 1km by 1km big hole at the end of the day". Jan Nel responded that "from rehabilitation point of view, taking out material is not going to be enough to fill the hole to the top. In the end you will have a section that is filled to the top, and in another section a slight hole or void (not a whole pit), which will be filled with water". Jan Nel added that "the backfilling is part of the rehabilitation studies (including the processes to backfill in order to not leave a large hole). To leave the smaller hole in the end is part of rehabilitation". Jan Nel responded that it is acceptable, but not final. There will be other activities that will take place afterwards.
Hennie Nagel stated that in order to reach the coal, they will have to drill and blast with chemicals and water. The moment that you blast, you are disturbing the natural environment. "The chemicals along with the drilling material will end up directly in our drinking water".	Jan Nel responded that the chemical that they will be using to drill is not problematic, it is biodegradable. It will be specified in the documentation.
Anne Theunissen stated that "this is agricultural land, then you mine it and then you leave a hole. I am speaking of 3 or 4 generations from now – this land will never be used for agricultural practices again" She enquired whether the correct rehabilitation will not be to bring in topsoil and rehabilitate it back to agricultural land. Pop van Schalkwyk asked what insurance they have.	Jan Nel responded that that is how it works. If a mine has a 500 m stretch, they will at least be able to plant on 400 m. The yield will be lower than before it was disturbed. All of this depends on how the soil is placed back, can lead to 65 – 75% of yield prior to mining. Jan Nel answered that it is a requirement that is placed in the documentation. If the mine has to backfill and rehabilitate back to agricultural ground, this is the requirement they will have to comply with.
Pop van Schalkwyk stated that "the whole Droogenfontein has some of the best red soil for planting. Now Droogenfontein is being mined over. Who is going to supply our people with food?".	Jan Nel replied that food security is a big issue with regards to coal mines, because coal mining normally destroys agricultural land. That specific aspect will be addressed in the socio-economic study. The fact that it is a major negative impact will go into the

ISSUES RAISED:	RESPONSES:
	documentation and the Department will be made aware of the consequences. "It is not something that we will hide". The department of agriculture is involved in this process, they are giving their inputs. "I can guarantee you that the Department of Agriculture is looking out for the farmers and ensuring that agriculture is sustainable and not completely destroyed".
Ernie van Gruening enquired whether all this information will be available to everyone in the documents, so that each of them can give their inputs. Ockert Bezuidenhout stated that he thinks that they personally (as I&AP's) should have had input into the experiments and evaluations for soil, noise, groundwater etc. "You should have had it here today. We do not know what the facts are and the consequences in 10 year's time. We are being given an introduction course on what the project is about but nothing about facts. There are a lot of maybes, we need facts. Now three days before the 30th of November, we must have our own evaluation in whether you are telling us the truth – and it is not fair on us".	Jan Nel responded that "we must first identify how we are going to make the documentation available to everybody. These documents are large, and too expensive to be copied for everyone. We will put all of the documentation on the Shangoni website so there is access and we can make CD's available (electronic format)". Jan Nel stated that "your inputs do not stop on 30 November 2013 or 15 January 2014. The moment that the mining right document is submitted to the Department it becomes public domain; it is available for anyone for comments. For six months it is available for you to comment on and raise your concerns and give your inputs. We have a cut-off line from the legal point of view that we need to submit documentation to the department to review".
Ockie Bezuidenhout Snr asked who is paying him to sit here the whole day, and indicated that his time is being wasted.	Jan Nel responded that "it was necessary to come to this meeting because you as the public and you are worried".

ISSUES RAISED:	RESPONSES:
Peter Theunissen enquired which Department is going to have the final say in granting the mining right. Peter Theunissen enquired, in terms of finances, who is going to guarantee that the rehabilitation is going to take place.	Jan Nel replied that the mining right is granted by the Department of Mineral Resources (DMR). With a mining right, they cannot mine if they do not have a water use license (approved by the Department of Water Affairs), EIA (approved by the Department of Environmental Affairs) and rezoning approved by the municipality. Jan Nel responded that from a rehabilitation point of view, there is a requirement in the Mineral and Petroleum Resource Development Act (MPRDA) which states that you have to calculate your rehabilitation funding required and you have to make that money available in a fund for rehabilitation. It is part of the authorisation process, and authorisation will not happen if the money is not available.
Mapale Nyakale states that he is a bit disturbed by this meeting today. It seems as if many questions are being asked, and there are no straight answers. He enquired whether this meeting is valuable. He also stated that “we need clarity that nothing will happen in the area before they have a mining right”. Mapale Nyakale stated that “your answers are not well articulated, answers are not giving direction. Specifics have never been given. We need clear answers”.	Jan Nel responded that the value of this meeting is that decision makers are made aware of the concerns of the community with regards to licensing or permitting this activity as well as the consequences of those concerns. They should not approve a right or reject a right if the community’s concerns are not part of the submission documentation. A number of other companies do not have these meetings. Jan Nel responded that nothing will happen that requires a mining right, rezoning or authorisation. Jan Nel responded that he should be given an opportunity to present details on the studies. “Then we can discuss that”.
Jan Hattingh stated that “there is not one person here who is positive over this thing. You are giving us masses of information and detail. I do not know what positive impacts that thing will have on me. I would like to discuss all the impacts (positive and negative) of this mine so that we can make an informed decision”.	Jan Nel responded that he cannot give the positives and negatives if he cannot explain what the mine is planning to do. We cannot describe the impacts if you do not understand the detail of the mine first.
Pop van Schalkwyk stated that we are living in a	

ISSUES RAISED:	RESPONSES:
rural area. She asked if, with this mine, "will they become a city?". "That is why we bought 'plots' otherwise we could have lived in town. Now a mine is establishing here, with masses of people and vehicles that are going to work there. This is all unacceptable". Hennie Nagel contributed that everybody present knows that the farm Droogenfontein has no water. "There is not even water for household use. The water rights says that first of all groundwater needs to be presented for household use, after that for the animals and the farm community. Thirdly it must be used for irrigation. Lastly for anybody else. My borehole does not have enough water to sustain what I want to do. So I would like to see your geologist's study to see where he gets water that they can't get".	Jan Nel announced that he will be skipping all the processes. He indicated this and stated that everyone must be aware that the processes are being skipped in order for him to move on with the presentation.
Paul Fourie enquired when all the studies were completed.	Jan Nel responded that the studies have been done the last three months.
Jenny Greeff asked how far these impacts will go.	Jan Nel replied that each of these studies have certain modelling being done; the geo-hydrological study models is an example. "Information regarding these impacts is all discussed in the documentation in the case of the mine continuing".
Ernie van Gruening confirmed that these studies are from the mine itself and the areas surrounding the mine portion. He also confirmed that all the positive and negative impacts are included in the documentation. He enquired how much time they will have to comment once they have received the document.	Jan Nel confirmed that once they get the documentation they still have 6 months to give their comments.
Anne Theunissen requested a copy of the presentation. Furthermore she stated that the Heritage said that there are cemeteries in the area. She wanted to know if that is true. She asked how these graves will be cared for.	Jan Nel confirmed that it is true. There are 80 graves to the north of the wetland and an old structure to the west of the wetland. Jan Nel responded that at the moment the graves are near the wetland so they are not near the mining operation. If the mining operation extends into that area, the process they will need to follow is to relocate those graves. It is a whole consultation process, in which you have to consult every living person who is a relative of those people. They have to get permission to relocate the graves. It is about

ISSUES RAISED:	RESPONSES:
	R40 000 per grave to relocate. It is therefore preferable to not disturb the graves.
Brent Parrott stated that the specialist studies were done in the last three months, so you have basically done a study for water during the winter season. "Do you really feel that it is a representative study?". We farm in the area and it is extremely dry in the spring, you cannot say it is a representative study if you have just done three months. You have to do a study in the summer and another winter for it to be representative. Brent Parrot enquired from the client whether they have done a bankable feasibility study.	Jan Nel responded that it is an initial baseline study and that they had received feedback from the Department requesting additional studies. Pierre Briel stated that he does not know, most likely not.
Andries Grobler stated that there is a wetland. He asked that if a mine is established there, where the water will go if the Pollution Control dam bursts. Andries Grobler also enquired what will be done in terms of air pollution. Andries Grobler asked what will happen if their houses start to crack as a result of the blasting. He also enquired if the mine is not going to pay them for the damage.	Jan Nel answered that the pollution control dam will be built to accommodate a 1:50 year flood. It is a real requirement according to which it must be built. Jan Nel responded that the air pollutions specialist report is not done yet. The general activities that will be carried out include: dust management through water, and blasting will be limited to ensure that not too much dust is released into the air. Jan Nel responded that one of the requirements is to monitor the effects of blasting in the area. Jan Nel responded "no, he cannot give that kind of commitment."
Jenny Greeff stated that the specialist studies were conducted for only three months. She asked that the studies must be conducted for a year to see how everything functions there.	Jan Nel answered that the question had been addressed earlier. "The Departments that give us feedback require that we must repeat our studies over a time period including all seasons. The commitment is there to do additional studies. The studies will be done for all the seasons".
Ernie van Gruening asked who follows up on what the mine does.	Jan Nel responded that there is a legal requirement that the mine must complete an annual audit on compliance to their water use license, environmental management programme and mitigation measures. All the information from the audits is forwarded to the Department of Mineral Resources (DMR) and is available as public documents as soon as DMR

ISSUES RAISED:	RESPONSES:
	receives them. Therefore you can check them, DMR, Water affairs and Environmental Affairs must also check the documents. They cannot stray from all their responsibilities and requirements without consequences.
Jaco Labuschagne enquired at which boreholes at Prosperity the prospecting and testing was done. Do you know how deep it is and how much water there is. We are situated right next to where you are going to mine (much closer than Sundra). Jaco Labuschagne said that the Jan just said that the specialist studies were already completed. Jaco Labuschagne confirmed that there are once again no answers. He also stated that "we are here at something tonight where you are already bought into the whole situation. You are telling me that it has been done, I ask you where, there is no answers". Jaco Labuschagne stated that Prosperity is right next to where they are going to mine, in Welgedacht's direction. "You don't even know that we live in that hole". Hennie Nagel said that he can say with certainty that everybody who is from Prosperity, will allow them to come to their boreholes to test them. He is speaking on behalf of the Prosperity people. Hennie Nagel also stated that the mine area is Prosperity's catchment area. Also, since they constructed the gravel road, they have disturbed the soil. Aston Lake is dry for the first time in years.	Jan Nel replied that he will have to check for the details. Ockie Scholtz responded that it is part of the participation process where we want to set up a specific time to test everyone's boreholes. That is why we are trying to get all the people together to get their signatures and addresses, so that the specialist studies can be followed up. Jan Nel responded that it was a baseline study that was done. Jan Nel responded that 13 boreholes were sampled on Portion 26. Ockie Scholtz stated that he does not know exactly where Prosperity is. Jan Nel confirmed that 13 boreholes were tested on Palmietkuil and Droogenfontein. These are the two farms on which the Hydro census was conducted. "It is important that you give this information now, so that we can expand the study. We now have your addresses and your names. What usually makes it difficult for us is that farmers deny us access to their property. If you say tonight that we are going to deny you access, do not come later and say that we did not test on our property. Please give us the permission to conduct the studies on your properties, we will use the list". Jan Nel thanked him, and said that they will definitely. "It will give us a much better idea of what the potential impact will be."
Pop van Schalkwyk asked in what season the boreholes will be tested. "In the rainy season we have water, but as soon as the rainy season stops, then it is dry. Also where we live, when they blast at	Jan Nel asked if we can move on to the reports, he will only discuss the critical areas.

ISSUES RAISED:	RESPONSES:
Leeuwpan, we feel the blast and there are pieces of coal and soot in the water for weeks."	
Thinus van Dyk stated that he has a problem with the presentation and these studies that you have done here because it is not the original study by the organisation or people who physically conducted them. "This is a summary. Where are the people who physically conducted the study? I am looking for the full report not a summary".	Jan Nel responded that they will receive the full report. It will be the specialist's work with his signature – nothing will be changed on the document. "I guarantee that it will accompany the documentation. For this presentation I extracted summaries 'word for word' from the specialist studies just to give you an idea of what is going on. You will get the detailed specialist studies as part of the addendums of the documentation, which you will be able to evaluate and see".
Ernie van Gruening stated that on the presentation it stated that the vegetation on Portion 46 and 47 was degraded and classified as transformed with no plants of conservation concern occurring. He enquired what that sentence means.	Jan Nel responded that the specific sentence means that there are no plants with a protected status on Portion 46 and 47. But the protected plant is found on Portion 26.
Pop van Schalkwyk asked what insurance is there that the wetland will be protected once they start mining there.	Jan Nel asked if he could answer the question once they get to the wetland study section.
Ockert Bezuidenhout asked with reference conservation plan, if it is upstream or downstream.	Jan Nel responded that it is flowing downstream.
Ockert Bezuidenhout enquired whether they picked up any pollution from the mine dam (Angelo's dam).	Jan Nel answered that the hydrological study is not completed yet.
Anne Theunissen stated that corruption is a serious problem in South Africa. "How do we know that corrupt officials approve the mining right when there is an impact? Bribes can possibly be paid (with respect to the mining house)."	Jan Nel responded that he understands what she is saying. "I do not always sit in this side of the room, sometimes I sit where you are sitting. It is very disheartening to see that it could happen. I guarantee you that from our side we will do our best to reflect and present right information. We are not changing anything to make it less significant. I cannot guarantee corruption."
Hennie Nagel asked Jan if he honestly feels that his client is 100 % honest.	Jan Nel responded that he can never give that guarantee.
Jenny Greeff enquired where the coal will be washed. She also enquired what 'lorries' will be driving on the roads and what the impacts will be on the roads.	Jan Nel answered that they are still busy negotiating, and he does not know with whom they are negotiating. Jan Nel responded that it is an impact which they have identified. If the mine is established, it is one of the mitigation measures.
Hennie Nagel stated that for the record he wants to differentiate between ploughing and a fire break. On	Comment noted.

ISSUES RAISED:	RESPONSES:
the presentation you say it is ploughing but it is actually firebreaks.	
Ockert Bezuidenhout stated that you say that the government will allow activities 500 m away from a wetland. "What does it mean pollution wise."	Jan Nel responded by saying that from a water license perspective the department will give the requirements. They can give a requirement that says you cannot be closer than 100 or 500 m to a wetland area. If it comes from the Department, it is a licensing requirement, to which the mine must comply. If the license is approved that requirement in there is something they will have to look at.
	Jan Nel stated for additionally objectivity that the wetland study was peer reviewed and that the Wetland has been classified as a Category C.
Jaco Labuschagne asked how close it is to a Category D. Jaco Labuschagne stated that it is once again in a dry season, so it might just be in the B rating.	Jan Nel responded that he does not know the detail of the reports. It is in the report, along with the ratings. Jan Nel responded that it can be in the B, but can also go to the D. That is why the follow up assessment is necessary.
Ernie van Gruening stated that Jan said earlier that there are other mining activities. He asked whether they will have an influence on this decision.	Jan Nel replied that if those dams discussed earlier leak into the wetland (and the dam's water is polluted), it will contribute to the condition of the wetland. "It is not our responsibility".
Riaan Fourie enquired what the effect of digging a pit will be on the wetland.	Jan Nel responded that it will be discussed in the geo-hydrological discussion.
Jan Hattingh stated that to the left of Portion 26 there are people who live there. "We do not worry about the lilies, we worry about our stuff".	
Paul Fourie enquired how the coal is going to be transported.	Jan Nel responded that it can be by road or rail. Deciding what is the most effective way to transport (part of the feasibility study).
Hennie Nagel responded to Ockie Scholtz's statement that the boreholes in a 2 km radius around portion 26, 46 and 47 were tested. He stated that if a 2 km radius was tested – they were supposed to have been at Prosperity. "If you tell me you did 2 km, I am telling you that you are a liar, because you were not at my house." Hennie Nagel responded that in that case he (Ockie) should not say that he was in a 2 km radius. "You are not credible. Three quarters of your ground is on	Ockie Scholtz responded that they could not go everywhere. Ockie Scholtz responded that he is totally independent.

ISSUES RAISED:	RESPONSES:
a wetland, 1/3 is on ground and on that 1/3 you are going to build a dam and a storage area." Hennie Nagel enquired by whom Ockie is paid.	Ockie Scholtz replied that we have already discussed that. Somebody has to do it; the mine has been instructed to do it.
Paul Fourie asked Ockie, if he stayed here, if he would allow something to happen out there. Jaco Labuschagne responded that there are no facts because you have not done the studies. Jaco Labuschagne stated that they are wasting their time. "In two year's time I am going to have no water in my borehole." Ernie van Greunen asked if these tests can be done up to January of next year (2014), so all the mistakes that were made must be corrected before January 2014. Before the information goes in, it will first have to be communicated to the community. Jaco Labuschagne responded that they would appreciate another meeting.	Ockie Scholtz responded that it is not up to him, he brings the facts to the table. "My facts are going to the Department of Water Affairs and DMR." Ockie Scholtz responded that there was a complete geo-hydrological study done, with data available. Jan Nel interjected that they previously discussed that some of the areas were not covered and that these areas will be done to create a better image of what the impact is. Jan Nel responded that they will be able to see the document that includes the results of the tests. "If you would like us to organise additional feedback meetings for the results of the geo-hydrology, we will do it." Jan Nel stated that he is not going to discuss this in detail any further, as all the boreholes have not been tested. "We are not going to give you all the information based on the fact not all of the boreholes were tested. The image that we are creating here is not necessarily right because we did not consider Prosperity's information." He apologised for that, and stated that it will be done and feedback will be given on the conclusion of the studies. Ockie Scholtz stated that for the holes that they missed now, they still have two years before the mine starts. "I need borehole levels to conduct mathematical calculations."

ISSUES RAISED:	RESPONSES:
Andries Grobler stated that when you look at that map, at the portion of 1.34 km by 1 km, on three sides of the portion there are no houses and on the one side you have houses. Prosperity has 56 smallholdings – "how much has to be tested to get a good average?" Andries Grobler stated that he also has a geo-hydrological background, and to get a good average, you need to measure as many as possible boreholes. "This whole thing is not about the frogs and flowers, it is about people." "If you are telling me that you tested 13 boreholes, and in a radius if 2 km, you would have covered a number of those smallholdings. A high-quality study was not done here. We are talking about people who are going to sit without water in a year or a year and a half. The mines are not going to compensate the people. All the farmers flee their farms as a result of the houses cracking from the blasting. Land resettlement is not going to happen. Testing only 13 boreholes on 56 smallholdings is just not enough. The six months that we have to comment is not enough." Ockert Bezuidenhout responded that he does not agree. "Air Pollution travels a distance of 100 km from the coal and dust particles. Clouds form and acid rain forms right around us. The whole problem with your presentation is that you do not give the impacts. We do not want just the geo-hydrological impacts; we want the noise and air. I hear what you are saying about the 2 years. You are going to give the department you documents, after that there is not going to be any discussions and negotiations – this whole thing is one sided."	Ockie Scholtz responded that as much as possible has to be tested. The Department requires a 1 km radius. I know that you do not have water. I did a 3 km radius study. Ockie Scholtz stated that there is still time to do more baseline studies. The impact study that we did does not need such a large area (600 m). Jan Nel responded that it is the reason why we looked at the fauna and flora studies. It is the information from the specialist studies that is available at the moment.
Jaco Labuschagne stated that Ockie is talking about 500 – 600 m from the pit. "So you are telling me with all your knowledge that I will not lose water. I will have water for the next 10 or 20 years. You (Ockie) will ensure that I have water, it is your work."	Comment noted. Refer to previous discussions.
William Vermeulen stated that if it depends on him – this mine will not happen. "With the report that these	Comment noted.

ISSUES RAISED:	RESPONSES:
guys are going to give I can almost guarantee you that the mine will not open. These guys are not here to use us; they are here to protect us."	
Jaco Labuschagne replied that he wants to believe him. "Everything that I see says that everything has already been approved – they have already started building a road."	Comment noted.
Pop van Schalkwyk enquired how big the area is that is going to be mined. "Can you think that somebody would chase a little money from the 50 ha portion, without thinking how we will be negatively affected."	Jan Nel responded that it is around 50 ha. Comment noted.
Andries Grobler enquired about the people's health.	Jan Nel responded that if all the information that they have gathered so far shows that they should not carry on with the mine, then the mine will not carry on.
Hennie Nagel stated that the math does not make sense. "Because 1.4 km by 1 km is 10 ha. If 8 of that 10 ha is wetland, there is only 2 hectares left. Where do you get the 50 ha?"	Jan Nel responded that 1.4 km by 1 km is 100 ha.
Smanga Mashiane stated that unemployment is a problem. Ngululu Resources is trying to create jobs. Smanga Mashiane stated that as a young man he is disturbed. "Unemployment is a valid point. We must also dwell on the issue of unemployment. We are here to find a solution."	Noted. Jan Nel stated that they have identified that there is a shortcoming on the geo-hydrological report, which we will address. "We have made the commitment that we will come back to you with the information in that report and present it to you. If you do not agree on what is in the document, you can have the document reviewed by somebody else." Jan Nel replied that he agrees, and that the socio-economic aspects are discussed in the socio-economic study and will also be identified in the EMP.
Ockert Bezuidenhout asked that "let's say it rained 50 mm over night into that hole, how long the water will be in the mine before it is dry? All polluted water will be going down." "What about the maize's roots?"	Ockie Scholtz responded that if they cannot de-water, they cannot mine. Water tends to follow the path of least resistance, which is horizontal not vertical. Water will be moving very slowly underground. Ockie replied that the whole area is going to be mined out; there will not be any maize. There will be impacts.
Ernie van Gruening enquired what the impact of the	Ockie Scholtz responded that it will have an impact.

ISSUES RAISED:	RESPONSES:
dynamite will be on the wetland. Ockert Bezuidenhout asked what happens to the ecosystem, ground and water is part of the ecosystem.	Jan Nel proposed that they move on, "not going to have any solutions now. I don't think we are going to convince you."
Hennie Nagel asked if the studies have been completed, there will be another meeting.	Jan Nel responded that there will be. He also stated that this is part of one of the three processes mentioned earlier. "The impact study process which is handled by environmental affairs – will also consist of a meeting with you to give feedback on the result of the studies. "
Andries Grobler asked how the document will be delivered to each person.	Jan Nel responded that a copy of the document will not be given to every person, it is just too large. We will make the documents available on the Shangoni website and at specific places where you will be able to sit together and look at it. We will be able to give out CD's as well with electronic documents on. We will send to everybody who was here and to all the people who were invited but did not attend. Jan Nel stated the environmental programme will be given to DMR on the 15th of January, then DMR has 120 days to look at the document and you also have 120 days to give your inputs. They will give feedback on what must be done additionally (for the mining right). The impact study documents will be submitted in May 2014 and October 2014. During that process there will be more consultation opportunities like these. The water use license application will be submitted May 2014. Remember: "not just one license is necessary for them to mine, they need to whole packet."
Danie van Wyk asked what is going to happen to Portion 46 and 47 since they were not really discussed. "What is the agenda for these two portions?"	Jan Nel responded that Portion 46 and 47 is part of the application. On Portion 46 and 47 there is not going to be any coal mining. Hennie du Rand stated that at the time when the application went in, Portion 46 and 47 was the only two small areas where they could make a coal yard from which the trains could be loaded. "I rejected it. I can assure you that there will not be mined on those portions, now and in the future. I can give a letter as well. The goal of the portions is not important to us anymore as we are not going to be loading on

ISSUES RAISED:	RESPONSES:
	Sundra anymore. The coal will be done on Welgedacht."
Mapale Nyakale asked a question regarding the rights of the community, what is the role of the community. "It is not clear. When you own the surface, what is actually your right. The setup everywhere has got many flaws."	Jan Nel responded that he will do his best to get the Government Departments here at the next meeting so that they can give their viewpoint as well but indicated that he cannot guarantee that.
Ronnie Mlambo commented that they are dwelling too much on one slide and should move forward.	Comment noted.
Ernie van Gruening stated that his great grandfather and the Van Dyk Grandfathers built the farms and a school in the Sundra area. "All that is built there lies very close to my heart."	Comment noted. .
The meeting was adjourned. Jan Nel thanked everyone for attending the meeting and for their participation	

Regulation 50 (g)

14 The appropriate mitigatory measures for each significant impact of the proposed mining operation

14.1 Adequacy of predictive methods utilised

The mitigation measures as described in Section 2 (Environmental Management Programme) have been used adequately by various mines and on various other sites. The mitigation measures are specific to the nature of the impact. Based on the continual improvement principle, where mitigation measures can be improved on, this will be done. The main reasons for this would be improvement in technology to address impacts and new developments which may require additional measures.

14.2 Adequacy of underlying assumptions

The following specialist studies and technical reports were completed and are attached to this document:

- Agricultural impact assessment report - Appendix C1
- Basic Atmospheric Impact Report - Appendix C2
- Environmental noise survey report - Appendix C3
- Faunal assessment report Appendix - C4
- Geohydrological investigation report Appendix - C5
- Heritage impact assessment report Appendix - C6
- Hydrological Assessment Report Appendix - C7
- Social impact assessment report Appendix - C8
- Vegetation assessment report Appendix - C9
- Visual impact assessment report Appendix - C10:
- Wetland and riparian functional assessment report - Appendix C11
-

14.3 Knowledge gaps, Assumptions, Limitations and Uncertainties in the information provided

- The information in this EMP was obtained from the specialist reports listed in sub-section 14.2 of Section 1, the current MWP and the SLP.
- The proposed mine does not have a rehabilitation plan, mine schedule or Life of Mine Plan.
- The proposed mine does not have a detailed Mine Layout plan
- It is not known at this stage where ore processing will take place.
- The Mining Work Programme (MWP) did not provide technical design information on blasting and stockpiling of overburden and coal ore. The number of holes drilled and blasts per year were determined based on technical designs from similar mining operations and material densities of the overburden and coal ore. The overburden stockpile area was obtained from a presentation

done by VBKom Consulting Engineers (Pty) Ltd for the proposed opencast mine by Ngululu Resources (Pty) Ltd;

- The operational areas (e.g. stockpile area) were selected to reflect the most representative scenario;
- For all other limited data or information, data from similar operations was used;
- The impact assessment was limited to dust particulate matter that provide a nuisance (TSP) and present health risks associated with the upper respiratory track (PM10);
- Emission rates used in the dispersion modelling were calculated based on emission factors developed by the National Pollution Inventory (NPi) (Australian government) and material throughputs of overburden and coal ore;
- Emission rates were calculated on the assumption that recommended emission control methods will be used;
- At this stage no emission factor data is available to calculate PM 2.5 emissions. The ground level concentration of this pollutant specie was therefore not modelled and its impact could not be assessed. However as this pollutant specie has become a criteria pollutant regulated by the National Ambient Air Quality Standards, its monitoring has been included in the recommendations for air quality management (Refer to Section 5);
- Measured background concentrations of PM10 were not available at the time of the assessment and its quantitative cumulative impact could not be determined. The proposed site falls within the Vaal Triangle Airshed Priority Area (VTAPA), cumulative impact is therefore assumed to be highly likely;
- Dry deposition results do not include background concentrations, except for Oxides of Nitrogen when modelling chemistry; and
- No on site meteorological data was available for this study. Hourly sequential meteorological data was obtained from the closest South African Weather Service.
- Faunal Assessments should be done across seasons or years to obtain an understanding of the community structures as well as the status of the endangered and vulnerable species in the area. Due to time constraints these long term studies are not feasible. This assessment includes only the winter / dry season sampled in 2013. The Faunal Assessment was conducted mainly during the day. This resulted in less visual confirmations considering most faunal species are nocturnal in nature. No mammal trapping was undertaken as this method of assessment only caters for mammal assemblages found during that survey period. Rather, vegetation on site and a desktop survey was utilised to provide information into the report with ground truthing exercises done to confirm conditions within the study area.
- An invertebrate assessment was not undertaken as these are only representative of the species found during a particular survey period and extended assessments are not economically viable. Every attempt has been made to use the latest information for each faunal grouping however some groupings only have data which are out of date and therefore are not as reliable.
- Vegetation studies should be conducted during the growing season of all plant species that may potentially occur. According to the Mpumalanga Minimum Requirements for Biodiversity

Assessment (Mpumalanga Tourism and Parks Agency, 2008): *"A floristic (plant) survey must be conducted during the growing season of all species that may potentially occur (this may require more than one season's survey in order to identify flowering species) with two (2) visits undertaken (November & February). Visits during other seasons will be determined by the flowering and fruiting times of species that do not occur during the summer."* However, one season survey was undertaken on the 17th of October 2013. The large wetland area on portion 26 of the farm Droogenfontein 242IR was burnt at the time of both survey with grass species just beginning to emerge. This hampered positive identification of species.

- No household/individual surveys were done as part of the data gathering exercise.
- No economic modelling or analysis was done as part of the SIA. Any data relating to the economic profile of the area was obtained from municipal sources, such as municipality/provincial websites, Integrated Development Plans (IDPs), Service Delivery and Budget Implementation Plans (SDBIPs), the Limpopo Employment, Growth and Development Plan (LEGDP) and census data.
- The Garmin Montana 650 GPS used for wetland and riparian delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by at least a five meters radius. It is also important to note that, during the course of converting spatial data to final drawings, several steps in the process may affect the accuracy of areas delineated in the current report. Printing or other forms of reproduction may also distort the scale indicated in maps. It is therefore suggested that the no-go areas identified in the current report be pegged in the field in collaboration with the surveyor for precise boundaries.
- Wetland delineations are based on vegetation gradients and the interpretation of soil and wetness indicators. Identification of wetland characteristics rely on 1) the types of vegetation, in specific the presence of hydrophytic plants (plants adapted to growing in saturated soil conditions), 2) hydromorphic soils (soils displaying characteristics such as gleying and mottling that indicate temporary or permanently saturated conditions and 3) the position of the perceived wetland in the landsape (e.g. valley bottom). However, *at the time of the survey, these indicators were not accessible*. Large parts of the site were cultivated, including the wetland areas. Ploughing hampers the recognition of wetland characteristics of the soil. In addition, at the time of the study the area was burnt and little to no vegetation remained recognisable. Both soil and vegetation indicators used to delineate wetlands were thus disturbed. It is suggested that a follow up study be conducted during the summer. Description of the depth of the regional water table and geohydrological processes falls outside the scope of the current assessment. Particularly seepage wetland areas should be verified by suitably qualified pedologists

Regulation 50 (h)

15 Arrangements for monitoring and management of environmental impacts

The characteristics or impacts that should be monitored may be identified from the following sources and baseline studies related to:

- Biomonitoring
- Fauna and Flora Study
- Rehabilitation plan
- Soil study
- Alien invasive plant programme
- Noise study
- Air Quality Impact Assessment
- Water management plan
- Geohydrology study
- Hydrology study
- Legal requirements and compliance
- EMP Performance Assessment Reports
- Aspect / risk registers
- Water management strategy
- Wetland management strategy
- Water Use License and other permits

Once the elements and parameters to be monitored are agreed upon, the location at which monitoring takes place for each element is be determined. The monitoring criteria, methodologies, responsibilities, frequency, reporting mechanisms, units of measurement and action levels, specifications and control parameters must be specified. Once the monitoring criteria have been determined, monitoring must be undertaken in a three step process:

- Data Collection;
- Data Input; and
- Data Analysis & Reporting

Results that exceed action and control levels set for individual monitoring criteria should be discussed at meetings, and these are to be further investigated.

Accuracy of critical monitoring and measurement equipment will be ensured through either calibration of equipment through an accredited laboratory or through a reputable agent if calibration by an accredited laboratory is not possible. Accuracy of non-critical equipment will be ensured through

verification against each other or against a standard. Refer to Table 34 showing the timeframes for the execution of the monitoring programmes.

Table 34: Monitoring of environmental impacts

SECTION 15.1	SECTION 15.2	SECTION 15.3	SECTION 15.4
Monitoring	**Functional Requirement**	**Roles and Responsibilities**	**Timeframes**
Bio monitoring	A comprehensive biomonitoring program will be compiled and will be submitted to the DMR for approval 6 months prior to commencing with activities.	Specialist.	Quarterly
Alien invasive species monitoring	Alien invader plant species control program will be compiled and submitted to the DMR for approval 6months prior to commencing with activities.	SHE Manager	Continuously
Monitoring of the survival rate of *Crinum bulbispermum* and *Kniphofia typhoides*	A program to monitor the survival rate of the *Crinum bulbispermum*, and the *Kniphofia typhoides* will be compiled and will be submitted to the DMR for approval 6 months prior to commencing with activities.	SHE Manager	Up to five years after closure
Fall out dust	Dust sampling will be done will be conducted comprehensively as stipulated in the Atmospheric Impact study compiled by Shangoni Management Services, attached hereto in Appendix C2.	SHE Manager	Monthly
Ambient Air quality monitoring	PM10 and PM2.5 monitoring will be conducted comprehensively as stipulated in the Atmospheric Impact study compiled by Shangoni Management Services, attached hereto in Appendix C2.	SHE Manager	Continuously

SECTION 15.1	SECTION 15.2	SECTION 15.3	SECTION 15.4
Monitoring	**Functional Requirement**	**Roles and Responsibilities**	**Timeframes**
Monitoring of Meteorological conditions	PM 10 monitoring station should also record basic hourly average meteorological measurements of the following parameters: The following meteorological conditions will be monitored: • Wind direction • Wind speed • Temperature • Rainfall • Solar radiation/Surface heat flux	SHE Manager	Continuously
Environmental noise	Environmental noise monitoring will be conducted comprehensively as stipulated in the Environmental Noise Survey compiled by Varicon CC, attached hereto in Appendix C3.	SHE Manager	Annually
Ground water quality	Ground water quality sampling will be conducted comprehensively as stipulated in the Geohydrological investigation, compiled by Shangoni Management Services, attached hereto in Appendix C5.	SHE Manager	Quarterly
Ground water levels	Ground water levels monitoring will be conducted comprehensively as stipulated in the Geohydrological investigation, compiled by Shangoni Management Services, attached hereto in Appendix C5.	SHE Manager	Monthly
Surface water quality	A Surface water monitoring program will be compiled and submitted to the DMR six months prior to commencing with the mining activities.	SHE Manager	Monthly
Surface water quantity		SHE Manager	Monthly
Wetland rehabilitation	Wetland rehabilitation will be done in accordance to the wetland management strategy to be compiled and submitted to the DMR six months prior to commencing with the mining activities.	SHE Manager	Up to five years after closure

SECTION 15.1	SECTION 15.2	SECTION 15.3	SECTION 15.4
Monitoring	**Functional Requirement**	**Roles and Responsibilities**	**Timeframes**
Soil monitoring	Regular inspections will be undertaken to identify erosion concerns, and the necessary erosion protection and rehabilitation undertaken. An erosion monitoring program will be compiled and submitted to the DMR six months prior to commencing with the mining activities	SHE manager	Continuously
Rehabilitation monitoring	Rehabilitation will continuously be monitored to determine whether the practices are effective. A rehabilitation plan will be compiled and submitted to the DMR six months prior to commencing with the mining activities.	SHE manager	Continuously
Blasting monitoring	Blasting monitoring program will be compiled and submitted to the DMR for approval six months prior to commencing with mining activities.	SHE manager	Continuously
Pit stability monitoring	A pit stability monitoring programme will be complied and submitted to the DMR six months prior to commencing with mining activities.	SHE manager	Continuously
Monitoring MRD as per CoP	The MRD will continuously be monitored as per the CoP to be compiled and submitted to the DMR six months prior to commencing with mining activities.	SHE manager	Continuously

Regulation 50 (i)

16 Technical and supporting information

The specialist studies are attached to this report as Appendix C.

Section 2: Environmental Management Programme (EMP)

Regulation 51 (a)

1 Description of environmental objectives and specific goals for mine closure

1.1 Environmental aspects that describe the pre-mining environment

1.1.1 Pre-mining environment

Refer to Section 1 (EIA), Regulation 50(a) for a complete description of the pre-mining environment.

1.2 Measures required to contain or remedy any causes of pollution or degradation or the migration of pollutants, both for closure of the mine and post-closure

1.2.1 Closure objectives

Mine Closure incorporates a process which starts at the commencement of mining and continue throughout the LoM. It is executed within the framework of sustainable development. Risk to elements of the environment is quantified and managed pro-actively. This includes the gathering of relevant information throughout the LoM.

The MPRDA provides specific information on the Closure application, policies, methodology and measures.

The mine's Closure objectives are the following:

Geology and the mineral resource

- The removal of material from the pit shall adversely affect the geology.

Topography

- To reduce the visual impact of the altered topography by a process of reclamation and rehabilitation
- To dispose of saleable assets

Soils

- To identify alternate use of as much of the infrastructure as possible
- To the extent to which it is reasonably feasible to do, to remove infrastructure not required in situ and restore the land to grassland.
- To cover mining areas with sufficient soil in order to maintain vegetation.
- To treat all soil pollution found during rehabilitation.

Land capability, surrounding land use and landscape character

- To identify alternate use of as much of the infrastructure as possible
- To the extent which it is reasonably feasible to do, to remove infrastructure not required in situ and restore the land to grassland
- Investigate what infrastructure can have alternative uses
- Remove all un-sealable infrastructures where it is reasonably feasible to do so.
- Reinstate mining land to grasslands infrastructure where is it reasonably feasible to do so.
- To hand over land to a person interested in developing the land.

Natural vegetation

- To achieve self- sustaining vegetation on all rehabilitated areas.
- To treat soil allowing vegetation to sow itself in areas not implemented for other use.

Surface water

- To minimise the risk of escape of polluted water from the mine property into natural watercourses.
- To reduce, as far as reasonably feasible, the contamination of surface water thus obviating the need to treat excessive quantities of polluted water.
- To measure water quality chemical/bacteriological and submit reports – action any anomalies.
- Discharged water shall be treated to meet applicable discharged water quality standards.

Groundwater

- Minimise all long term affects which individual facilities may have in terms of quality on other groundwater users.
- To measure water quality chemical/bacteriological and submit reports – action any anomalies.

Air quality

- Dust emanating from rehabilitated land should not exceed normal levels associated with agricultural and residential areas..

Noise

- To remove all sources generating noise

Visual aspects

- Limit long term visual impact of mining activities.

Regional socio-economic aspects

- To leave structures and infrastructures for future use where appropriate
- To hold meetings with I&AP- communicate any changes
- To hand over to any persons interested to take-over property after closure

1.2.2 Objectives of the mine Closure process

The objective of the mine Closure process is to ensure that with regards to the various elements of the environment, the above objectives are met. In order to achieve these objectives:

- To achieve the optimal form of land use for the mining right area commensurate with the needs of local communities and South Africa as a whole;
- To achieve closure within a realistic financial framework which is acceptable to the stakeholders involved;
- To leave behind a land use and infrastructure assets which meets the needs of the present without compromising the ability of future generations to meet their own needs;
- To ensure that all arable land, grazing land, wetland and wilderness areas are left behind as self-sustaining land assets for the use of future generations; and
- To ensure, as far as is practically possible, that all mining infrastructure, which cannot be used or demolished, is rendered safe to humans and animals alike

1.2.3 Closure objectives:

The objective for the post-closure land use is to rehabilitate the land to a stable condition. The final land use will agriculture. Refer to Section 1 (EIA) of this document for a description of the pre-mining and current land use.

1.2.3.1 General

- Prior to applying for mine closure; a detailed risk assessment will be conducted to determine the potential residual and latent impacts associated with the Closure of the mine.
- A Closure Plan will be developed in accordance with the requirements of the Minerals Petroleum Resources Development Act (Act 28 of 2002), Regulation 57(a). Furthermore, closure objectives will be set in accordance with Regulation 61 and 62(a).
- Ngululu Resources will continue to investigate and quantify the residual impacts associated with the mining and related activities so as to ensure the identification, investigation and implementation of suitable mitigation.
- In order to ensure that rehabilitation was effective; the aftercare maintenance of the site will take place after mining operation has ceased.
- The rehabilitation will continuously be monitored to determine whether the practices are effective. If erosion and limited re-vegetation takes place a detailed assessment of the seed mixtures and possible fertilizer to be used, will be done. Once the mining activities have ceased two (2) - year monitoring will take place to ensure that the practices were effective.
- Backfill or re-contour strip-mined or contour-mined areas with excess excavation material generated during construction (TEEIC).
- Thorough monitoring of biological, hydrologic, and geochemical conditions will take place.
- Activities near aquifer recharge areas will be monitored to reduce potential contamination of the aquifer (TEEIC).

- Divert surface water (clean water) flowing towards the site of pollution will be diverted.
- Groundwater infiltration to a potentially polluting site will be prevented.
- Hydrological water seepage into the affected areas as well as controlled placement of Acid Mine Drainage (AMD) generating waste will be prevented.

1.2.4 Rehabilitation

1.2.4.1 Rehabilitation plan

The major goal for surface mine rehabilitation is to ensure the adequate rehabilitation of all areas disturbed by the mining operations. The rehabilitation of the mining area takes place in line with the actions described in this section. Rehabilitation is scheduled in accordance with the financial provision and rehabilitation budget over the life of the mine.

Rehabilitation will continuously be monitored to determine whether the practices are effective. If erosion and limited re-vegetation takes place a detailed assessment of the seed mixture and possible fertilizer to be used will be done. Once the mining activities have ceased monitoring will take place to ensure that the practices are effective. Monitoring will take place until a closure certificate is issued by DMR.

The rehabilitation objectives are as follows:

- To rehabilitate the area as close as possible to its former state (agricultural land)
- To slope the landscape to a gradient in line with the current slope
- The area will be made free draining to prevent ponding of water to occur.

A roll-over system which ensures continuing rehabilitation during the operational phase is compulsory. An integrated rehabilitation plan should be drawn up. A soil stripping study should be conducted and stripping of different soil types should take place at depths according to the soil stripping study.

The rehabilitation process which include shaping of spoil surfaces and stripping and replacing of topsoil should be monitored continuously by a competent third party (a soil specialist registered at the South African Council for Natural Scientific Professions). The rehabilitation process should be documented and the post-mining land capability in terms of arable crop production should be verified by actual arable crops for at least 3 consecutive years to be used for future references. This will be the only way to ensure that rehabilitation of high standards take place. Failure to do this will result in failure to restore soil potential, land capability and land use close to pre-mining conditions which implies deterioration of the most important natural resource which provide national food security.
Currently the mine does not have a detailed rehabilitation plan. A detailed rehabilitation plan will be compiled and submitted to DMR.

1.2.4.2 Monitoring of Effectiveness of Rehabilitation

The monitoring of the compliance with the commitments made in the EMP will be done on an annual basis in line with the performance assessment requirements as stipulated in the Minerals and Petroleum Resources Development Act.

To monitor the effectiveness of the rehabilitation the following aspects will be monitored:

- Assess species diversity compared to surrounding area and vegetation study as per EMP
- Identify areas of erosion
- Identify any invader plant occurrence on rehabilitated area.
- Identify disturbed sensitive areas (wetland and the red data species) and include these areas in the rehabilitation plan.
- On a regular basis, verify alignment between the rehabilitation plan and the post mining topography. Furthermore, aspects such as backlog to rehabilitation should also be noted with timeframes within which this will be .
- Further, more detail, as part of the vegetation commitment, should be provided on the management of alien and invasive species, as well as indigenous and red data species.
- For each phase of the rehabilitation, ensure that detailed rehabilitation standards have been defined. Further to this, ensure training on these procedures, with regular audits undertaken to assess compliance against the requirements as set out within these procedures.
- To ensure sustainability in respect to rehabilitation, and to motivate such, it is critical to conduct at least annual assessments on the effectiveness of rehabilitation, and to track this over time. These assessments will also identify aftercare requirements, and input to future reviews of the rehabilitation standards.
- Ensure that records of any effective rehabilitation sign-off are kept on file (critical record).
- Develop detailed standards for aftercare and maintenance, which must include aspects such as vegetation and soil surveys, erosion inspections and other parameters which will ensure long term sustainability of rehabilitation (develop Aftercare and Maintenance Programme).
- All rehabilitated land and infrastructures will be maintained as described in the previous sections for a period of three years after operations in that particular area have ceased.
- For each facility the maintenance on vegetation will be maintained for 18 months after germination. Once rehabilitation has been completed, a three year period will be allowed to ensure that this vegetation is self-sustaining. If so, a partial closure certificate will be applied for. If not, a contingency sum will be allowed for in the trust fund to bring the vegetation to this self-sustaining level.

1.2.4.3 Control of Invader Plants

Alien invasive species that were identified within the study area should be removed. By removing these species, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation.

- All alien seedlings and saplings must be removed as they become evident for the duration of mine operation and after closure.
- Manual / mechanical removal is preferred to chemical control.

All construction and operation vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction areas. This should be verified by the SHE Manager.

Implement an alien invasive plant monitoring and management plan whereby the spread of alien and invasive plant species into the rehabilitated areas are regularly removed and re-infestation monitored for at least five years.

- The area should be re-landscaped and resemble the land form prior to the open cast activities.
- The areas should be planted within indigenous vegetation typical of the area.

1.2.4.4 Control of red data and indigenous species

The 'Declining' plants must be removed if situated within the planned mining and associated infrastructure footprint. These plants should be replanted during rehabilitation, only if its habitat (moist grasslands) will be recreated. If the plants cannot be conserved *in situ* or replanted as part of rehabilitation, the plants must be relocated to conserved areas.

These plants can only be removed and relocated with permission (permit) from the Mpumalanga Tourism and Parks Agency (MTPA).

A vegetation rehabilitation plan should be implemented. Grassland can be removed as sods and kept in suitable growing conditions. The sods must preferably be removed during the winter months and latest springtime. Relocation of the sods should be into suitable moist growing conditions. In the absence of timely rainfall, the sods should be watered well after planting and at least twice more over the next 2 weeks. These sods can be used in the eventual rehabilitation of the open cast footprint.

The presence / absence of K typhoides in wetland areas should be confirmed during its flowering time (likely February)

- Where possible, the *Crinum bulbispermum* plants should be conserved in situ and their survival monitored during spring and summer for the duration of the operation and at least 3 years after closure.

Implement a Plant Rescue and Rehabilitation Plan: Where the *Crinum bubispermum* plants are deemed to be under threat from the open cast footprint, the plants should be removed by a qualified specialist and replanted into suitable conserved areas, or maintained under suitable growing conditions until such time that it can be replanted as part of rehabilitation. The survival of these plants in their new habitat must be monitored for at least five years and corrective action taken, when it is

found that the plants are not adapting. Note that these plants may only be removed with the permission of the provincial authority (MTPA).

- *Crinum bulbispermum* should be removed when dormant (winter months) and relocated prior to first growth in spring. The bulbs should not be watered during winter.
- Workers may not tamper or remove these plants and neither may anyone collect seed from the plants without permission from the local authority.
- It must be noted that plant removal and relocation measures are no substitute for *in situ* conservation and, although they may appear to be effective in the short term, have a net effect of shrinking the distribution of the species and increasing their vulnerability to extinction.

The area should be re-landscaped and resemble the land form prior to the open cast activities.

- The areas should be planted with indigenous vegetation typical of the area and monitored to ensure that the vegetation progresses through succession stages.
- Monitoring of the rehabilitation success as well as the survival of *Crinum bulbispermum* on the site should take place for at least five years and include corrective follow-up action.
- It is recommended that Landscape Functional Analysis (LFA) forms part of the rehabilitation and monitoring process. Landscape function analysis is a process-based technique that was developed specifically to track post-disturbance recovery of ecosystems. It aims to restore specific and measurable elements of ecosystem function rather than focusing purely on attaining floristic targets and thresholds e.g. nutrient cycling, increase in vegetation patches and infiltration are measured (Tongway & Hindley, 2004).

1.2.4.5 Control of wetland area

No construction / activities should be undertaken within the moist soils until a Water Use License is granted by the Department of Water Affairs (DWA).

- Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area (DWAF, 2005).
- Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to work areas.
- Prevent polluted water from reaching the watercourse and surrounding moist grasslands.
- Trucks and equipment should only be washed in dedicated areas and the dirty water is not allowed to discharge into the watercourse or surrounding natural vegetation.
- During rehabilitation, colonisation of the disturbed areas by plants species from the surrounding natural vegetation must be monitored to ensure that vegetation cover is sufficient within one growing season. If not, then the areas need to be rehabilitated with a grass seed mix containing species that naturally occur within the study area.

Cordon off the main mine infrastructures from the surrounding natural vegetation and wetland areas to prevent any disturbances into the surrounding areas.

- Contain sediment and turbidity at the open cast and work sites by installing diversion or containment structures.
- Place and maintain erosion control barriers as appropriate to prevent sedimentation into the watercourse and moist grasslands.
- Keep sediment barriers in place until restoration is complete.
- Stockpile topsoil and organic surface material such as root mats separately from overburden and return it to the surface of the restored site where feasible.
- Systematically remove vegetation as needed, storing it in a manner to retain viability, and replacing it after operation where feasible.
- Rehabilitate on an ongoing basis.
- All overburden and soils shall be left in a configuration which is in accordance with accepted conservation practices and which is suitable for the proposed subsequent use of the land.
- An ecologically sound, storm water management plan must be implemented, including all measures as set out above

Rehabilitation and potential erosion problems should be monitored for at least 5 years after closure.

- Monitoring should result in corrective action taken immediately to remediate erosion or failed rehabilitation.
- Ensure that rehabilitated areas are free draining.
- Topsoil should not be compacted during the rehabilitation process.
- Keep sediment barriers in place until restoration and rehabilitation is complete.
- Prevent grazing from livestock within the first 2 to 3 years after rehabilitation and prevent access to rehabilitated areas until such time that rehabilitation was successful.
- If the plants were replanted as part of rehabilitation, the survival of the population of the 'Declining' *Crinum bulbispermum* must be monitored and if the plants are under threat, they should be removed with the permission of the approving authority and transplanted to suitable habitat.

1.2.4.6 Soil Rehabilitation

1.2.4.6.1 Construction Phase

Stripping and stockpiling of topsoil within the footprint of the proposed opencast area will probably commence during the construction phase but will be an ongoing action during the operational phase as the opencast expands.

1.2.4.6.2 Operational Phase

Soil Utilisation Guide

Sustainable development implies development with as little damage to natural resources as possible. Stripping and stockpiling of topsoil is a very high impact on the most valuable and less reparable natural resource in the world. The cumulative impact by opencast mining on high potential soils in

South Africa became devastating. Proper planning, management and execution of rehabilitation procedures are therefore crucial. The ability to do proper rehabilitation depends on precise stripping and replacing of topsoil and proper shaping of spoil surfaces.

As part of the soil stripping study to be conducted a soil utilisation plan should be included. This soil utilisation guide should be implemented during the operational phase.

Stripping and Stockpiling

The project description states that the first 3 months will be dedicated to stripping and storing of topsoil and the establishment of storm water diversion channels to ensure compliance with GN 704 of 4 June 1999.

According to the BFAP report, Stockpiling is a process in which the different layers of topsoil (A-G) are removed separately and dumped on separate sites, to replace them back in future as the final topsoil. The process includes the following:

- The A and B-horizon should be stripped and stockpiled separately as specified by the Chamber of Mines (Guidelines for the rehabilitation of mined land, Section 3.2). Each stockpile should consist of a section for both the A and B-horizons. The A and B-horizon sections should be marked with a signboard.

- The A and B-horizon should be replaced in the same sequence on top of the soft overburden material. The fairly higher organic carbon content of A-horizons provides a buffer against compaction and hard setting. The A-horizon is also a seed source which will escalate the re-establishment of natural species. When B-horizons are replaced on the surface, they tend to seal and compact severely, which intensifies runoff and causes erosion.

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

The depth of stockpile must not be more than 2.5 to 3 m. Soil should be stockpiled away from any underlying spoil material and cross-contamination should not be allowed. The soil stockpiles should be stabilised and terraced on the downslope side to avoid erosion of the stockpiles by water runoff. The stockpiles should be re-vegetated using a creeping indigenous grass seeding to ensure stability as well as possible material accumulation.

Topsoil stockpiles degrade during long-term stockpiling. It loses organic content and fertility. The pH and fertility levels need to be optimal for crop production. It is expensive to reach and sustain and does not occur naturally. Rehabilitation should start as soon as possible.

Replacing of topsoil

Proper stripping and stockpiling of the original soil types is the first key to proper rehabilitation which will enable the reconstruction of the pre-mining land capability as far as possible.

Proper shaping of the spoil layer to a freely drained surface and as close to the original topography as possible is the second key to proper rehabilitation. Failing in these 2 critical requirements will definitely adversely affect the post-mining land capability even with other rehabilitation requirements at its best.

The soils should be placed back in consolidated blocks with a pre-assigned land capability class for each block to prevent frequent varying depths which lead to small fragmented land capability units. The land capability class will be determined by the soil type and the thickness of the soil layer placed back on the spoil surface.

Topsoil should be dumped in sufficient quantities to allow a once-off levelling on top to prevent compaction in the lower soil profile which cannot be alleviated with normal agricultural equipment. Topsoil should not be spread over distances with dozers and bowl scrapers should not be used. These precautions will ensure that the rehabilitation process meet the EMPR commitments for closure purposes.

The opencast area should be rehabilitated to the post-mining proportions of land capability according to the soil stripping study and the soil utilisation guide:

The soil fertility status of the rehabilitated land should be determined and soil amelioration should be take place accordingly before re-vegetation takes place.

Spoil and cover-soil surfaces will be shaped to allow free drainage throughout the area to prevent water logging and subsidence

1.2.4.7 Infrastructure Rehabilitation

- During the decommissioning phase all non-operational structures and associated infrastructure will be demolished and removed from site.
- All equipment not being utilised will be removed from site.
- All concrete foundations and contaminated underlying soil will be handled in terms of the closure plan.
- On the removal of all buildings and related infrastructures, the surface will be rehabilitated to a pre-determined standard. A rehabilitation programme, as part of the closure plan, is to be implemented to ensure that the area is completely rehabilitated.

- The pollution control dam and all other water management structures will be rehabilitated in accordance with the water management strategy to be developed. The fence and access gate around the dam will remain and be adequately signposted
- The access roads will remain open to allow access for maintenance and inspections. Any roads that do not require usage will be ploughed and vegetated.
- The pump station buildings will be stripped and all pumps and associated equipment removed, once these facilities are no longer of use to the rehabilitation programme. All overland pipelines and plinth will be removed.
- All the fences and access gates will remain and be adequately signposted.

2 Description of environmental objectives and specific goals for the management of identified environmental impacts emanating from the mining operation

2.1 List of identified impacts which will require monitoring programmes

Refer to sub-section 7 of Section 1 (EIA), for a complete description of the monitoring for the mine.

2.2 List of the source activities that are the cause of the impacts which require to be managed

Refer to sub-section 7 of Section 1 (EIA), for a complete description of the source activities that are the cause of the impacts that require to be managed.

2.3 Management activities which, where applicable, will be conducted daily, weekly, monthly, quarterly, annually or periodically as the case may be in order to control any action, activity or process which causes pollution or environmental degradation

Refer to sub-section 7 of Section 1 (EIA), for the management activities which, where applicable, will be conducted continuously, daily, weekly, monthly, quarterly, annually or periodically as the case may be in order to control any action, activity or process which causes pollution or environmental degradation.

2.4 The roles and responsibilities for the execution of the monitoring and management programmes

Refer to sub-section 7 of Section 1 (EIA), for the roles and responsibilities for the execution of the monitoring and management programmes.

3 Description of environmental objectives and specific goals for the socio-economic conditions as identified in the social and labour plan

3.1 Human resources development plan

The primary objectives of the human resource development program are:

- To maximise positive job creation related impacts of the mine on the local community through skills transfer, bursaries, internships, learnerships etc.
- To facilitate the availability of mining and related skills and competencies of the workforce through mentorship, training and other means.
- To provide workers with a fair opportunity for career progression.
- To facilitate the transformation of the mining industry.
- To provide workers with portable skills utilisable outside the mining industry.

The mine will seek to contribute to the economic, social and educational well-being of its employees and communities (associated with their operations), which will include local business development and providing opportunities for workers from disadvantaged backgrounds.

The mine fully subscribes to the principles of the Mining Charter regarding the empowerment and employment of historically disadvantaged South Africans, including women in mining in order to achieve the representative targets.

3.2 Employment equity plan

The purpose of the plan is to ensure diversity as well as participation of HDSA at all decision-making positions and core occupational categories in the mining industry.

The mine is committed to protect all employees against unfair discrimination, and all forms of racism. The mine also commits to the promotion of equal opportunity for all employees and will guard against any form of unfair discrimination in any policy. Policies will be drafted to include aspects such as transformation, gender, language, disability, HIV/AIDS, culture and religion, sexual harassment and race in order to achieve employment equity.

Specific dispute resolution mechanisms are to be put into place in conjunction with the mentorship programme in order to deal with matters pertaining employment equity. This process needs to be driven on a multi-dimensional level and all relevant stakeholders should be included in the resolution mechanism.

Transformation at the mining operation is aimed at enhancing the opportunities and quality of life of especially that group of employees that can be described as HDSA's. Transformation is also a

measure designed to redress the imbalances of the past, and to ensure equality of opportunity and diversity so as to prepare HDSA's to equally compete for vacant positions, and to confidently compete for positions in sections of the mine other than that specific section they start-up in.

3.3 Mine community development

The primary objective of mine community development is to meaningfully contribute towards community development, both in terms of size and impact, in keeping with the principle of the social license to operate.

3.4 Measures to address housing and living conditions

The mine is proposed near the settlements where the workers will reside with their families. Therefore, the mine does not need to provide additional housing

3.5 Processes pertaining to management of downscaling and retrenchment

As mentioned earlier, training in both industry related and non-industry related skills will be conducted. These skills will equip employees with marketable skills in the mining, industrial and private business sectors, helpful when/if downscaling does happen.

Ngululu Resources's Future Forum will be established and in operation within 6 months after mining right is obtained. Ngululu Resources's Future Forum will enable both management and workers to be proactively involved to prevent job losses.

Ngululu Resources's Future Forum is a partnership between the management, the workers and their representatives. The Future Forum will identify and analyse problems in an organisation in good time, look ahead to identify problems, challenges and potential solutions, which will be debated openly, and as early as possible. Together they will devise appropriate solutions to the identified problems, and implement solutions in a properly planned manner.

To remain economically viable and competitive, Ngululu Resources will engage in serious strategic planning and evaluate progress at regular intervals. Early warning systems will be put in place. As soon as potential problems are identified, turnaround or redeployment strategies will be developed. If necessary, Ngululu Resources will then apply for government funds to partially subsidise the cost of strategic interventions The Future Forum will notify the Minister of Labour as soon as possible and then seek Social Plan assistance to support implementation of its plans. Ngululu Resources's Future Forums will:

- Promote ongoing discussions between worker representatives and employers about the future of the industry sector and/or the organisation;

- Look ahead to identify problems, challenges and possible solutions;
- Develop turnaround or redeployment strategies to help reduce job losses and to improve business sustainability;
- Structure and implement proposals agreed on by both the employer and the worker parties.

4 Description of environmental objectives and specific goals for historical and cultural aspects

4.1 Environmental objectives and goals in respect of historical and cultural aspects identified in specialist studies conducted during the EIA phase

Refer to sub-section 7 of Section 1 (EIA), for the description of environmental objectives and specific goals for historical and cultural aspects.

Regulation 51 (b)

5 Appropriate technical and management options chosen for each environmental impact, socio-economic condition and historical and cultural aspect in each phase of the mining operation

5.1 Actions, activities or processes, including any NEMA EIA regulation listed activities, which cause pollution or environmental degradation

Refer to sub-section 7.1 of Section 1 (EIA), for a complete description of the actions, activities or processes; including any NEMA EIA regulation listed activities, which cause pollution or environmental degradation.

5.2 Concomitant list of appropriate technical or management options chosen to modify, remedy, control or stop any action, activity, or process which will cause significant impacts on the environment, socio-economic conditions and historical and cultural aspects as identified

Refer to sub-section 7.1 of Section 1 (EIA), for a concomitant list of appropriate technical or management options chosen to modify, remedy, control or stop any action, activity, or process which will cause significant impacts on the environment, socio-economic conditions and historical and cultural aspects as identified.

6 Action plans to achieve the objectives and specific goals contemplated in Regulation 50 (a)

This chapter serves the purpose of providing information with regards to the action plans that will take place. Also refer to the risk assessment in sub-section 7 of section 1 (EIA) for objectives to be achieved through these action plans. These action plans are as follow:

Table 35: Action Plan for the implementation of the commitments in this EMP

No.	Commitment	Timeframes
Geology		
1.	No mining to take place on portion 46 and 47 of the farm Droogefontein 242IR.	At all times.
Soils		
2.	Duplicate pre-existing soil/ rock profile by placing coal spoils and other carbonaceous material at the bottom of the pit followed by clayey layer and compaction.	During concurrent rehabilitation.
3.	Hydrocarbons and other potentially contaminating materials will be stored within suitable lined or bunded areas.	At all times.
4.	Servicing of vehicles and equipment will only be undertaken within workshops that are equipped with suitably lined floors and hydrocarbon spillage management equipment.	At all times.
5.	Any spills of hydrocarbons or other contaminating substances will be recorded, reported and cleaned immediately using appropriate methods.	Reporting of spillages to authorities within 14 days.
6.	Hazardous waste will be stored within suitably bunded areas before being removed by a suitably qualified contractor to an appropriately Licensed waste disposal facility.	At all times.
7.	Records of the volumes of hazardous waste removed, as well as of the actual disposal of the waste at a Licensed disposal site will be obtained from the contractor and kept on record by the mine.	At all times.
8.	A topsoil balance and management plan will be developed prior to onset of mining activities.	The Soil Management Plan (including soil balance) will be submitted to the DMR by October 2014.
9.	Erosion will be prevented as far as practicable.	Continuously until Closure is obtained.
10.	Surface areas over which soils are impacted will be minimised as far as possible.	Continuously until Closure is obtained.
11.	If new infrastructure is erected, or if additional surface land use areas are disturbed during the Life of Mine, the soils will be characterised by a suitably	Prior to the commencement of

No.	Commitment	Timeframes
	qualified person and the pre-activity state of the soils will be documented prior to the stripping and stockpiling of the soil that will take place before the implementation of the activity for later use during rehabilitation.	construction and / or expansion activities.
12.	Topsoil stockpiles will be limited to 3 m in height.	Continuously, when necessary as part of construction of new infrastructure.
13.	Erosion of topsoil stockpiles will be minimised.	Continuously, when necessary as part of construction of new infrastructure.
14.	Appropriate rehabilitation methods and strategies will be identified for the purpose of establishing the best practical measures that when implemented will ensure the long-term sustainability of the soils within rehabilitated surface land use areas.	The Rehabilitation method and strategies will be submitted to the DMR by October 2014.
15.	A Code of Practice for all Mine Residue Deposits will be developed prior to onset of the mining activities.	The Code of Practice will be submitted to the DMR by October 2014
Land Capability and Land Use		
16.	Ensure that rehabilitation measures are implemented immediately after coal seams have been exhausted. Rehabilitation measures must ensure that the landscape is returned to a natural state by suitably fertilising and re-vegetating the land.	During concurrent rehabilitation. The Rehabilitation plan will be submitted to the DMR by October 2014.
17.	Site-specific end land use objectives will be identified by the mine in conjunction with the relevant Authorities and I&APs as part of Closure Planning.	The Closure plan will be submitted to the DMR by October 2014.
18.	Depending on the historical conservation value of redundant infrastructure, and the site-specific end land use objectives to be identified, redundant infrastructure will be removed and, depending on the end land use, the remaining footprint areas will be rehabilitated to the agreed end land capability.	Continuously, when necessary, as part of the removal of redundant infrastructure.
Vegetation		
19.	If any Red Data, protected or other plant species of biodiversity significance is found within the mining area, mitigation and management measures for the protection and conservation of any species of conservation importance found within the mining will managed in accordance to the vegetation study.	At all times.

No.	Commitment	Timeframes
20.	Depending on the agreed end land use objectives, identified surface land use areas that were disturbed during the Life of Mine will be rehabilitated, reshaped and re-vegetated. Rehabilitation activities will include the re-establishment of naturally occurring vegetation and in such a manner so as to ensure a self-sustaining ecosystem	End land use planning to be conducted and submitted to the DMR by October 2014; implemented continuously.
21.	Haulage of coal material from the mine will be limited to the designated haul roads.	At all times.
22.	An alien / invader plant species control programme will be developed by a suitably qualified person and implemented by the mine.	An alien / invader plant species control programme to be submitted to the DMR by October 2014; implemented continuously, audited annually.
23.	Compliance of the mine to the alien vegetation programme will be determined on an annual basis. The findings of such an audit will also be used to improve the effectiveness and applicability of the alien vegetation control programme, if necessary.	Annually.
24.	Fire breaks will be implemented around rehabilitated areas.	Continuously.
Animal Life		
25.	No poaching or illegal killing of animals within the mine boundary of mine will be allowed.	At all times.
26.	A low speed limit will be enforced on vehicles driving within the mine boundary.	At all times.
27.	Offenders not complying with the speed limits of the mine during the Operation Phase will be warned and possibly fined.	At all times.
28.	Employees of the mine will be educated on the importance of the conservation of animal life, amongst others.	Annually
29.	Employees of the mine are discovered poaching will be warned and fined.	At all times.
30.	A Traffic Study will be conducted prior to onset of the mining operations.	A Traffic Study to be submitted to the DMR by October 2014.
Surface Water		
31.	Rate and volume of water infiltration should be minimised by compaction and capping.	At all times.
32.	The final cut or pit should be filled to resemble the pre-mining in-situ profiles with the coal spoils and carbonaceous materials (mudstones) in the bottom followed by the higher neutralising potential rocks such as the sandstones and tillites and finally by a clay and topsoil layer. The clay layer should be as clayey as possible	During concurrent rehabilitation.

No.	Commitment	Timeframes
	to limit water infiltration.	
33.	No process water will be used on the mine.	At all times
34.	No construction of any water management measures, such as the return water/dirty water dam or the haul roads will be undertaken with carbonaceous material.	At all times.
35.	A Water Management Plan should be developed for the mine and would include an: • erosion and sediment control plan; • surface water and groundwater monitoring; • a surface water and groundwater response plan; • water levels, yield and quality in the region, and privately owned boreholes; • details of the groundwater monitoring program including monitoring locations, parameters and • frequency of sampling; • groundwater assessment criteria for investigating any potentially negative groundwater impacts; • Description mitigation options to be implemented if other groundwater users are negatively affected by the mine. • Implement minimum design flood specifications.	A Water Management Plan to be submitted to the DMR by October 2014.
36.	Establish appropriate purpose-designed infrastructure around opencast pits to divert surface water runoff around the pits.	During construction phase.
37.	Depending on the end land use objectives, the final void will be rehabilitated in situ and will be shaped to divert clean runoff water to the surrounding catchment.	End land use planning to be conducted and submitted to the DMR by October 2014; implemented during construction.
38.	Footprint areas remaining subsequent to the removal of redundant surface infrastructure will be reshaped to ensure free drainage.	Within 3 months of removal of redundant surface infrastructure.
39.	The surface water and groundwater monitoring programmes will be implemented at the mine for the purpose of determining the current and long-term impacts on the surface water and groundwater components.	Surface water monitoring should be conducted on a monthly basis and groundwater monitoring on a quarterly basis.
40.	The water management system infrastructure within the mining area will be inspected regularly and maintained when necessary by a suitably qualified	Inspected monthly and after extreme

No.	Commitment	Timeframes
	person.	rainfall events. Maintained when necessary.
41.	Measures will continuously be investigated and if feasible be implemented to optimise the use of water and thus reduce the volumes of water required for the successful operation of the mining and related activities.	Continuously until Closure is obtained.
42.	The potential for contaminated water generation will be minimised as far as practicable.	At all times.
43.	Clean water will be separated from dirty water, as far as practicable, possibly through the implementation of silt traps in strategic localities.	At all times.
44.	Establishment of a network of monitoring boreholes placed in the mining area as well as upslope and downslope is required as part of the monitoring programme that must be reported to DWA and DMR.	At commencement of mining. Report Annually.
45.	No discharge of contaminated water containing waste to the receiving environment will occur without the required authorisation(s).	At all times
46.	Hydrocarbon management measures will be implemented to ensure that surface water contamination is prevented.	At all times.
47.	All contaminated water will be re-used for dust suppression, to limit the intake of raw water from the municipality.	Continuously until Closure is obtained
48.	Implement and maintain proper storm water management infrastructure in compliance with GN704 of 4 June 1999.	Continuously until Closure is obtained
49.	The water balance to be conducted will be updated frequently to reflect the current situation of water management at the mine, as well as to comply with the requirements of the DWA as indicated in the relevant Best Practice Guidelines. The water balance will be interactive and will allow for flexibility in terms of alterations to the water management system, in order to ensure that the water balance reflects the actual situation at the mine at all times.	Water Balance to be compiled as part of the IWULA and submitted to the DMR by October 2014.
50.	Once an Integrated Water Use Licence has been issued by the DWA to the mine, the mine will implement all conditions in the Licence. No water use activities will be undertaken without an approved water use license.	At all times.
51.	Dirty water holding facilities will be managed properly and mitigation measures will be implemented to minimise associated impacts.	At all times.
52.	The mine will investigate the necessity of implementing additional storm water measures such as berms around the opencast areas. This will ensure that clean water is diverted around dirty water management areas.	At all times.
Groundwater		
53.	Ensure that site preparation includes sealing of substrate before developing waste rock and tailings facilities.	Prior to the commencement of construction and / or expansion of waste rock and tailings facilities.

No.	Commitment	Timeframes
54.	Rehabilitated areas will be reshaped to prevent excessive ponding of surface water which may also result in groundwater impacts.	During Rehabilitation.
55.	All dams will be lined in an effort to minimise the seepage of poor quality leachate.	During construction of the dams.
56.	The dewatering of the aquifer system cannot be prevented. If the monitoring program indicates that nearby groundwater users are affected by the dewatering, the users need to be compensated for the loss.	Continuously.
57.	Ensure adequate basal sealing of areas where stockpiles and waste rock dumps are to be placed.	Prior to the commencement of construction and / or expansion of stockpiles and waste rock dumps.
58.	All external users' boreholes within a 2 km radius of any mining activities must be monitored for water level response.	Quarterly as part of the groundwater monitoring program.
59.	Concurrent rehabilitation should follow the pre-mining in-situ profile with coal spoils and carbonaceous material placed in the bottom beneath the water table which should be followed by the high neutralising rock (sandstone/tillite) and finally a the clay and topsoil layer.	During concurrent rehabilitation.
60.	Water accumulating in the active cut and excess seepage from spoils/rehabilitated areas, must be pumped out or used during the operational phase as soon as possible, as to prevent the acidification of large volumes of water in the active cuts.	During Operational Phase.
61.	Water pumped from the operational open cast mines should be categorised as contaminated and should be discharged/stored in water pollution control facilities.	Continuously.
62.	Coal spoils and carbonaceous material should be placed beneath the water table to limit the ingress of oxygen.	During concurrent rehabilitation.
63.	All opencasts should be backfilled and flooded as soon as possible to limit the ingress of oxygen and oxidising the remaining pyrite or other sulphidic minerals.	During concurrent rehabilitation.
64.	Measures will be put in place during decommissioning to manage all pit water as part of the mine post-closure water balance	Post Closure Water Balance to be conducted and submitted to the DMR post Closure; implemented during Decommissioning Phase.
65.	The most important aspect which needs to be addressed is the establishment of a facility for the collection and treatment of decanting mine water.	Strategy for Mine water decanting

No.	Commitment	Timeframes
		management to be conducted and submitted to the DMR by October 2014; implemented during Closure.
66.	Boreholes will be drilled in accordance to the groundwater monitoring programme to monitor all possible pollution sources to ensure that the direction and rate of movement of the pollution plume(s) can be determined. Sufficient groundwater level and quality monitoring will be instated around the open pits and pollution source areas (wastewater facilities). The placing of the groundwater boreholes will be undertaken by a qualified geohydrologist.	Boreholes to be drilled prior to construction. Monitoring to be done quarterly.
67.	In the event of a diesel or oil spill, the affected area will be cleaned immediately to prevent / limit seepage of the hazardous waste to the groundwater.	Reporting of spillages to authorities within 14 days.
68.	Pollution of the groundwater resources will be prevented as far as possible.	At all times.
69.	Groundwater monitoring will be undertaken throughout the Life of Mine to indicate the occurrence of any groundwater impacts towards groundwater quality.	Quarterly, until Closure is obtained.
70.	Additional mitigation measures will be implemented at the mine should it be evident from the groundwater monitoring results that the groundwater quality within the study area are deteriorating due to current mining activities.	As required.
71.	The surface of the mining and related areas will be kept free-draining, as far as practical, to prevent ponding of contaminated surface water which may lead to seepage to the groundwater.	Continuously until Closure is obtained.
72.	The extent of disturbance to the aquifer will be minimised.	Continuously until Closure is obtained.
73.	The commitments made in the IWULA to be conducted pertaining to the groundwater management aspects will be implemented at the mine. This will reduce further impacts on the groundwater regime, possibly reducing long-term environmental liabilities.	On-going until issue of Integrated Water Use Licence by the DWA.
Air Quality		
74.	Conduct a feasibility study to determine the cost and management implications of dust suppression on the different mine haul roads an open pit operations using water or other chemical suppressants.	Feasibility study for dust suppression to be conducted and submitted to the DMR by October 2014.
75.	Particulate emissions can be reduced by increasing the truck payload, as fewer trips will be required to transport the same amount of material.	During the Operational Phase.
76.	The surface of unpaved roads should be properly maintained by grading and shaping for cross sectional crowing	Continuously.

No.	Commitment	Timeframes
77.	Wind breaks and establishment of vegetation on overburden stockpiles should be constructed to prevent wind erosion from these areas.	Continuously.
78.	Stockpiling of overburden and coal should take place according to the guidelines for rehabilitation of mined land developed by the Chamber of mines of South Africa/CoalTech.	At all times.
79.	A fugitive emission monitoring plan which consists of continuous monitoring of ambient PM10 and PM2.5 and dust fall out monitoring of TSP should be implemented. Monitoring should take place prior to establishment of the mining operations as well as throughout the LoM, to collect baseline information and record any increase as a direct result of the mining operations.	A fugitive emission monitoring plan to be conducted and submitted to the DMR by October 2014. Monitoring to commence before mining commences.
80.	Dust deposition is to be measurement according to the Society for Testing and Materials standard 1739- 98 methods recommended in SANS 1929-2004. This involves exposure of a standard bucket for a month, with weighing and chemical analysis of the dust collected. Weighing and chemical analysis is to be done by a suitable off-site or on-site laboratory.	Monthly.
81.	In order to act as dust filters, tree planting programmes must be instituted off-site, along the main gravel access road. Further management actions should be negotiated with the affected farming community and might include actions such as Compensations and Offsets or Rehabilitation and Restoration of the landscape.	Tree planting programme to be conducted and submitted to the DMR by October 2014. Negotiations to be conducted throughout LOM.
82.	Dust suppression will be undertaken on the haul roads, as well as on all gravel access roads within the mining area.	Twice daily.
83.	Dust suppression on the haul and access roads will be undertaken using effective dust control measures which will be managed properly to minimise surface ponding which may in return lead to groundwater impacts.	Continuously.
84.	The movement of vehicles within the mine boundary of the mine will be restricted to the haul roads, as well as to the roads accessing various areas of the mine. Speed limits will be enforced on the heavy vehicles transporting the coal material from mine to the processing plant.	At all times.
85.	The size of exposed areas subject to dust generation will be minimised.	At all times.
86.	Areas available for rehabilitation will be re-vegetated to minimise the exposed soil areas, depending on the end land use to be decided upon.	The Rehabilitation plan will be submitted to the DMR by October 2014.
87.	The dust generated from the mine will be monitored and incorporated into the dust monitoring programme to be conducted at the mine. Analysis and	The dust monitoring programme will be

No.	Commitment	Timeframes
	interpretation of all the dust monitoring data will be undertaken by a suitably qualified person. Dust fallout monitoring will continue to be implemented at the mine until Closure is obtained	submitted to the DMR by October 2014. Monitoring monthly; Reporting quarterly
88.	The mine will investigate the possibility of implementing air quality monitoring to indicate the effectiveness of the mitigation measures. This monitoring will indicate any rise in pollutants, where after proper mitigation measures will be implemented to prevent any significant impacts pertaining to air pollution on the surrounding environment, including any Interested and Affected Parties (I&AP's).	The air quality monitoring programme will be submitted to the DMR by October 2014.
Noise and Vibration		
89.	A blasting study will be conducted prior to onset of the mining activities.	The blasting study will be submitted to the DMR by October 2014.
90.	Handle and store blasting material according to manufacturing requirements.	At all times.
91.	Train staff and implement correct procedures for the handling of blasting material. Only qualified staff should handle these materials.	At all times.
92.	Speed limits on the haul and access roads will be enforced to limit the impact on the surrounding environment, biota and Interested and Affected Parties (I&APs) with regards to noise.	At all times.
93.	All equipment, machinery and vehicles will be maintained and regularly serviced to ensure no additional noise generation.	At least biannually.
94.	The activities such as loading and hauling of coal material will be limited to day time thus preventing nuisance noise to any I&APs.	Day time.
95.	The mining and related activities undertaken with mechanical equipment close to residential areas will be subject to the legal requirement for controlled noise areas, i.e. 69 dB(A) during day time (6h00 to 18h00 from Monday to Saturday) and the ambient noise plus 7 dB(A) for night time.	At all times
96.	Monitoring on hearing loss will be undertaken at the mine, the results of which will be documented and kept on file by the person responsible for environmental management at the mine.	Continuously
97.	A speed limit will be enforced on heavy vehicles used for transporting the coal material from the mine to the processing facilities, especially those situated outside of the mine boundary area.	At all times.
Sites of Archaeological and Cultural Interest		
98.	A grave management plan will be conducted prior to onset of the mining activities.	Grave Management Plan to be conducted and submitted to the DMR by October

No.	Commitment	Timeframes
		2014.
99.	Should the development proceed on Portion 26 then the graveyard would be impacted. Two possible mitigation actions can be considered. The first option is to fence-in, clean and manage the site within the development. This would entail providing access to descendants and family members to visit their graves and the drafting and implementing of a Graves Management Plan. The second option is the exhumation and relocation of the graves, after following a detailed social consultation process that will include the erection of site notices, radio and newspaper ads, meetings with community members, getting consent for the removals from family members and the obtaining of permits for the exhumation and relocation process	Grave Management Plan to be conducted and submitted to the DMR by October 2014.
Sensitive landscapes		
100.	In the event of impact or destruction of the wetland, a wetland management strategy will be developed, submitted and approved by the Department of Water Affairs prior to commencing with such activities.	Wetland management strategy to be conducted and submitted to the DMR and DWA by October 2014.
101.	Sufficient buffers must be established between the wetland area and the activity. The natural processes in the wetland area must also be allowed to continue	Prior to the commencement of construction and / or expansion of activities. Continuously.
102.	The proposed activity must not be established closer than 100m from the northern, western and southern boundaries of the project site. This will allow sufficient planted buffers to be established between the observers and the proposed activity. Planting programmes and landscaping should be undertaken in this zone	Prior to the commencement of construction and / or expansion of activities. Continuously.
Visual aspects		
103.	Suitable vegetation will be utilised for rehabilitation to ensure that the rehabilitated areas resemble the surrounding natural occurring vegetation.	Implementation – commence after any disturbance of vegetation and continue until rehabilitation is self-sustaining
104.	Visual barriers such as trees can be erected that could simultaneously interrupt noise transmission pathways and reduce air quality impacts during windy conditions.	Prior to the commencement of construction and / or expansion of

No.	Commitment	Timeframes
		activities.
105.	Depending on the agreed end land use objectives of the mine, redundant infrastructure will be removed and the remaining footprint areas will be rehabilitated.	Prior to Closure is obtained.
Regional socio-economic structure		
106.	An Economic study will be conducted prior to onset of the mining activities	An Economic Study to be conducted and submitted to the DMR by October 2014.
107.	A Social Impact Assessment will be undertaken as part of Closure planning for the mine, to assess the anticipated impacts of mine Closure, as well as to determine applicable and appropriate management measures that will mitigate the impacts on the employees and businesses that are dependent on the mine.	A Social Impact assessment to be conducted and submitted to the DMR by October 2014.
108.	The Social and Labour Plan will be implemented to minimise the anticipated impact of the imminent mine Closure on the employees of the mine.	At all times.
109.	The mine will continue with established community projects throughout the Operational Phase to strive in uplifting the local community.	Continuously.
110.	The mine will provide the employees with training and skills development to enable these employees to obtain employment elsewhere after the decommissioning of the mine, thus taking the Closure objectives of the mine into account.	Continuously until Closure is obtained.
Interested and Affected Parties		
111.	The owner of the land the mine is planned on will be impacted most severely and issues such as relocation of houses and broiler chicken facilities should be investigated for further compensation.	Prior to commencing of mining activities.
112.	Because most social impacts will result from environmental impacts (air pollution, water contamination, etc.) it is recommended that the mitigation measures listed in the comprehensive selection of specialist studies be adhered to. It is also recommended that those conditions be included in the EIR and EMPr, as well as the conditions of the authorisation, should the project be approved.	At all times.
113.	All of the activities and / or projects in which the mine is taking part will be documented and kept on file, so as to be accessible for future audit purposes or available for anyone's perusal, should it be necessary.	Continuously until Closure is obtained.
114.	Consultation between the mine and I&AP's such as DWA, DMR, MDEDET and the Municipality, will continue.	Continuously.
115.	A complaints register will be kept at the mine to record I&AP's issues, the name and contact details of the I&AP lodging the complaint, the date on which the complaint was lodged, the action taken to correct the problem, the date on which	At all times.

No.	Commitment	Timeframes
	corrective action was taken, and the date on which the I&AP was notified of the corrective action taken. The other identified I&APs should also be notified when the action has been taken.	
116.	A structured compensation protocol, to be compiled in consultation with external users, will be commissioned for the open cast mine area. This protocol will control alternative water supply to external users in the event that their ground water resources have been detrimentally affected	A compensation protocol to be conducted and submitted to the DMR by October 2014, this protocol is to be implemented at all times during the LOM.

7 Procedures for environmentally related emergencies and remediation

7.1 Fire management

1. This emergency will be minimised by ensuring that fire breaks have been established.
2. Fire breaks will be maintained on an annual basis before the winter season starts to ensure that the potential spreading can be curbed in the case of a fire.
3. No open fires will be allowed on-site.
4. Fire will be extinguished as soon as possible.
5. The Fire Response Procedure will be developed and implemented.

7.2 Handling of spillages

1. Spill kits will be available on site.
2. All spillages will be reported and attended to.
3. Should a spill occur, the person responsible / discovering the spill will take the necessary steps to contain the spill in order to minimise the area that will be affected.
4. The contaminated soil will be lifted and removed as hazardous waste and disposed accordingly.

8 Planned monitoring and environmental management programme performance assessment

8.1 Description of planned monitoring of the aspects of the environment which may be impacted upon

Refer to Paragraph 15 of Section 1 (EIA) for the planned monitoring of the aspects of the environment which may be impacted upon.

8.2 Provide a description as to how the implementation of the action plans contemplated in Regulation 51 (b) (ii) as described will be monitored as described in paragraph 6 of the EMP will be monitored

An EMP Performance Assessment (EMP PA) will be conducted every two years (biennial basis), to monitor the effectiveness of the implementation of the commitments as contained in this document.

Random site visits or inspections may be done by the government officials and any deviation raised shall be managed through the Environmental Management System of the mine.

Ad hoc inspections shall also be conducted by the mine's Environmental Management section during the course of their duties and non-conformances shall be addressed through the Environmental Management System of the mine.

8.3 Frequency of proposed reporting for assessment purposes

According to section 55(2)(a) of the MPRDA, a Performance Assessment must be conducted every two years, therefore, the EMP Performance Assessments (EMP PA) for the mine shall be done every two years (biennially).

Refer to Paragraph 15 of Section 1 (EIA) for the planned time frames for monitoring.

9 Financial provision in relation to the execution of the environmental management programme

9.1 Plan showing the location and aerial extent of the aforesaid main mining actions, activities, or processes anticipated

Refer to Figure 25 for a Mine Layout Plan.

9.2 Annual forecasted financial provision calculation

Table 36 below contains the financial provision calculation. The total is R 76 484 582 57.

Table 36: Rehabilitation cost estimate

			A	B	C	D	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
NO	DESCRIPTION	UNIT	Quantity	Master rate	Multiplication factor	Weighting factor	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D
			Step 4.5	Step 4.3	Step 4.3	Step 4.4										
1	Dismantling of processing plant and related structures including overland conveyors	m3	21 740	R 11,52	1.1	1.1	R 303 038.21	R 324 250.88	R 34 648.45	R 371 234.84	R 397 221.28	R 425 026.76	R 454 778.64	R 486 613.14	R 520 676.06	R 557 123.38
2(A)	Demolition of steel buildings and structures	m2	630	R 160,50	1.1	1.1	R 69 913.80	R 74 807.76	R 80 044.30	R 85 647.41	R 91 642.73	R 98 057.72	R 104 921.76	R 112 266.28	R 120 124.92	R 128 533.66
2(B)	Demolition of reinforced concrete buildings and structures	m2	450	R 236,53	1.1	1.1	R 128 790.58	R 137 805.92	R 147 452.33	R 157 773.99	R 168 818.17	R 180 635.45	R 193 279.93	R 206 809.52	R 221 286.19	R 236 776.22
3	Rehabilitation of access road	m2	6000	R 28,72	1.1	1.1	R 208 507.20	R 223 102.70	R 238 719.89	R 255 430.28	R 273 310.40	R 292 442.13	R 312 913.08	R 334 816.99	R 358 254.18	R 383 331.98
4(A)	Demolition and rehabilitation of electrified railway lines	m	0	R 278,76	1.1	1.1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
4(B)	Demolition and rehabilitation of non-electrical railway lines	m	0	R 152,05	1.1	1.1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
5	Demolition and housing and or administration facilities	m2	570	R 321,00	1.1	1.1	R 221 393.70	R 236 891.25	R 253 473.64	R 271 216.80	R 290 201.97	R 310 516.11	R 332 252.24	R 355 509.90	R 380 395.59	R 407 023.28
6	Opencast rehabilitation including final voids and ramps	ha	115	R 168 272,10	1.1	1.1	R 23 415 062.71	R 25 054 117.00	R 26 807 905.00	R 28 684 458.00	R 30 692370.00	R 32 840 836.00	R 35 139 695.00	R 37 599 473.00	R 40 231 437.00	R 43 047 637.00
7	Sealing of shafts, admits and inclines	ha	0	R 86,16	1.1	1.1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
8(A)	Rehabilitation of overburden and spoils	ha	5	R 112 181,40	1.1	1.1	R 678 697.47	R 726 206.29	R 777 040.73	R 831 433.58	R 889 633.93	R 951 908.31	R 1 018 541.89	R 1 089 839.82	R 1 166 128.61	R 1 247 757.61
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic,	ha	0	R 139 719,91	1.1	1.1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

			A	B	C	D	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
NO	DESCRIPTION	UNIT	Quantity	Master rate	Multiplication factor	Weighting factor	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D
			Step 4.5	Step 4.3	Step 4.3	Step 4.4										
	salt producing waste)															
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal rich waste)	ha	6	R 405 812,85	1.1	1.1	R 2 946 210.29	R 3 152 445.00	R 3 373 116.00	R 3 609 234.00	R 3 861 880.00	R 4 132 212.00	R 4 421 467.00	R 4 730 969.00	R 5 062 137.00	R 5 416 487.00
9	Rehabilitation of subsided areas	ha	0	R 93 935,03	1.1	1.1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
10	General surface rehabilitation	ha	5	R 88 866.59	1.1	1.1	R 537 642.87	R 575 277.00	R 615 547.00	R 658 635.00	R 704 740.00	R 754 071.00	R 806 856.00	R 863 336.00	R 923 770.00	R 988 434.00
11	River diversion	ha	0	R 88 866.59	1.1	1.1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
12	Fencing	ha	0	R 101,37	1.1	1.1	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
13	Water management	ha	12	R 33 789,58	1.1	1.1	R 409 624.70	R 438 298.00	R 468 979.00	R 501 807.00	R 536 934.00	R 574 519.00	R 614 736.00	R 657 767.00	R 703 811.00	R 753 078.00
14	Maintenance and aftercare	ha	0	R 11 826,35	1.1	1.1	R 0.00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
15(A)	Specialist Study	each	7	R 300 000.00	1.1	1.1	R 2 541 000.00	R 2 718 870.00	R 2 909 190.00	R 3 112 834.00	R 3 330 732.00	R 3 563 883.00	R 3 813 355.00	R 4 080 290.00	R 4 365 911.00	R 4 671 524.00
Subtotal 1							31 459 881.53	R 33 662 071.80	R 35 706 116.34	R 38 539 704.90	R 41 237 484.48	R 44 124 107.48	R 47 212 796.54	R 50 517 690.65	R 54 053 931.55	R 57 837 706.13
Weighting factor 2						1.1	34 605 869.68	R 37 028 278.98	R 39 276 727.97	R 42 393 675.39	R 45 361 232.92	R 48 536 518.22	R 51 934 076.19	R 55 569 459.71	R 59 459 324.70	R 63 621 476.74
Preliminary and General					6% of subtotal 1		1 887 593.89	R 2 019 724.30	R 2 142 366.98	R 2 312 382.29	R 2 474 249.06	R 2 647 446.44	R 2 832 767.79	R 3 031 061.43	R 3 243 235.89	R 3 470 262.36
Subtotal 2 (Subtotal 1 plus preliminary and genera							33 347 475.42	R 35 681 796.10	R 37 848 483.32	R 40 852 087.19	R 43 711 733.54	R 46 771 553.92	R 50 045 564.33	R 53 548 752.08	R 57 297 167.44	R 61 307 968.49

			A	B	C	D	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
NO	DESCRIPTION	UNIT	Quantity	Master rate	Multiplication factor	Weighting factor	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D	E=A*B*C*D
			Step 4.5	Step 4.3	Step 4.3	Step 4.4										
l items)																
Contingency					10% of subtotal 1		3 145 988.15	R 3 366 207.18	R 3 570 611.63	R 3 853 970.49	R 4 123 748.44	R 4 412 410.74	R 4 721 279.65	R 5 051 769.06	R 5 405 393.15	R 5 783 770.61
Subtotal 3 (Subtotal 2 plus contingency)							36 493 463.57	R 39 048 003.28	R 41 419 094.95	R 44 706 057.68	R 47 835 481.98	R 51 183 964.66	R 54 766 843.98	R 58 600 521.14	R 62 702 560.59	R 67 091 739.10
VAT 14%							5 109 084.90	R 5 466 720.45	R 5 798 673.29	R 6 258 848.07	R 6 696 967.47	R 7 165 755.05	R 7 667 358.15	R 8 204 072.95	R 8 778 358.48	R 9 392 842.47
Grand Total (Subtotal 3 plus VAT)							41 602 548.46	R 44 514 723.73	R 47 217 768.24	R 50 964 905.75	R 54 532 449.45	R 58 349 719.71	R 62 434 202.13	R 66 804 594.09	R 71 480 919.07	R 76 484 582 57

9.3 Confirmation of the amount that will be provided should the right be granted

Refer to Table 36 above.

9.4. The method of providing financial provision contemplated in Regulation 53

The projected closure quantum is provided for by means of a bank guarantee.

10 Environmental awareness plan (section 39 (3) (c))

The following Environmental Awareness Plan must be implemented by Ngululu Resources (Pty) Ltd in order to inform their employees and contractors of the environmental risk that may result from their work. The plan must be conducted as part of the induction process for all new employees (including contractors) that will perform work in terms of all activities undertaken on the mine. Proof of all training provided must be kept on-site.

The Environmental Awareness Plan is referred to as the “SHE match” training programme. The training programme focuses on the following aspects:

1. Explaining clearly what the environment is and what the environment consist of namely: air, water, soil, fauna, flora and people.
2. Once participants have grasped the description of what the environment entails, the training focuses on the potential impacts that the construction and operational activities may have on each one of these environmental components. This is done by making use of the aspect register, where each one of the environmental aspects and associated impacts has been identified.
3. To ensure that the training is effective, visual aids are used. Photos are taken of actual and potential impacts occurring on site and in some cases role-play is used to illustrate a potential impact.
4. The participants are then exposed to a poster that reflects the various environmental components. The various photos taken are posted on the poster on a rotational basis and the participants indicate (based on the visual component) what environmental component was or could have been affected by the activities portrayed on the photo.
5. By doing this the participants visualise the action as well as the potential consequence (environmental impact) of their action.
6. This General awareness training must be done before construction commences and also when new employees start work. The training should be done every two years during the Operational Phase. The poster is posted in the communal area where the impacts are visualised and the photos rotated on a monthly basis.

11 Attachment of specialist reports, technical and supporting information

- Agricultural impact assessment report
- Basic Atmospheric Impact Report
- Environmental noise survey report
- Faunal assessment report
- Geohydrological investigation report
- Heritage impact assessment report
- Hydrological Assessment Report
- Social impact assessment report
- Vegetation assessment report
- Visual impact assessment report
- Wetland and riparian functional assessment report

12 Section 39 (4) (a) (iii), capacity to manage and rehabilitate the environment

Component	Monthly budget
Surface water monitoring	Budgeted on an estimate of 6 sampling points. Requirement is quarterly. Budget per month R4000.00
Groundwater monitoring	Budgeted on an estimate of 15 sample points. Requirement is quarterly. Budget per month R 6000.00
Concurrent rehabilitation	Concurrent rehabilitation all inclusive of R200 000.00 per month per hectare disturbed. (should more than 1ha be disturbed per month)
Alien Invasive eradication	Less than R2000.00 per month as the site is small with very little identified alien invasive species at current. This will be managed throughout the LOM to prevent new species from establishing on site
Firebreaks	This will be done once per quarter at a cost of R4000.00 for the day to make a fire break around the site.
General and hazardous waste removal	Enviroserve on a monthly basis per skip. R3000.00 per skip per month (We estimate 2 skips on site)
Dust suppression	Daily for 8hours with water bouser. We estimate R12000.00 per month
Spill handling and pollution prevention measures / maintenance	Spill handling procedure and spill kits as and when it occurs. 10 Spill kits on sit at a once of cost of R15000.00. No monthly cost involved. Cleaned up spills will be disposed of in the relevant skips provided.
Dust fall-out monitoring	This is also a quarterly requirement. This we estimate at R 14500.00 per quarter.
Sampling of Ambient PM10 and PM2.5 (Particulate Matter of size 10- and 2.5 micrometers (µm) or less) Dustfall networks should be established with deposition measurement by method ASTM 1739- 98 recommended in SANS 1929-2004.	This will be done by HOHLCC. This is also a quarterly requirement. We estimate a quarterly budget of R32 000.00. (This excludes purchasing of any equipment).
Salaries (environmental)	One permanent SHE manager on site with a budget of R35000.00 per month
Vehicle maintenance (diesel, licenses)	Contractor Vehicle and diesel and all related expenses included in the contractor agreement between client and contractor

13 Undertaking

The Environmental Management Programme will, should it comply with the provisions of Section 39 (4) (a) of the Act and the right be granted, be approved and become an obligation in terms of the right issued. As part of the proposed Environmental Management Programme, the applicant is required to provide an undertaking that it will be executed as approved and that the provisions of the Act and regulations thereto will be complied with.

14 Identification of the report

Herewith I, the person whose name and identity number is stated below, confirm that I am the person authorised to act as representative of the applicant in terms of the resolution submitted with the application, and confirm that the above report comprises EIA and EMP compiled in accordance with the guideline on the Departments official website and the directive in terms of Sections 29 and 39 (5) in that regard.	
Full Names and Surname:	
Identity Number:	
Signature:	