November 2012

VUNENE COLLIERY (PTY) LTD

Draft Environmental Impact Assessment Report

Submitted to:
Vunene Colliery (Pty) Ltd
Private Bag X 9001
Ermelo
Mpumalanga Province

REPORT

Report Number: EIA-REP-325d/11
Revision: BB/ 14 September 2012
Distribution:
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KEY PROJECT INFORMATION

DEA Reference number: 17/2/3 GS 11

Title: Proposed opencast and surface mining of coal on Portion 3, 4, 6, 9, 14 and 15 of the Farm Jan Hendriksfontein 263 IT, Portions 2, 8, 9, 11, 17, 21 of the Farm Witpunt 267 IT, Portions 5, 6, 7, 8 of the Farm Vlakfontein 266 IT, Holbank 265 IT and Roodewal 270 IT, Twyflaar 298 IT, Vlakfontein 269 IT, Mooiplaats 290 IT, Msukaligwa Local Municipality, Mpumalanga Province.

Authors: I. Ueckermann

Sub-consultants:

NAME	ORGANISATION	SPECIALISTS ASSESSMENT
Johan Mare	MENCO	Surface water specialist
Llywelyn Coertzen	MENCO	Wetland specialists
Johan Mare	MENCO	River Health (SASS 5)
Morne Burger	GPT	Geohydrologist
P.J. Gouws	PG Consulting	Floodline report
Vuyo April	ENVASS	Ecologist
Dutoit Wllken	ENVASS	Visual specialist
Tobias Coetzee	ENVASS	Heritage specialist
Francois Botha	ECOSiol	Soil specialist
Judith Mandla	ENVASS	Social specialist
Cobus Havenga	Corli Havenga and Associates	Traffic specialist
Dutoit Wilken	ENVASS	Air Quality specialist

Client:

Vunene Colliery (Pty) Ltd
Private Bag X 9001
Ermelo
Mpumalanga Province

Report status: Draft Environmental Impact Assessment Report for public review

Farm Description: Portion 3, 4, 6, 9, 14 and 15 of the Farm Jan Hendriksfontein 263 IT, Portions 2, 8, 9, 11, 17, 21 of the Farm Witpunt 267 IT, Portions 5, 6, 7, 8 of the Farm Vlakfontein 266 IT, Holbank 265 IT and Roodewal 270 IT, Twyflaar 298 IT; Vlakfontein 269 IT, Mooiplaats 290 IT

21 Digit Surveyor General Code:

FARM	SG CODE	SERVICE RIGHT OWNER
Jan Hendriksfontein 263 IT	T0IT00000000026300003	Johannes Vos
Jan Hendriksfontein 263 IT	T0IT00000000026300004	Pierre Theron Familie Trust
Jan Hendriksfontein 263 IT	T0IT00000000026300006	BHP BILLITON ENERGY COAL SOUTH AFRICA LTD
Jan Hendriksfontein 263 IT	T0IT00000000026300009	Sara Maria Steyn
Jan Hendriksfontein 263 IT	T0IT00000000026300014	BUENA VISTA TRADING 69 PTY LTD
Witpunt 267 IT	T0IT0000000002670002	INDAWO ESTATE PTY LTD
Witpunt 267 IT	T0IT0000000002670008	P.J. Randall Trust
Witpunt 267 IT	T0IT0000000002670009	ESKOM Holdings LTD
Witpunt 267 IT	T0IT0000000002670011	ESKOM Holdings LTD
Witpunt 267 IT	T0IT0000000002670017	ESKOM Holdings LTD
Witpunt 267 IT	T0IT0000000002670021	ESKOM Holdings LTD

Vlakfontein 266 IT	T0IT0000000002660005	P.J. Randall Trust
Vlakfontein 266 IT	T0IT0000000002660006	P.J. Randall Trust
Vlakfontein 266 IT	T0IT0000000002660007	Peter Johan Randall
Vlakfontein 266 IT	T0IT0000000002660008	Ferreira Family Trust
Holbank 265 IT	T0IT0000000002650000	
Roodewal 270 IT	T0IT0000000002700000	National Government of the Republic of South Africa
Twyfelaar 298 IT	T0IT0000000002980000	
Vlakfontein 269 IT	T0IT0000000002690000	Global Forest Products PTY LTD

Photograph of site:

Plate 1: General characteristics of the study area

Plate 2: General characteristics of the study area

Maps are attached in the report in Annexure 4: Technical Support Information

SYNOPSIS

INTRODUCTION

Environmental Assurance (Pty) Ltd (Envass), as an independent environmental consultant has been appointed by Vunene Mining (Pty) Ltd to undertake the Environmental Impact Assessment (EIA) for the proposed opencast and surface coal mining on Leeuwenburg 137 IT, Roodewal 270 IT, Holbank 265 IT, Vlakfontein 266 IT, Vlakfontein 269 IT, Mooiplaats 290 IT, Witpunt 267 IT, Transutu 257 IT and Jan Hendriksfontein 263 IT, in the Msukaligwa Local Municipality.

The Usutu Coal Colliery opencast mine is located 18 kilometres south east of Ermelo. This is an existing coal mine which was under care and maintenance for a period, subsequent to which mining operations were restarted. However, subsequent to the issuing of the mining right (dated 10 July 2009); a desktop study was undertaken which revealed that the mining area was mined before by Ingwe (Usutu Colliery). The area was mined by means of underground mining methods.

Environmental Assurance was appointed by Vunene Mining (Pty) Ltd to undertake the environmental authorisation process for the coal mining process. Issues which would specifically be addressed in this report are amongst others:

- Opencast mining methods which will be used to extract the coal;
- Underground mining methods which will be used to extract deeper coal;
- Existing infrastructure at the Usutu Colliery;
- Mining and blasting operations;
- Surrounding infrastructure and land uses; and
- In detail environmental impact assessment of activities undertaken on site.

The Environmental Impact Assessment (EIA) process followed is in compliance with the National Environmental Management Act, 1998 (Act 107 of 1998), as amended and the Environmental Impact Assessment Regulations of 2010 (Government Notice No's R544, 545 and 546 in Government Gazette No. 33306 of 18 June 2010). The proposed coal mining operations constitutes a listed activity which falls within the scheduled activities listed in Government Notice Regulation No 545 (Scoping and EIA). Prior to such a listed activity being approved, it is required that an environmental process is undertaken and a report is submitted to the relevant environmental authority for consideration.

The EIA process includes the completion of the Scoping Report as well as an Environmental Impact Assessment Report. The Scoping Report determined the issues or concerns from the relevant authorities as well as interested and/or affected parties. In addition, an Impact Assessment Report (this report) will determine the likely consequence that the proposed coal mining may have on the environment.

PROJECT DESCRIPTION

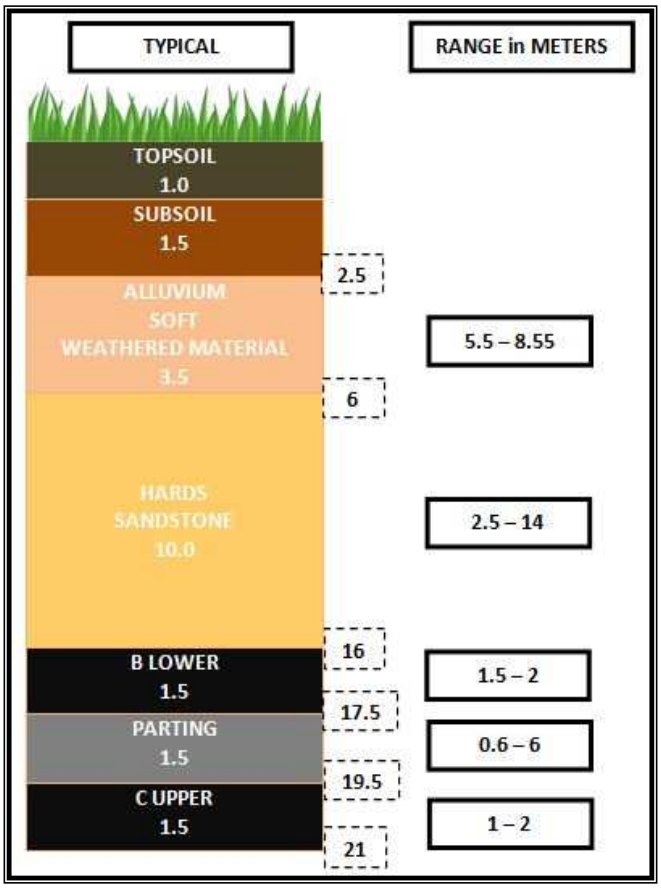
Usutu Colliery is a coal mine situated on certain portions of the farms Leeuwenburg 137 IT, Roodewal 270 IT, Holbank 265 IT, Vlakfontein 266 IT, Vlakfontein 269 IT, Mooiplaats 290 IT, Witpunt 267 IT, Transutu 257 IT and Jan Hendriksfontein 263 IT, in the Msukaligwa Local Municipality, approximately 18 kilometres southwest of the

town of Ermelo. The area falls under the Msukaligwa Local Municipality and specifically in ward 11 of the local municipality.

The proposed roll-over open cast mining method entails the following:

The coal residues are at a depth of approximately 6 – 26 meters. A box cut of approximately 500 - 700 meters by 70 - 80 meters will be made, using heavy mining machinery, such as excavators and articulated dump trucks to extract the coal. The cover material (e.g. topsoil and sandstone), excavated during the initial box cut, will be stockpiled in separate stockpiles. Care will be taken to ensure that the topsoil, subsoils, softs, hards, B lower, Parting and C upper will not be mixed during this stockpiling procedure.

The coal will thereafter be mined and as soon as the total *in situ* coal volume has been extracted from the primary box; the method will roll-over to the second strip. The roll-over method assumes that the mining operator rehabilitates and restores the disturbed area as the mining process progresses. Thus; by the time the mine has been mined in totality; the rehabilitation of the disturbed area should at the end of the life of the mine be lagging by approximately three (3) strips.



Crushing screening and de-stoning plants will be erected at Usutu Colliery for the processing of the Run of Mine (ROM) coal. The ROM coal will be transported and then sold to Eskom once the contracts are concluded.

Through geological assessments and the feasibility study it has been determined that the coal reserve on the above mentioned farms have an economic value and can be mined optimally via opencast and underground mining methods. Based on the proposed production rate of 3 000 000 tonnes per year, the life of mine is estimated to approximately 30 years.

The NEMA application concerns the associated surface activities and coal mining activities to be undertaken by Vunene Mining (Pty) Ltd on certain portions of the above mentioned farms.

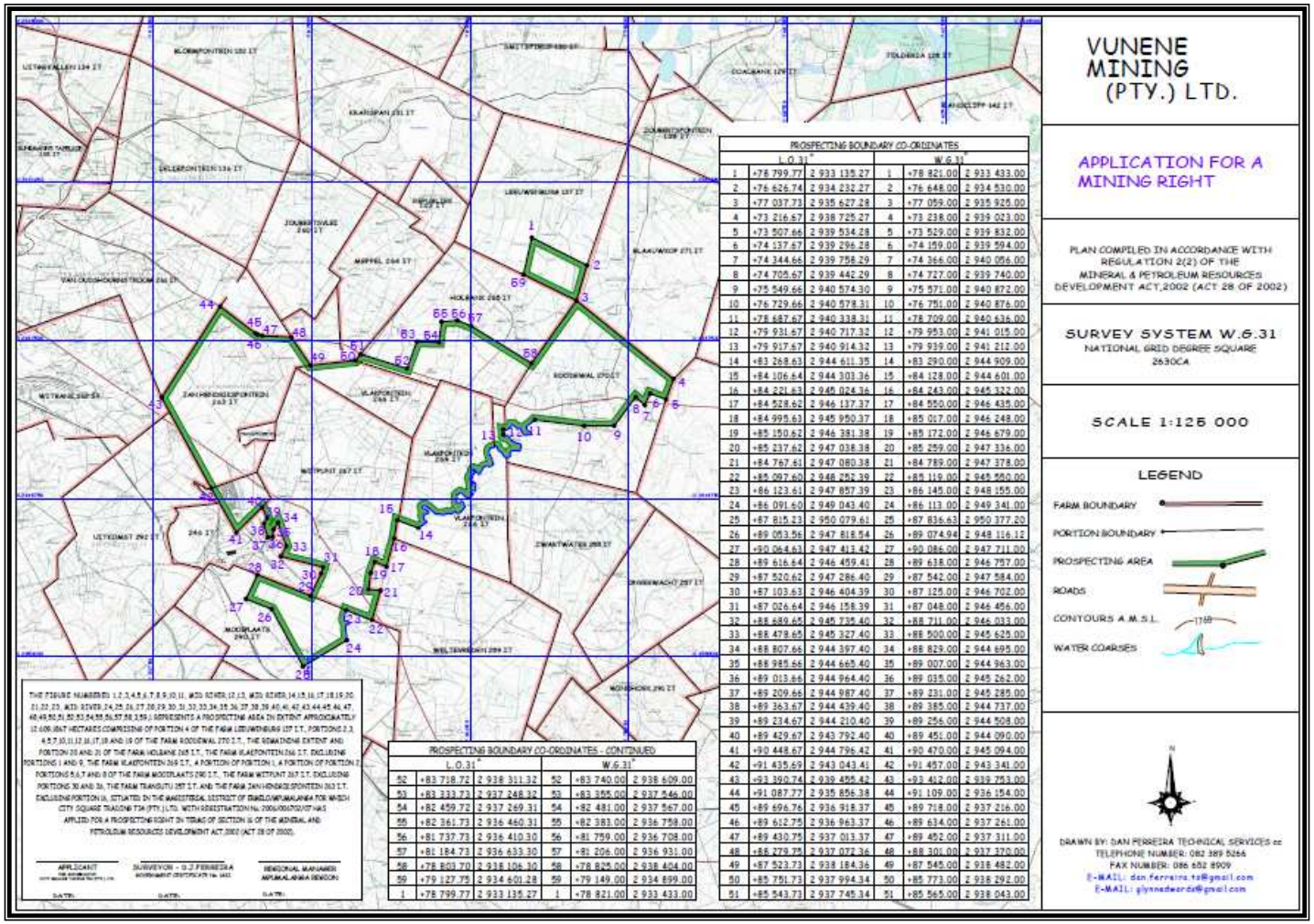


Figure 1: The Regulation 2(2) map of the Usutu Coal Colliery

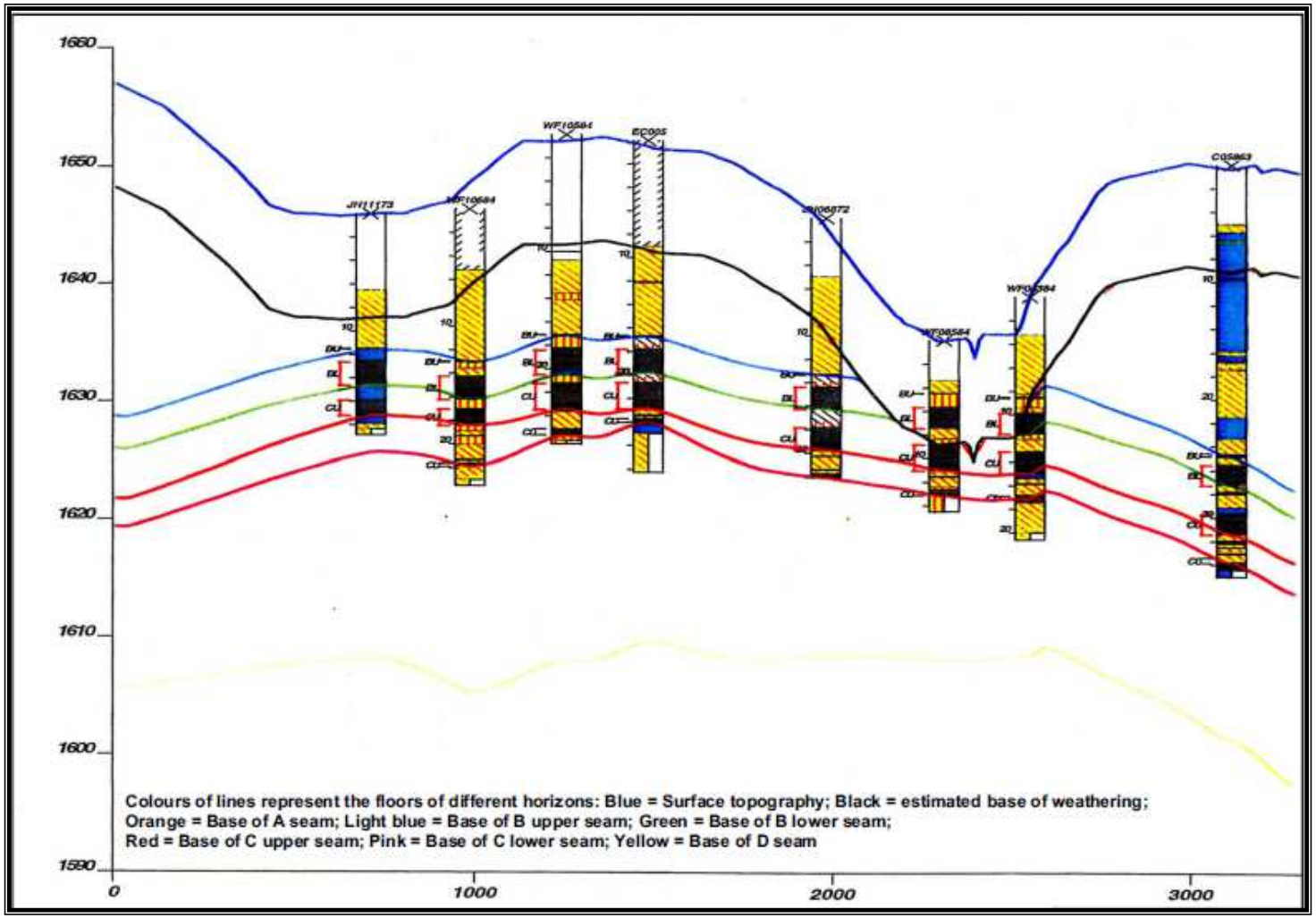


Figure 2: Cross section 1 from west to east looking north through the northern portion of the proposed mining area

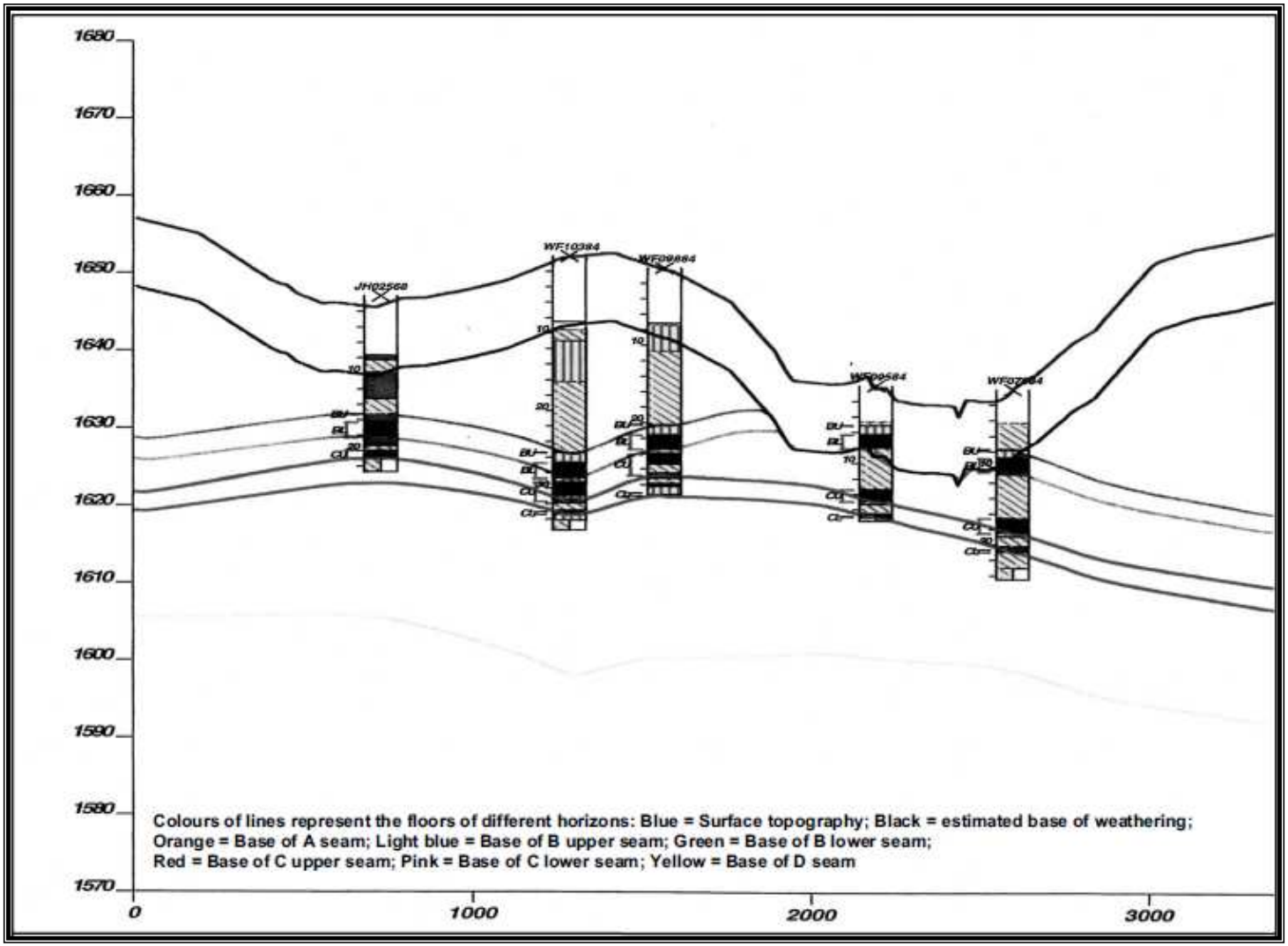


Figure 3: Cross section 2 from west to east through the main pit north of Camden Village

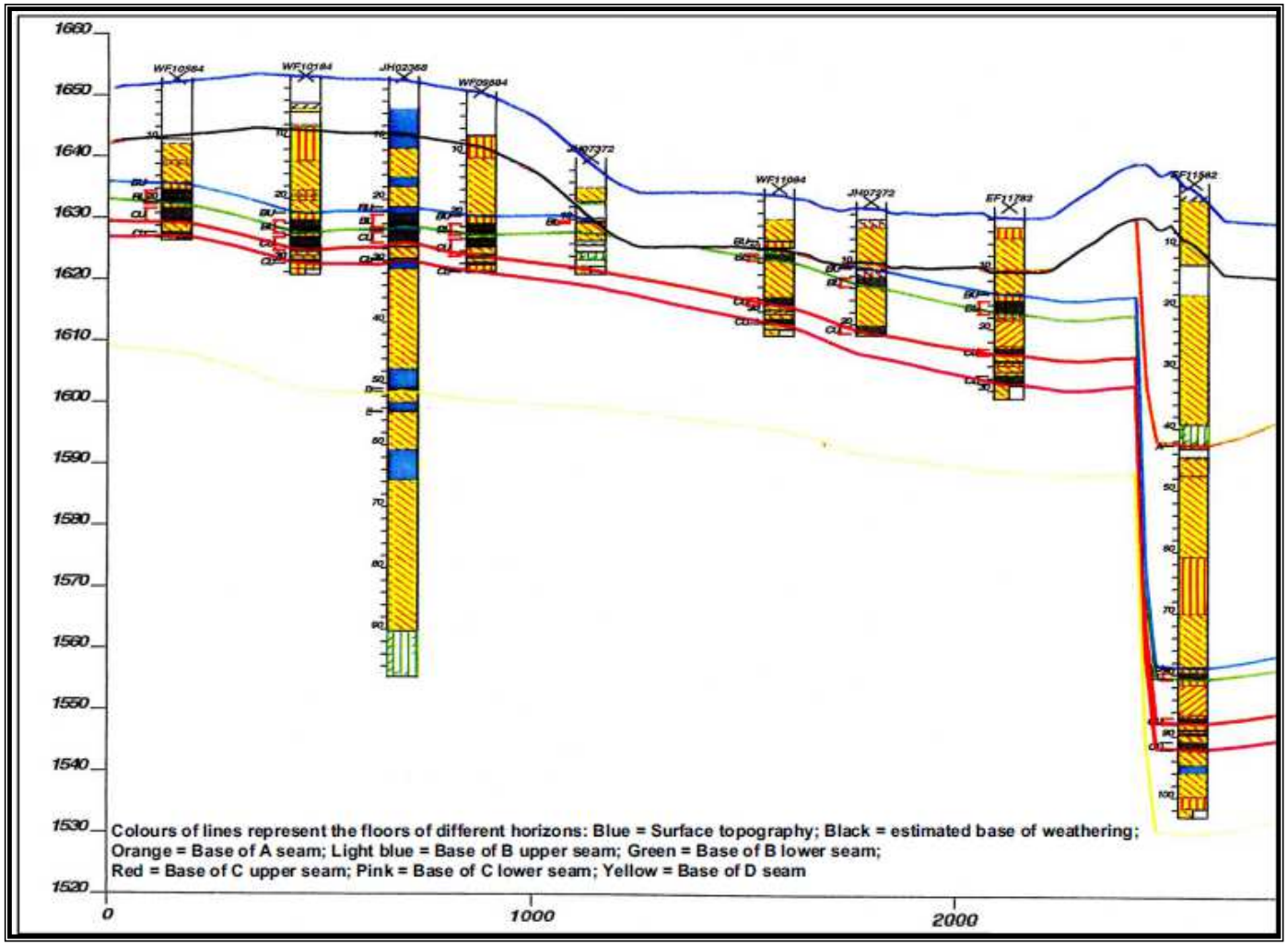


Figure 4: Cross section 3 from north to south looking east into the proposed mining area

There are increased demands for coal, as an energy source, both locally and internationally. Until alternative energy sources are dependable and financially viable, coal will remain in high demand. South Africa is in a position where the labour costs makes the mining of coal a cheaper financial option. In the current world economic situation, the proposed open cast and underground mine at Leeuwenburg 137 IT, Roodewal 270 IT, Holbank 265 IT, Vlakfontein 266 IT, Vlakfontein 269 IT, Mooiplaats 290 IT, Witpunt 267 IT, Transutu 257 IT and Jan Hendriksfontein 263 IT, in the Msukaligwa Local Municipality; will be mined at an ideal time as the Northern Hemisphere is experiencing economic down scaling and recessions.

The motivation for the project is based on the financial feasibility and Geological Assessment Report that was undertaken by the proponent, i.e. Vunene Mining (Pty) Ltd. Through geological assessments and a feasibility study it have been determined that the coal reserves on the above-mentioned farms (the proposed mining area) have an economic value and can be mined optimally via opencast and underground mining methods. Based on the proposed production rate of 3 000 000 tonnes per year, the life of mine (LOM) is estimated to be approximately 30 years.

Furthermore, Vunene Mining (Pty) Ltd. identified that with the proposed Usutu open cast mine the proponent will be supplying economic stimuli which will eventually result in an economic boost and financial stability and growth in the Mpumalanga Province.

The original delineation of the coal reserve in the area was identified during earlier exploration phases. It has however been established that the coal layer on Leeuwenburg 137 IT, Roodewal 270 IT, Holbank 265 IT, Vlakfontein 266 IT, Vlakfontein 269 IT, Mooiplaats 290 IT, Witpunt 267 IT, Transutu 257 IT and Jan Hendriksfontein 263 IT, in the Msukaligwa Local Municipality is located at a relatively shallow position (between 6 – 26 meters); which makes open cast mining a financially viable option. The coal reserves located deeper will be mined using the underground mining method.

Underground mining

The B and C coal seams reserve at the proposed mining area extends over an area of approximately 13 540 hectares. The seam thicknesses varies between 1.20 metres and less than 3 metres at the depth of 55 to 90 metres. It is estimated that the B and C coal Seam is 84 Million *In-Situ* Tonnes; as a result the mine is expected to remain in production for thirty years (30 years).

The seam thickness varies between 1.20 to 3.00 meters in thickness, which lends itself to bord and pillar mining using continuous miners. It is planned to take the maximum extraction allowed in primary mining to a safety factor of 1.6, which will give a 65% yield. There is no plan to extract any pillars at this stage. It is expected that there will be some dolerite intrusions, thus a dyke development section will be deployed for the purpose of mining through these and to prepare new mining sections.

The underground production is planned to commence on the West Underground Main high wall and will produce at a rate of 90,000 ROM tons per month from a single production section.

The underground mining equipment in each section will comprise the following, namely:

- Conventional mining (Continuous miners);

- 3 shuttle cars;
- Roof bolter;
- LHD (Underground Loaders);
- Feeder breaker;
- Section conveyor (extended as the section advances);
- Power supply and switches;
- Water supply and pumping arrangements;
- Tractor and trailer for materials transport; and
- Face drill.

The terms of reference for underground bord and pillar mining includes:

- No secondary extraction may be undertaken;
- A minimum safety factor of 3,0 must be maintained at all times; and
- A minimum pillar width to mining height ratio of 4,0 must be maintained at all times.

The main factors that influence pillar stability in underground coal mines are the pillar width to height (w:h) ratio and the pillar safety factor (SF). In order to better understand these concepts, the background relating to these aspects needs to be understood.

W:H Ratio

The width of the pillar to the height of the seam mined is given as the width to height ratio. This ratio can be read as the manner in which the pillar will fail. A ratio smaller than 3, indicates that the failure can be violent and sudden and a ration above 3 indicates that the failure will be more gradual; meaning the signs of pillar failure will precede the actual failure.

To date no pillar has been known to have failed in South Africa with a width to height ratio of above 3,75.

The safety factor that is used to calculate a stable pillar geometry for underground bord and pillar mining is derived by dividing the pillar strength by pillar load. Because it is a safety factor, there will statistically be a certain probability that a given pillar with a certain safety factor will fail. The probability of failure is a function of the safety factor. The probability of failure for a safety factor of 2 is 0,0006%, indicating that less than 1 pillar in 1 000 000 (one million) would fail. The probability of pillar failure for different safety factors are illustrated below:

Table 1: Probability of pillar failure for a given safety factor

SAFETY FACTOR	PROBABILITY OF FAILURE (%)
2	0.0006
1.8	0.02
1.5	0.5
1.0	50
0.8	99.34
0.6	99.4

The Safety Factor formula is based on the assumption of the Tributary Area Theory (TAT) which assumes that:

- Each pillar carries the weight of overburden directly above it;
- The panel width exceeds the depth to the workings; and

- All pillars in the panel are uniform size.

The biggest concern undermining watercourses and wetlands is the subsidence or displacement that may occur. Subsidence can be described as a downward movement of the surface that overlies an underground excavation, or adjacent to the surface excavation.

The effect of subsidence or displacement can be divided into various types of subsidence namely:

Tilt:
During active subsidence tilting may for examplecause buckling of the building. Windows can crack and doors can be stuck. After the area has stabilized the structure will return to the vertical position. In the case of watercourses and wetlands drainage or inlet course might be slightly affected.

Strain:
Two types of strain can be identified, tensile strain and compressive strain. Tensile strain can cause elongation of a piece of land whilst compressive strain can cause the surface to buckle.

Horisontal displacement:
This type of displacement can cause a section of land to move an x amount of meter. This type of displacement usually form cracks on the edges.

Sub-surface erosions (Potholes):
Potholes form where cracks formed in the upper rock layers are slowly fill with eroded soil. Eventually, a subterranean cavity forms in the soil, at the soil rock contact, due to the rock acting as a reservoir for this eroding soil. When this cavity reaches its critical size, it collapses and results in a pothole on surface.

Sinkhole formation:
This type of subsidence mainly occurs where intersections collapse, and is more common in areas where the depth of mining is less than 50 meters. In contrast to potholes, these sinkholes are usually wide and deep and approximately the same size as the intersection underground.

Opencast mining

Opencast mining, using the truck and shovel lateral rollover mining method, will be undertaken. Mining will commence from the initial box cut. Access to the opencast pit will be via a 17˚ pit ramp. A haul road that will be extended from the nearby existing road will be used to access the mining area. The underground production is planned to commence on the West Opencast section and will produce at a rate of 160,000 ROM tons per month.

The proposed Usutu Colliery opencast mining project will be undertaken over an area of approximately 200 ha at opencast areas, namely: portion 6A, 6B, 6C, 9 and 14. Mining will be conducted by open cast mining method, using a truck and shovel roll over mining technique. The mining will be outsourced to a suitably qualified mining contractor. Mining will be undertaken by diesel powered mining equipment in the form of front end loaders, excavators, haul and dump trucks, water carts and graders.

The soft overburden will be removed by mechanical methods. The hard overburden will be drilled and blasted and then removed by mechanical methods. The coal will be drilled and blasted prior to removal.

Replacement of overburden materials into the mining pit will be according to the following sequence:

- Placement of hard overburden at base of pit;
- Placement of soft overburden; and
- Final cover of topsoil (minimum 500 mm).

The B and C coal seams will be removed and sold to Eskom's Camden Power Station.

Strip ratio:

For the opencast mining of the coal seams at Usutu Colliery the following average strip ratio applies:
The B and C coal seams 4:1

The strip ratio is determined by the average thickness of the overburden in meters divided by the average seam thickness of the coal seam, multiplied by the relative density of the coal (taken as 1.5). This gives a ratio of cubic meters of overburden per ton of coal mined.

Run of Mine (ROM) coal will be processed through the crushing and screening plant at Usutu Colliery and then sold to Eskom's Camden Power Station for power generation purposes. All coal products from this Colliery will be sold to Camden Power Station, since coal from Usutu Colliery meets the Eskom's quality specification, and Eskom will only accept coal of such quality. Since Liketh Investments (Pty) Limited has operations that sells its product to Eskom, it was decided that the coal from Usutu Colliery would also be sold to Eskom. In view of the above, Usutu Colliery will entered into an agreement with Eskom for the sale of the ROM coal. Liketh Investments (Pty) Limited is a valued client of Eskom having concluded several agreements with Eskom.

Usutu Colliery is an existing operation which was placed under care and maintenance. Infrastructures that will be needed will be constructed at the opencast mining areas. The existing West shaft will be utilized to access the underground workings. Mining will consist of the removal of coal from the B and C coal seam and processing the ROM at the crushing and screening plant. The rehabilitation phase will include opencast voids backfilling, seeding, sealing of the shaft, the dismantling of the said plants and related buildings e.g., workshops, the substation, mine offices, etc.

PROJECT MOTIVATION (NEED AND DESIRABILITY)

Usutu Mining (Pty) Limited expects that substantial benefits from the project and associated infrastructure will accrue to the immediate project area, the sub-region and the province of Mpumalanga. These benefits must be offset against the costs of the project, including the impacts to land owners.

The potential benefits of the proposed project are:

- Long-term, national benefits of reliable power supply and the resultant socio-economic benefits;
- Highly significant benefits to the province of Mpumalanga in terms of coal supply contracts, which bring about needed job creation and other local, provincial and national socio-economic benefits;

- Potential reduction in crime because of short-term job creation during construction (provided farm safety and security measures are implemented), but also in the long-term in the region, as a result of job creation;
- Local growth in the economy of the town of Ermelo and surrounding areas, and for local businesses including those that provides different services;
- Economic benefits for contractors and other suppliers of goods and services; and
- Through the implementation of the Social and Labour Plan the mine employees will be developed in terms of skills development and career progression; and
- Small businesses will be established and sustained and the mine will contribute towards community infrastructure development and poverty eradication.

APPROACH TO THE PROJECT

The purpose of this Environmental Impact Assessment report is to comply with the statutory and legislative requirements of the Minerals and Petroleum Resources Development Act (MPRDA) and the MPRDA Amendment Act as well as the DMR requirements as set out in the letter dated Monday, 20 June 2011. These requirements as well as the requirements of the National Environmental Management Act (Act 107 of 1998) where the Final Scoping Report was approved (dated Thursday, 23 August 2012).

As per the legislative requirements of the MPRDA, the applicant submitted an application to the DMR for their consideration and decision-making on Friday, 20 August 2011. Subsequently, the DMR acknowledged receipt of the application as well their additional requirements. In order to comply with the DMR requirements as stipulated in the aforementioned correspondence, the Section 102 amendment to the Environmental Management Programme was submitted as a final copy to the DMR on the due date Friday, 3 August 2012. The amended Environmental Management Programme was submitted to DMR to inform their decision-making.

In addition, the process needs to comply with other legislative requirements of which the National Environmental Management Act (Act No 107 of 1998)[NEMA] is one. Such an application for authorisation was additionally submitted to the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) as prescribed under NEMA and section 18 of the MPRDA Amendment Act.

The Scoping Report represented the initial identification of key issues or concerns as highlighted by the relevant authorities, interested and/or affected parties (I&APs), as well as the professional judgement by the Environmental Assessment Practitioner.

The EIA process includes the completion of the Scoping Report as well as an Environmental Impact Assessment Report and EMPr.

The Scoping Report as required in terms of the National Environmental Management Act (Act 107 of 1998) was submitted on Friday, 27 July 2012 and approval for this document was received on Thursday, 23 August 2012. Subsequently the draft Environmental Impact Assessment Report has now been compiled and will be made available to stakeholders, registered Interested and Affected Parties and any other decision-making authorities for review and comment.

PROCESS IN TERMS OF THE MPRDA, MPRDA AMENDMENT ACT AND NEMA REGULATIONS

Mining operations require environmental authorisation from the DMR for the mining right application in terms of Section 22 of the MPRDA. The following issues require consideration whilst compiling the Environmental Impact Assessment Report.

- The objectives of the MPRDA include giving effect to Section 24 of the Constitution by ensuring that the Nation's mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development. (Section 2(h) of the MPRDA);
- Any prospecting or mining operation must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of mining projects, in order to ensure that exploitation of mineral resources serves present and future generations (Section 37(2) of the MPRDA);
- The principles set out in Section 2 of the National Environmental Management Act, 1998 (Act 107 of 1998)[NEMA] serve as guidelines for the interpretation, administration and implementation of the environmental requirements of the MPRDA. (Section 37(1)(b) of the MPRDA);
- Section 38(1)(a) of the MPRDA requires that effect be given to the general objectives of Integrated Environmental Management laid down in the NEMA. Integrated Environmental Management (IEM) is a philosophy, which prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development process in order to achieve a desirable balance between conservation and development; and
- The environmental management programme to be submitted is not limited to but must *inter alia* include the requirements of regulation 51 of the MPRDA. For instance, where regulation 51(a)(ii) refers to measures for the prevention, management and remediation of each environmental impact, these clearly must be understood in the context of the NEMA where the general objectives of the IEM include ensuring that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them. This clearly requires a description of the mining project that lists each activity pertaining to the mining project, in order that each activity can be assessed.

The MPRDA Amendment Act further states that:

- Any person who wishes to apply for a mining right must simultaneously apply for an Environmental Authorisation (Section 18);
- Environmental reports, as required in terms of Chapter 5 of the NEMA must be submitted to the DMR (Section 18);
- Consultation with the landowner, lawful occupier and any interested and affected party must occur in the prescribed manner and the result of the consultation must be included in the relevant environmental reports (Section 18); and
- The mining right may only be granted if the mining will not result in unacceptable pollution, ecological degradation or damage to the environment and an environmental authorisation is issued (Section 19).

PUBLIC PARTICIPATION PROCESS

A comprehensive public participation process (See Annexure 2: Public Participation) was followed by Environmental Assurance and as such the project was announced as follows:

Newspaper Advertisement

An advertisement was placed in the Highvelder on Friday, 11 February 2011. Additional advertisements were placed in the Highvelder of 25 November 2011 and the Highvelder of 15 June 2012.

Site notice

Four (4) site notices were erected on site and at visible locations close to the site on Friday, 11 February 2011.

Direct Notification of Identified I&APs

Key stakeholders were directly informed of the proposed development by e-mail and fax on Friday, 11 February 2011.

Hand – delivered notifications

I&APs were given 40 days to comment and / or raise issues of concern regarding the proposed development. The comment period expired on Wednesday, 23 March 2011. The main issues that arose from Public Participation Process (PPP) were as follows:

- Issues related to surface water;
- Issues related to groundwater;
- Issues related to air quality;
- Issues related to soils;
- Issues related to fauna and flora;
- Issues related to aesthetic aspects;
- Issues related to land use and capability; and
- Issues related to the socio-economic aspects.

The Draft Scoping Report

The Draft Scoping Report was available for public comment for a period of approximately 40 days from Friday, 7 October 2011 until Tuesday, 15 November 2011. The report was retracted and an amended copy of the Draft Scoping Report was made available for a period of 40 days from Thursday, 1 March 2012 until Monday, 9 April 2012. The availability of the Draft Scoping Report was announced as follows:

- Letters announcing the availability of the Draft Scoping Report was send to all registered I&AP's by e-mail, fax or post, approximately three weeks prior to the availability of the report;
- An electronic copy of the report was available on the Environmental Assurance website http://www.envass.co.za;
- Electronic copies of the report was also e-mailed to registered stakeholders; and
- A hard copy of the Draft Scoping Report was placed at Ermelo Library;

All the issues raised by the I&AP's during the public participation process of the Scoping phase were captured in an Issues and Responses Report and the I&AP's received letters acknowledging their contributions.

The Final Scoping Report

All comments on the Draft Scoping Report were incorporated into the Issues and Responses Report which formed part of the appendices for the Final Scoping Report. The Final Scoping Report were circulated to registered Interested and Affected Parties for a period of 21 days; after which it was submitted to the Mpumalanga Department of Economic Development, Environment and Tourism once all the comments received from the Interested an Affected Parties have been incorporated into the report. The Final Scoping Report and Plan of Study for EIA was submitted for review and decision-making purposes. The Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) accepted the Final Scoping Report on Thursday, 23 August 2012.

The Draft Environmental Impact Assessment Report

The Draft Environmental Impact Assessment Report will be made available for public comment for a period of approximately 40 days from 15 November 2012 to 26 January 2013. The availability of the Draft Environmental Impact Assessment Report will be announced as follows:

- Letters announcing the availability of the Draft Environmental Impact Assessment Report will be sent to all registered I&APs by e-mail, fax or post, approximately 3 weeks prior to the availability of the report;
- A hard copy of the Draft Environmental Impact Assessment Report will be placed at a public venue;
- An electronic copy of the report will be available on the Environmental Assurance website http://www.envass.co.za; and
- An electronic copy of the Draft Environmental Impact Assessment Report will be e-mailed to registered stakeholders requesting copies.

All the issues raised by the I&APs during the public participation process of the EIA phase will be captured in a Issues and Responses Report and the I&APs will receive letters acknowledging their contributions. The Final EIA Report will be circulated to registered Interested and Affected Parties for a period of 21 days; after which it will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism once all the comments received from the Interested an Affected Parties have been incorporated into the report.

ALTERNATIVES

The IEM procedure stipulates that the environmental investigation needs to consider feasible alternatives for any proposed development. Therefore, a number of possible proposals or alternatives for accomplishing the same objectives should be identified and investigated. During the EIA phase of the project, the various alternatives identified during the Scoping phase will be assessed in terms of both environmental acceptability as well as economical feasibility. The preferred option is highlighted and presented to the authorities. The following alternatives are discussed and highlighted in the EIA report:

- Input alternatives;
- Location alternatives;
- Scheduling alternatives;
- Process alternatives and
- Status quo / no-go alternatives.

The Scoping exercise concluded that the main aspects which required further investigation were the potential impacts on:

Water Resources:

- Increase in watercourse sedimentation, erosion and general pollution of surface water resources;
- The quantity of groundwater resources used;
- The impact of mining operations (opencast and underground) on identified wetlands on site;
- Depletion of the underground aquifer; and
- Pollution of groundwater resources due to seepage from open cast coal mining activities.

Air Quality:

- Dust levels and related health impacts from the generation of dust during blasting and opencast mining.

Destruction of Sensitive Flora and Fauna:

- The ecological status quo of the Usutu area;
- Wetlands on site and in the surrounding area;
- The dispersal of existing flora and fauna on site by means of existing water channels; and
- Spill-over impacts, which may occur on adjacent ecological systems.

Soils and Land-use Capability:

- Loss of soil resources for agricultural land uses;
- Soil degradation as a result of mining activities; and
- The utilisation of soil resources for inappropriate land uses such as backfilling cut areas.

Noise vibration and shock:

- Increase in the ambient noise level as a result of blasting activities;
- The disruption of current ambient noise levels; and
- The disruption of sensitive receptors by means of increased noise and vibration.

Socio-economic:

- The determination of the extent to which the current social status quo will be altered and if so, the manner in which such changes will occur.

Visual Impact:

- The visual character of the area as a result of the establishment of mining infrastructure such as a coal ore dump.

Traffic:

- The change in the traffic patterns as a result of traffic entering and exiting the Usutu coal mine on the surrounding road infrastructure (N2) and existing traffic.

Job Creation:

- Job creation in an area where the main source of income is generated through primary activities e.g. farming;
- Creation of job opportunities during mining for residents of the region;
- The provision of improved infrastructure and social upliftment, by creating short term employment over a period and skills transfer to unskilled and semi-skilled unemployed individuals.

The above mentioned key issues and potential impacts; identified during the Scoping phase; were together with potential cumulative impacts, assessed during the Environmental Impact Assessment phase of the project and appropriate mitigation measures to reduce the identified impacts as far as possible were proposed. The summary of the significance of identified impacts before and after mitigation is given in the table below:

Table 2: A summary of the significant impacts identified during the Scoping phase and assessed during the EIA phase of the project

Environmental Aspect	Significance Without Mitigation	Significance With Mitigation
Impacts on groundwater levels	High	Medium
Impacts on groundwater levels due to the dewatering of the open pit	High	Medium
Contamination of surface and groundwater resources due to the migration of contaminated water from the mining operations	High	Medium
Pollution of surface water due to construction and operation activities	High	Medium
Destruction of Wetland Habitat	High	Medium
Altered Hydrological Regime	High	Medium
Atmospheric pollution	Medium	Low
Impacts on Rare and Endangered Fauna and Flora	Medium	Low
Destruction of Natural Habitat	Medium	Low
Reduction of Natural Migratory Routes	Low to Medium	Low
Noise and Vibration	Medium	Low
Visual impacts	Medium	Low
Soil Erosion and Surface runoff	Medium	Low
Soil Pollution	Medium	Low
Heritage resources	Low to Medium	Low
Socio-economic environment – job creation	High Positive	High Positive

Based on the impact assessment and the results of the various specialist studies, it is believed that the proposed development will not result in any fatal flaws in terms of the environment that could warrant stopping the development from proceeding. Provided that the correct mitigation measures are implemented in accordance with the Environmental Management Plan (EMP), impacts that would potentially have a significant negative

effect on the environment will be minimised to medium and low impacts.

- The groundwater system as well as ground and surface water quality is monitored and models and assessments updated as more information becomes available;
- Rehabilitation and monitoring plan should be developed to ensure the success of wetland re-establishment. Furthermore, every effort should be made to prevent the impact on the remaining wetland on the study site;
- Blasting vibrations should be controlled by means of optimising blasthole geometry and altering the time of blasting;
- Implementation of a dust and noxious gases minimisation strategy that will reduce the impact of atmospheric pollution be undertaken. This strategy will include the use of noxious gas fixation techniques, using and adhering to blasting schedules and strategies that minimize dust generation;
- The building textures and colours should blend in with the backdrop of colour and textures provided by the landscape. The natural setting and colours of buffs, olive greens, dark browns should be respected and where possible, these should be incorporated into the materials used in the exteriors of the building and landscape;
- Colours of new infrastructure should be matt and not glossy, so as to reduce reflection and glare from the surfaces. This is important when considering the night scene and reflected light;
- Disturbed surfaces must be ripped, and the area must be backfilled with topsoil or overburden and appropriately re-vegetated when rehabilitation commences;
- The topsoil layer must be retained and used in facilitating the reinstatement of indigenous vegetation;
- By maintaining the maximum amount of vegetated area on site, the extent of erosion and ecosystem loss can be contained;
- An ecologically-sensitive stormwater management plan should be implemented during the construction phase;
- Dust fallout monitoring should be carried out close to the sensitive receptors around the mine area and in the proposed site for the operational activities. It is recommended that dust deposition monitoring be confined to sites within, and in close proximity (<2 km) to the proposed mine operations. Monitoring should be undertaken using the American Society for Testing and Materials standard test method; for the collection and analysis of dustfall (ASTM D-1739) or any other method which can demonstrated to give equivalent results (SANS, 2004). Dust fallout at the sensitive receptor sites should be below 600 mg/m²/day at all times;
- No blasting with explosives or heavy drilling within 20 meters of any heritage feature may occur;
- It is recommended that an existing community based organisation and non-government organisation in the surrounding area be used to serve as a communication channel between the community and Vunune (Pty) Ltd; and
- Labour guidelines should be drafted in terms of employing local residents as it is expected that there will be an influx of newcomers in search of employment.

The mitigation measures suggested by the specialists in their reports include:

Ecological Assessment

The Usutu Colliery is located in the Msukaligwa Local Municipality (MP302) 5-10 kilometers south east of Ermelo in the Mpumalanga Province. From a biodiversity point of view, the area has no formal land base protected areas, thus it has been prone to extensive natural habitat loss due to land-use activities within the area.

The study has found and concluded that the proposed mining activity will cause a significant environmental impact to the remaining natural environment. The study area contains numerous wetlands types. A few of those wetland types, mainly the floodplains still maintain their functionality and offer a series of species ecological important ecosystem services. These include their use as breeding sites and as general species habitat.

The proposed activity will include the removal of vegetation thus causing habitat loss for species such as African grass owl. The obstruction of water flow would result in wetland drainage or dryness which will prevent species functioning, mainly for birds that use this environment for breeding and migratory purposes. Further disturbance to the area will lead to more alien species invasion and remaining natural area loss.

It is therefore recommended that the proposed mine, should it be authorized, includes rehabilitation, especially of wetlands in their Environmental Management Plans. Furthermore, there should be an allowance for species movement by leaving strips of natural vegetation that would serve as corridors for species movement. The client should adhere to the buffering zones recommended by the specialists. Lastly, further monitoring of the ecological function pre- and during mining should be considered in order to maintain and manage the biodiversity of the area prior to rehabilitation.

Due to the intensity of land-use activity in the area, it should be understood that the cumulative environmental impacts on the area are the results of the combination of the agricultural, infrastructure and mining activities in the vicinity. Therefore, it is important to consider the severity of each activity and where they interlink in order to implement correct ecological management of the area.

Ambient Air Quality Report

The South and East monitoring points are the only monitoring points that exceeded the lower limit of 600 mg/m^2/day for dust fallout. None of the monitoring point exceeded the 2400 mg/m^2/day limit and none of the monitoring points exceeded the 1200 mg/m^2/day limit more than 3 times in a calendar year. The North monitoring point is the only monitoring point that exceeded the 1200 mg/m^2/day limit in two sequential months. It can be concluded that the mine is compliant with the South African National Standards 1929:2004 most of the time. The Ambient Air Quality at Usutu Mine is of a very high standard and although the mining activities, such as blasting and transportation of coal is having a negative effect on the receiving environment. This impact is mitigated by means of dust suppression and other management measures to such a level that the impact is negligible small.

It is recommended that the following area be managed to ensure that dust fallout across the site do not increase to such levels that the dust exceeds the 2400 mg/m^2/day.

Pollution Control Dam Design Report

The conclusions that were reached during the design process can be summarised as follows:

- Choose an appropriate lining to be used when constructing the pollution control dam;
- Construct a 4 450m^3 pollution control dam with emergency overflow at the position to be determined on site;
- Construct trenches / berms in close proximity to the mining activities to minimise the amount of clean water (storm water run-off) that will infiltrate into the mining area; and
- Construct trenches / berms (channel type 12) with 2 000mm base width and minimum 660mm depth at minimum 1:50 gradient

Geohydrological Report

The results of the investigation were:

- Groundwater levels were measured in twelve boreholes during a hydrosensus conducted in November 2011 for the proposed Usutu opencast mine on the Farm Jan Hendriksfontein portion 263 IT and Transitu 257 IT. The depth of the static groundwater level was found to vary between 1m and 10m below ground level;
- A seasonal aquifer perched on the bedrock probably develops in the upper weathered soil layer, especially after high rainfall events. Flow in the perched aquifer is expected to follow the surface contours closely and emerge as fountains or seepage at lower elevations;
- From the chemical analysis of the water samples an overall assumption can be made that the groundwater sampled in the proposed mining area is of poor quality and not acceptable for domestic use. It can be deducted from the water quality of the sampled boreholes that the groundwater has been negatively affected by historic mining related contaminants;
- The acid base analysis (ABA) of exploration drill cores from the six opencast areas showed material that is intermediate to potentially acid forming material;
- Geophysics indicated that structures such as dykes are present across the opencast mining area.

Surface water Report

Resource Sensitivity and Integrity:
The Present Ecological State (PES) of the Witpuntspruit is classified as moderately modified (class C). This status is caused by upstream anthropogenic and agricultural activities as well as mining operations in close proximity to the stream.

In addition the area is characterised by 14 hectares of seasonal wetlands and permanent wet zones. All wetlands in the area are described as palustrine wetland types with areas adhering to non-channelled and valley bottom descriptions. Most of the wetlands in the study area obtained a low PES category status. In terms of the wetland study it was found that the biodiversity of the wetlands range from sensitive to less sensitive in the study area. The wetlands are considered to be of ecological importance and sensitivity but due to their current low significance status rehabilitation measures need to be instated.

Surface water impacts:
Surface water resources within the vicinity of the project area are already impacted due to mining activities. The historic water quality of the Witpuntspruit exceeds the Resource Quality Objectives for the catchment. Currently

there is no evidence of further degradation of the water quality as measured upstream and downstream of Usustu Coal operations. Water quality could be classed as unacceptable in terms of variables such as pH, TDS, SO_4, Mn, Al and Fe. Mining at Usutu Colliery may cause further degradation of the water resource if appropriate water management practises are not in place. Mining will impact on the aquatic ecology as well as wetlands within the project area. These impacts are rated as moderate to high and with the implementation of mitigation measures, impacts will have a rating of low to moderate.

Water Use and Management:
The approach in water management for the mine is founded in the requirements set for a water resource management framework on a catchment level. This entails that the mine will strive to follow a pro-active, coherent and consistent management strategy in accordance with the objectives to be achieved as provided in the Internal Strategic Perspective of the Upper Vaal.

It is further envisaged that the mine will impact on the wetland area as significant coal reserves are located in these areas. The water management approach of the mine will be to replace the affected wetlands with artificially constructed wetlands as part of the rehabilitation program.

The current footprint of the mine will be considered in the layout of new infrastructure to ensure that clean areas are maximised, dirty areas minimised, and that adequate containment facilities are in place to prevent spillages and discharge to the environment. The settling pond will be phased out and replaced with an appropriately designed pollution control dam. The proposed mining footprint will be rehabilitated by means of an artificial wetland to assist with further improvement of water quality.

Recommendations:
The feasibility of the mine is dependent on the mining of coal reserves on the Farm Jan Hendriksfontein 263 IT. The sterilisation of coal reserves in close proximity to the wetland areas will create a situation that not sufficient funding through mining will be generated to implement the entire pollution prevention infrastructure. The mining of coal adjacent to the wetland areas could be approved as the wetland specialist study has stated that the relatively small scale of the mining activity and the low conservation status of the wetlands will result in no major negative impact.

The commitment by the mine to reinstate affected wetlands and to rehabilitate disturbed areas will result in a situation where the water management practices adopted by the water management area is addressed. It is recommended that the water uses as applied for by the mine be approved on condition that all water management measures as specified are implemented.

Wetland Delineation and functionality report

The wetlands were assessed as having a combined impaired Class D rating. It was determined that the wetlands are considered to be ecological important and sensitive. The biodiversity of these wetlands are usually very sensitive to flow and habitat modifications and plays a role in moderating the quantity of water in major rivers. However, in some instances, these functions could no longer be attributed to some of the wetlands.

The Wetland health assessment revealed that in terms of natural and human services the wetlands are moderately to seriously modified. The loss of natural habitats and basic ecosystem functions are extensive and

were caused by extensive anthropological activities in the catchment. In the event that this wetland is subject to further degradation due to road construction and mining, Usutu Colliery will have to apply for a Section 21 (i) and (c) Water Use License authorisation. The water use authorisation will entail a proper rehabilitation plan as part of the closure plan.

River Health Assessment

Biomonitoring was conducted at two points in the Witpuntspruit upstream from the confluence with the Vaal River on the Farm Jan Hendriksfontein 263 IT and upstream from the Camden Power station. The reference site was selected in the upper parts of the Wipunt Spruit upstream from the confluence with the Humanspruit. However, the reference site was also situated downstream from several coal mining operations in the catchment. Biomonitoring was conducted along with surface water monitoring to determine the current state of the surface water resource and its associated aquatic community.

The biomonitoring points selected in the Wipunt Spruit and Humanspruit respectively were at the two bridges where these watercourses transect the N2 road, with a third point (UCREF) selected in the Witpuntspruit to act as a reference site. UC01 was located in the Witpuntspruit upstream of Camden power station and just downstream from the Usutu west coal operations at the bridge on the N2 opposite the turn off to Camden Village. UC02 was a further 300 meters upstream from the rehabilitated mining areas of Usutu West coal operations at the bridge on the N2 crossing the Humanspruit just before the Camden power station turnoff. The tributary falls within the C11B quaternary drainage area. According to the Ecological Water Requirements Assessment conducted by Department of Water Affairs and Forestry (2001), the Present Ecological Status (PES) of C11B quaternary drainage area is class D, largely modified. This category was used to determine the current reference scores for the stream.

The measured biota-specific water quality variables indicated that the stream could support aquatic life. The invertebrate Habitat Assessment System (IHAS) showed that UC01 and UC02 were within the range expected from largely impaired stream that could not support a diverse macro-invertebrate fauna. It is also important to remember that this biomonitoring was conducted directly downstream of mining operations. This might have influenced the availability of habitats. The SASS5 scores at both monitoring points were much lower than the reference score. Of the 13 taxa that were found during the study, only two families found at UC01 were sensitive to pollution while no sensitive species were found at UC02. The reference site hosted five sensitive species out of a total of 21 taxa identified. Compared to the reference scores, UC01 was severely impaired, while UC02 was largely impaired. Impacts on both monitoring points include upstream impacts from the agricultural land use activities, sediment from the coal mining activities and power generation, litter from the N2 and erosion.

Visual Impact Assessment

The construction and operation of the Usutu mine related activities and its associated infrastructure will have a visual impact on the natural scenic resources and the topography. However, with the correct mitigation measures the impact can be decreased to a point where the visual impact can be seen as insignificant.

The moderating factors of the visual impact of the facility in the close range are the following:

- Short exposure time of road users
- The time the structure will be visual due to roll-over mining

- Number of human inhabitants located in the area
- Natural topography and vegetation
- Mitigation measures that will be implemented
- Medium to high absorption capacity of the landscape

In light of the above mentioned factors that reduce the impact of the facility, the visual impact is assessed as LOW VISUAL IMPACT after mitigation measures have been implemented.

Traffic Impact Assessment:

This traffic impact assessment was done as part of the environmental impact assessment for the Vunene Colliery (Pty) Ltd located on Leeuwenburg 137 IT, Roodewal 270 IT, Holbank 265 IT, Vlakfontein 266 IT, Mooiplaats 290 IT, Witpunt 267 IT, Transutu 257 IT and Jan Hendriksfontein 263 IT in the Msukaligwa Local Municipality, Mpumalanga Province.

The mining area covers a large area and opencast as well as underground mining operations are envisaged. The opencast mine has an expected life of 30 years with the production off approximately 3 000 000 tons/ annum. The underground portion of the mine has the same life expectancy. This project is an extension of the existing mining operations at Usutu West Colliery. The colliery has an existing access to the N2 just west of the access to the Camden Power Station.

A traffic statement was conducted by Via Magna for the relocation of the Camden Power Station access in June 2012. The reason for the relocation of the access on the N2 was to mine the coal underlying the existing access road to Camden Power Station. The intention is to relocate the access approximately 1km (towards Witpuntspruit).

The proposed relocation was approved by SANRAL subject to a number of conditions. One of the conditions is that the Usutu West Colliery access (current access to the mine) must be relocated at the same time that the Camden Power Station access is relocated.

The extension of the mine requires a separate access for mining activities in Block D on the N2. This was discussed with SANRAL and an access could be supported, again subject to conditions that will be imposed if the access is approved.

The mine is not a land use for which trip generation figures are available in the “SA Trip Generation Rates”. The trip generation will be based on employment figures and operational information provided to the sub-consultant for the project. Shift changes times and the method of moving product between the mine and Camden Power Station plays a major role in the trip generation. In this instance the mine is an existing operation with trucks delivering coal to Camden Power Station. This will continue with between 120 and 150 thirty ton truckloads per day for 24 hour operations.

Land capability Assessment

According to the parent material maps the study area has Arenite and sedimentary sandstone parent material. According to the 1:250 000 land types map the specific ecotope for the area under investigation have mesotrophic and eutrophic soils on a plinthic catena with some duplex and gleyic soils on the valley bottom.

The topography of the area is a typical gentle rolling landscape with slopes of 2-3%, with drainage areas and wetlands in the valley bottom.

The soil investigation on the proposed area was done with a soil auger on a grid system. Profile pits were also opened on representative soil management units. Applying these criteria where possible to the soils that were mapped based on the limitations of the soils' chemical and physical characteristics and the site constraints. A combination of these variables was then used to obtain the land capability and agricultural potential of the soils.

The major soil forms that occur on the proposed development are as follow:
On the crests and mid-slopes the typical catena is Glencoe soils followed by Avalon soils on the lower mid- and foot-slopes and then Westleigh, Longlands, Katspruit and Rensburg soils associated with wetlands.

Glencoe (Gc)
The Glencoe soils have an Orthic A Horizon over a Yellow Brown Apedal B Horizon over Hard Plinthite. The average depth of the Glencoe soils range from 30-60cm on the crests to 60-90cm on the mid-slopes. Sub-dominant to Glencoe soils are Clovelly soils with hard rock in the sub-soil.

Avalon (Av)
The Avalon soils have an Orthic A Horizon over a Yellow Brown Apedal B Horizon over Soft Plinthite. The average depth of the Avalon soils Glencoe soils range from 60-90cm on the mid- and foots-lopes. Sub-dominant to Avalon soils are Longlands soils on the foot-slopes.

Westleigh (We)
The Westleigh soil has an Orthic A Horizon over a soft Plinthic B horizon with some signs of wetness in the sub-soil. The depth ranges from 0—60cm depending on the wetness of the soil. Sub-dominant to the Westleigh soils are Longlands, Katspruit and Rensburg soils forms all associated with wetland conditions.

The following table is a summary of the management units and their land capability potential.

Table 3: Land capability classes of different management units

Soil Management Unit	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
Soil Types	Avalon, Glencoe	Avalon, Glencoe,	Glencoe, Dresden	Westleigh, Longlands, Rensburg Katspruit	Disturbed Areas
Average soil depth	60-90cm	30-60cm	0-30	0-60cm	
Limiting Factors	Wetness, Depth	Depth, wetness	Depth, rock	Wetness,	
Agricultural potential	Medium to high	Low to medium	Marginal	Marginal	
Land capability	1	2	4	5-6	6
Recommended Land use	Arable, crop production	Arable crop production	Grazing	Wetlands	Wilderness/ Grazing
% of Area	126.1 (27.7%)	209.4 (46%)	28 (6.2%)	91.9 (20.2%)	6.6 (1.5%)

Special measures must be implemented in the soil stripping and rehabilitation process to restore the soils to an arable and grazing potential. The soils associated with wetlands are marginal for crop production but are very important from a wetland perspective. These soils should not be disturbed.

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LIST OF ABBREVIATIONS

AIA - Archaeological Impact Assessment
AP - Action Plan
ASAPA - Association of South African Professional Archaeologists
CPA – Communal Property Association
CRM - Cultural Resource Management
BID - Background Information Document
DEA - Department of Environmental Affairs
DEAT - Department of Environmental Affairs and Tourism (currently known as DEA)
DOE – Department of Energy
DWA - Department of Water Affairs
EIA - Environmental Impact Assessment
EIR - Environmental Impact Report
EMPr - Environmental Management Programme
ENPAT - Environmental Potential Atlas
EP - Equator Principles
EPC – Engineering and Procurement Contract
EPFI - Equator Principles Financial Institutions
ESA - Early Stone Age
FGM - Focus Group Meeting
FSR - Final Scoping Report
GDP - Gross Domestic Product
GGP - Gross Geographic Product
GIS - Geographic Information System
GPS - Global Positioning System
HIA - Heritage Impact Assessment
I&APs - Interested and Affected Parties
IDP - Integrated Development Plan
IUCN - International Union for the Conservation of Nature
KSW - Key Stakeholder Workshop
LSA - Late Stone Age
LIA - Late Iron Age
LTI – Latitude Tilt Irradiation
MSA - Middle Stone Age
MIA - Middle Iron Age
NEMA - National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA - National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NHRA - National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NSBA - National Spatial Biodiversity Assessment
NWA - National Water Act, 1998 (Act No. 36 of 1998)
O&M – Operations and Maintenance

PHRA - Provincial Heritage Resources Agency
PSSA - Paleontological Society of South Africa
PM - Public Meeting
PPP - Public Participation Process
SADC - Southern African Development Community
SAHRA - South African Heritage Resources Agency
SALA – Subdivision of Agricultural Land of 1970
SANBI - South African National Biodiversity Institute
SANDF - South African National Defence Force
SAWS - South African Weather Service
SDF - Spatial Development Framework
STEP - Subtropical Thicket Ecosystem Project
VT - Vegetation Type
VFR - Visiting Friends or Relatives
VAC - Visual Absorption Capacity

GLOSSARY OF TERMS

Alien species: A plant or animal species introduced from elsewhere: neither endemic nor indigenous.

Anthropogenic: Change induced by human intervention.

Applicant: Any person who applies for an authorisation to undertake an activity or undertake an Environmental Process in terms of the Environmental Impact Assessment Regulations – National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) as contemplated in the scheduled activities listed in Government Notice (GN) No R. 543, 544 and 545.

Arable potential: Land with soil, slope and climate components where the production of cultivated crops is economical and practical.

Archaeological resources: This includes:

- material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation; features, structures and artefacts associated with military history which are older than 75 years and the site on which they are found.

Alluvial: Resulting from the action of rivers, whereby sedimentary deposits are laid down in river channels, floodplains, lakes, depressions etc

Biodiversity: The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.

Cultural significance: This means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

Cumulative impact: In relation to an activity, cumulative impact means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

The "Equator Principles": A financial industry benchmark for determining, assessing and managing social & environmental risk in project financing

Ecology: The study of the interrelationships between organisms and their environments.

Environment: All physical, chemical and biological factors and conditions that influence an object.

Environmental impact assessment: In relation to an application, to which Scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of the application.

Environmental impact report: In-depth assessment of impacts associated with a proposed development. This forms the second phase of an Environmental Impact Assessment and follows on from the Scoping Report.

Environmental management programme: A legally binding working document, which stipulates environmental and socio-economic mitigation measures which must be implemented by several responsible parties throughout the duration of the proposed project.

Ephemeral: When referring to a stream or drainage line, it refers to the flow characteristics by which only periodic surface flows typically occur. Similarly when referring to a pan or depression, this would be characterised by only periods of time when surface water occurs within it, usually associated with the rainy season.

ESRI is a software development and services company providing Geographic Information System (GIS) software and geo-database management applications.

Heritage resources: This means any place or object of cultural significance. See also archaeological resources above.

Hyrdomorphic / hydric soil: Soil that in its un-drained condition is saturated or flooded long enough during the growing season to develop anaerobic conditions favouring growth and regeneration of hydrophytic vegetation. These soils are found in and associated with wetlands.

Local relief: The difference between the highest and lowest points in a landscape. For this study, it is based on 1:50 000 scale.

Macro-geomorphological: Related to / on the scale of geomorphic provinces. A geomorphic province is a spatial entity with common geomorphic attributes.

Precipitation: Any form of water, such as rain, snow, sleet, or hail that falls to the earth's surface.

Red data species: All those species included in the categories of endangered, vulnerable or rare, as defined by the International Union for the Conservation of Nature and Natural Resources.

Riparian: The area of land adjacent to a stream or river that is influenced by stream induced or related processes.

Scoping Report: An "issues-based" report which forms the first phase of an Environmental Impact Assessment process.

Soil compaction: Soil becoming dense by blows, vehicle passage or other type of loading. Wet soils compact easier than moist or dry soils.

INTRODUCTION

Environmental Assurance (Pty) Ltd (Envass), as independent environmental consultants have been appointed by Vunene Mining (Pty) Ltd to undertake the Environmental Impact Assessment (EIA) for the proposed opencast and surface coal mining at Leeuwenburg 137 IT, Roodewal 270 IT, Holbank 265 IT, Vlakfontein 266 IT, Vlakfontein 269 IT, Mooiplaats 290 IT, Witpunt 267 IT, Transutu 257 IT and Jan Hendriksfontein 263 IT, in the Msukaligwa Local Municipality.

The proposed Usutu Central Reserve opencast and surface mine is located approximately 18 kilometres south east of Ermelo.

The Environmental Impact Assessment (EIA) process followed is in compliance with the National Environmental Management Act, 1998 (Act 107 of 1998), as amended and the Environmental Impact Assessment Regulations of 2010 (Government Notice No's R544, 545 and 546 in Government Gazette No. 33306 of 18 June 2010). The proposed coal mining operations consists of listed activities which falls within the scheduled activities listed in Government Notice Regulation No 545 (Scoping and EIA). Prior to such a listed activity being approved, it is required that an environmental process is undertaken and a report is submitted to the relevant environmental authority for consideration.

The EIA process includes the completion of the Scoping Report as well as an Environmental Impact Assessment Report. The Scoping Report determines the issues or concerns from the relevant authorities as well as interested and/or affected parties. In addition, an Impact Assessment process was undertaken to determine the likely consequence that the proposed coal mining may have on the environment.

The activities applicable to this development are as follows:

NEMA (Act 107 of 1998) GNR 544 of 2010:

Item 9: The construction of facilities and infrastructure exceeding 1 000 meters in length for the bulk transportation of water, sewage or storm water –

i) With an internal diameter of 0,36 meter or more; or
ii) With a peak throughput of 120 litre per second or more.

Excluding:

a) Such facilities or infrastructure are for the bulk transportation of water, sewage or storm water drainage inside a road reserve; or
b) Where such facilities will occur within urban areas but further than 32 meters from a water course, measured from the edge of the water course.

Item 10: The construction of facilities or infrastructure for the transmission or distribution of electricity –

i) Outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;

Item 11: The construction of:

i) canals;
ii) channels;
iii) bridges;

iv) dams;
v) weirs;
vi) bulk storm water outlet structures;
vii) marinas;
viii) jetties exceeding 50 square metres in size;
ix) slipways exceeding 50 square metres in size;
x) buildings exceeding 50 square metres in size; or
xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.

Item 13: 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;

Item 18: The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from
i) a watercourse;
ii) the sea;
iii) the seashore;
iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater-
but excluding where such infilling, depositing, dredging, excavation, removal or moving
a) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or
b) occurs behind the development setback line.

Item 22: The construction of a road outside urban areas –
i) With a road reserve wider than 13,5 meters; or
ii) Where no reserve exists where the road is wider than 8 meters; or
iii) For which an environmental authorization 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.

NEMA (Act 107 of 1998) GNR 545 of 2010:

Item 13: The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation.

Item 14: 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:
i) Purposes of agriculture or afforestation inside areas identified in spatial instruments adopted by the competent authority for agriculture or afforestation purposes;
ii) The undertaking of a process or activity 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 activity is regarded to be excluded from this list;

iii) The undertaking of a linear activity falling below the thresholds in Notice 544 of 2010.

Item 15: 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.

Item 20: Any activity which requires a mining right or renewal thereof as contemplated in section 22 and 24 respectively of the Mining and Petroleum Resources Development Act, 2002 (Act 28 of 2002).

As independent environmental assessment practitioners, ENVASS is responsible for:

- Undertaking a comprehensive site evaluation facilitated by a site visit and desktop analysis;
- Advertising, requesting that Interested and Affected Parties (I&AP's) register their concerns;
- Identifying the possible I&AP's;
- Conduct specialist studies deemed necessary / required;
- Assessing the issues, impacts and alternatives; and
- Compiling a detailed Scoping Report and its submission to the relevant environmental authority.
- On approval of the Scoping Report, compile a draft Environmental Impact assessment report and EMPr

STRUCTURE OF THE REPORT

The Draft Environmental Impact Assessment Report (DEIAR) is structured as follow:

- Chapter 1 gives the assumptions and limitations under which the Draft EIAR was compiled;
- Chapter 2 describes the knowledge gaps pertaining to the EIA process for the proposed development;
- Chapter 3 will focus on the description of the proposed project;
- Chapter 4 provides explanation of the key legal requirements;
- Chapter 5 gives details of the applicant;
- Chapter 6 provides explanation of the need and desirability of the proposed project by highlighting certain issues such as local employment as well as regional and local income profile;
- Chapter 7 will focus on the description of the proposed project;
- Chapter 8 provides a description of the receiving environment;
- Chapter 9 provides a description of the environmental impact assessment process;
- Chapter 10 provides the environmental impact assessment methodology;
- Chapter 11 describes the alternatives which were considered during the project;
- Chapter 12 has a summary of the recommendations as provided by the various specialists;
- Chapter 13 provides a description of the environmental impacts;
- Chapter 14 describes the cumulative impacts; and
- Chapter 15 describes the authorisation opinion and possible mitigation measures.

EXPERTISE AND ENVIRONMENTAL ASSESSMENT PRACTITIONER (REG31(2)(a))

NAME	ORGANISATION	SPECIALISTS ASSESSMENT
Ilze Ueckermann	ENVASS	Environmental Assessment Practitioner
Dutoit Wilken	ENVASS	Visual Impact Assessment
Tobias Coetzee	ENVASS	Heritage Impact Assessment
Vuyokazi April	ENVASS	Ecological and Biodiversity Specialist
Judith Mandla Zvikaramba	ENVASS	Social Impact Assessment
Johan Mare	MENCO	Surface water report and Wetland delineation focussing on PES and EIS
Francois Botha	ECOSoil	Land Capability Assessment
Eben Kotze	WSP	Traffic Impact Assessment
Morne Burger	GPT	Geohydrological Assessment

1. ASSUMPTIONS AND LIMITATIONS (Reg 31(2)(m))

- All information provided by the applicant and I&APs to the Environmental team was correct and valid at the time that it was provided;
- The strategic level investigations undertaken by specialists prior to the commencement of the EIA process, indicated that the development site is suitable and technically acceptable;
- It is not always possible to involve all Interested and Affected Parties individually, however every effort has been made to involve as many affected stakeholders as possible;
- The information provided by the applicant and specialists was accurate and unbiased; and
- The scope of this investigation is limited to assessing the environmental impacts associated with the construction, operation and decommissioning of the opencast and underground coal mine.

2. KNOWLEDGE GAPS (Reg 31(2)(m))

It is the purpose of this part of the EIA Report to summarise the potentially significant findings of the review process. The environment that is likely to be affected by the proposed project was assessed and the EIA Report has covered all prevailing conditions of the environmental aspects identified, including cumulative impacts. It is believed that the environment is well understood. Hence, no significant knowledge gaps exist in terms of the current state of the environment.

Due to the nature of the existing environment, the local conditions of the area, and professional expertise, it is believed that the predicative measures are suitable and contain no limitations. Further work is constantly undertaken in the coal mining fraternity and investigations in parallel with the impacts presented in this report could change, should new information become available, or as the project description is refined.

3. DESCRIPTION OF PROPOSED ACTIVITY

The project at the proposed development includes the development of a opencast and underground coal mine (Usutu Coal Colliery) for the mining of coal on Farms Leeuwenburg 137 IT, Roodewal 270 IT, Holbank 265 IT, Vlakfontein 266 IT, Vlakfontein 269 IT, Mooiplaats 290 IT, Witpunt 267 IT, Transutu 257 IT and Jan Hendriksfontein 263 IT, in the Msukaligwa Local Municipality, Mpumalanga Province. Infrastructure on these farms associated with mining of coal will be:

- Mobile crushing and screening facility;
- An access road and roads to connect the operational section of the mine with the plant;
- An area where the heavy vehicles will be serviced and maintained;
- A fuel storage area; and
- Coal stockpile area.

The SG code for the farm portions are:

- T0IT00000000026300003;
- T0IT00000000026300004;
- T0IT00000000026300006;
- T0IT00000000026300009;
- T0IT00000000026300014;
- T0IT0000000002670002;
- T0IT0000000002670008;
- T0IT0000000002670009;
- T0IT0000000002670011;
- T0IT0000000002670017;
- T0IT0000000002670021;
- T0IT0000000002660005;
- T0IT0000000002660006;
- T0IT0000000002660007;
- T0IT0000000002660008;
- T0IT0000000002650000;
- T0IT0000000002700000;
- T0IT0000000002980000; and
- T0IT0000000002690000.

The site would therefore compromise of the following:-

Two coal seams were identified during the initial drilling process. The seams are developed within a discreet palaeo-basinal structure above Dwyka tillite deposits lying on basement felsites. B Lower seam is contained within the 1,6m - 2m interval, the average height is given between 2.5 and 3.5m and the average intersections

within the 4.0m areas. With the C Upper seam, the intersections greater than 1m and 2m were averaged out and the mean height applied to the total area.

The geological report (included an extensive wet vlei) has been included as inferred because access for drilling is not possible. Draining of the vlei would be required in order to properly evaluate the potential of these underlying reserves; which may be influenced by weathering.

The uppermost B Lower Seam horison is encountered at shallow depth with a minimum intersect of 6.06m and a maximum 17.59m roof of coal. The 2 Seam horison has a generally low ash lustrous dull upper half and a low ash bright vitrain banded basal zone varying in height between 1,6 to 2,0m pinching rapidly against the basin margins.

The C Lower Seam horison lies close below the floor of 2 Seam with a mixed shale/sandstone parting varying between a minimum of 0.08m and a maximum of 3.97m. The seam is generally finely vitrain banded with minor dull interbeds and varies in height between 0.10 to 2m.

The most economical method of coal extraction from coal seams depends on the depth and quality of the seams, and also the geology and environmental factors of the area being mined. The impact of coal mining processes is generally differentiated by whether they operate on the surface or underground.

Coal is mined only where technically feasible and economically justifiable. Evaluation of technical and economic feasibility of a potential mine requires consideration of many factors:

- regional geologic conditions;
- overburden characteristics;
- coal seam continuity,
- thickness, structure, quality, and depth;
- strength of materials above and below the seam for roof and floor conditions;
- topography (especially altitude and slope);
- climate;
- land ownership as it affects the availability of land for mining and access;
- surface drainage patterns;
- ground water conditions;
- availability of labour and materials;
- coal purchaser requirements in terms of tonnage,
- quality, and destination; and
- capital investment requirements.

The proposed Usutu Colliery opencast mining project will be undertaken over an area of approximately 200 ha at opencast areas, namely: portion 6A, 6B, 6C, 9 and 14. Mining will be conducted by opencast mining method, using a truck and shovel rollover mining technique. The mining will be outsourced to a suitably qualified mining contractor. Mining will be undertaken by diesel powered mining equipment in the form of front end loaders, excavators, haul and dump trucks, water carts and graders.

The typical sequence of mining will entail the stripping of all unsuitable soil and subsoil and the stockpiling thereof at dedicated topsoil and subsoil stockpiles, sited specifically for the purpose. The hard overburden material will be blasted utilising throw blasting techniques. Waste material overlying the coal seam will be removed by truck and shovel and these waste materials will be backfilled immediately behind the coal strip currently being mined. The backfilled waste and subsoil will be profiled, topsoil added and re-vegetated as part of the mining operation, and hence rehabilitation will be undertaken concurrently with the mining process. The final void and mine ramps will be backfilled to proximate pre-mining topography.

The extent of Vunene Mining (Pty) limited Mining Right application is approximately 13 540 hectares; however the extent of the proposed opencast mining area is approximately 200 hectares. The total minable *in-situ* coal located within the opencast area is approximately eight million Run Of Mine (ROM) tons of coal.

Based on the quality of the coal within the Usutu Colliery proposed opencast mining project area and the production rate, the life of mine for the Usutu Colliery proposed opencast mining project is estimated to be approximately five years.

3.1 Underground mining

The seam thickness varies between 1.20 to 3.00 meters in thickness, which lends itself to bord and pillar mining using continuous miners. It is planned to take the maximum extraction allowed in primary mining to a safety factor of 1.6, which will give a 65% yield. There is no plan to extract any pillars at this stage. It is expected that there will be some dolerite intrusions, thus a dyke development section will be deployed for the purpose of mining through these and preparing new mining sections.

The underground production is planned to commence on the West Underground Main high wall and will produce at a rate of 90,000 ROM tons per month from a single production section.

The B and C coal seams reserve at the proposed mining area extends over an area of approximately 13 540 hectares. The seam thicknesses varied between 1.20 metres and less than 3 metres at the depth of 55 to 90 metres. It is estimated that the B and C coal Seam is 84 Million *In-Situ* Tonnes; as a result the mine is expected to remain in production for thirty years (30 years).

The terms of reference for underground bord and pillar mining includes:

- No secondary extraction may be undertaken;
- A minimum safety factor of 3,0 must be maintained at all times; and
- A minimum pillar width to mining height ratio of 4,0 must be maintained at all times.

The main factors that influence pillar stability in underground coal mines are the pillar width to height (w:h) ratio and the pillar safety factor (SF). In order to better understand these concepts, the background relating to these aspects needs to be understood.

W:H Ratio

The width of the pillar to the height of the seam mined is given as the width to height ratio. This ratio can be read as the manner in which the pillar will fail. A ratio smaller than 3, indicates that the failure can be violent and

sudden and a ration above 3 indicates that the failure will be more gradual, meaning the signs of pillar failure will precede the actual failure.

To date no pillar has been known to have failed in South Africa with a width to height ratio of above 3,75.

The safety factor that is used to calculate a stable pillar geometry for underground bord and pillar mining is derived by dividing the pillar strength by pillar load. Because it is a safety factor, there will statistically be a certain probability that a given pillar with a certain safety factor will fail. The probability of failure is a function of the safety factor. The probability of failure for a safety factor of 2 is 0,0006%, indicating that less than 1 pillar would fail in 1 000 000 (one million). The probability of pillar failure for different safety factors are illustrated below:

Table 4: Probability of pillar failure for a given safety factor

SAFETY FACTOR	PROBABILITY OF FAILURE (%)
2	0.0006
1.8	0.02
1.5	0.5
1.0	50
0.8	99.34
0.6	99.4

The Safety Factor formula is based on the assumption of the Tributary Area Theory (TAT) which assumes that:

- Each pillar carries the weight of overburden directly above it;
- The panel width exceeds the depth to the workings; and
- All pillars in the panel are uniform size.

The biggest concern undermining watercourses and wetlands is the subsidence or displacement that may occur. Subsidence can be described as a downward movement of the surface that overlies an underground excavation, or adjacent to the surface excavation.

The effect of subsidence or displacement can be divided into various types of subsidence namely:

Tilt:
During active subsidence tilting may cause for example buckling of the building. Windows can crack and doors can be stuck. After the area has stabilized the structure will return to the vertical. In the case of watercourses and wetlands drainage or inlet course might be slightly affected.

Strain:
Two types of strain can be identified, tensile strain and compressive strain. Tensile strain can cause elongation of a piece of land whilst compressive strain can cause the surface to buckle.

Horisontal displacement:
This type of displacement can cause a section of land to be displaced with x amount of meter. This type of displacement usually form cracks on the edges.

Sub-surface erosions (Potholes):
Potholes form where cracks formed in the upper rock layers are slowly filled with eroded soil. Eventually, a subterranean cavity forms in the soil, at the soil rock contact, due to the rock acting as a reservoir for this eroding soil. When this cavity reaches its critical size, it collapses and results in a pothole on surface.

Sinkhole formation:
This type of subsidence mainly occurs where intersections collapse, and is more common in areas where the depth of mining is less than 50 meters. In contrast to potholes, these sinkholes are usually wide and deep and approximately the same size as the intersection underground.

The underground production is planned to commence on the West Underground Main high wall and will produce at a rate of 90,000 ROM tons per month from a single production section.

The underground mining equipment in each section will comprise the following, namely:

- Conventional mining (Continuous miners);
- Shuttle cars;
- Roof bolter;
- LHD (Underground Loaders);
- Feeder breaker;
- Section conveyor (extended as the section advances);
- Power supply and switches;
- Water supply and pumping arrangements;
- Tractor and trailer for materials transport; and
- Face drill.

3.2 Rollover mining and rehabilitation method

Figure 5: Diagram illustrating roll-over coal mining methodology, is a graphic representation of the rollover method. The stripping and stockpiling of topsoil is the most important step in any rehabilitation program and must begin before any minerals are extracted from the intended area of disturbance. Prior to the commencement of minerals extraction, the site will be cleared and grubbed. Then all topsoil located in the area of disturbance should be stripped from the site, avoiding mixing with trees, boulders and other discard materials, and should be stockpiled in berms located outside the boundaries of the proposed operations for use at later mining phases. Ideally, topsoil should not be worked when wet and prolonged storage should be avoided. In this way the valuable topsoil, an ideal medium for plant growth, will become available for rehabilitation purposes at the site as mining advances.

Subsoil and overburden should be stockpiled in berms located outside the boundaries of the proposed operations for use at later mining phases.

As mining advances, topsoil, subsoil and overburden will initially be shifted and stockpiled outside the boundaries of the pit and will then subsequently be shifted to mined-out areas. The Usutu opencast coal mine will be mined

over a period of 5 years. The movement and stockpiling of topsoil will take place as follows to ensure that progressive rehabilitation takes place during all phases of mining:

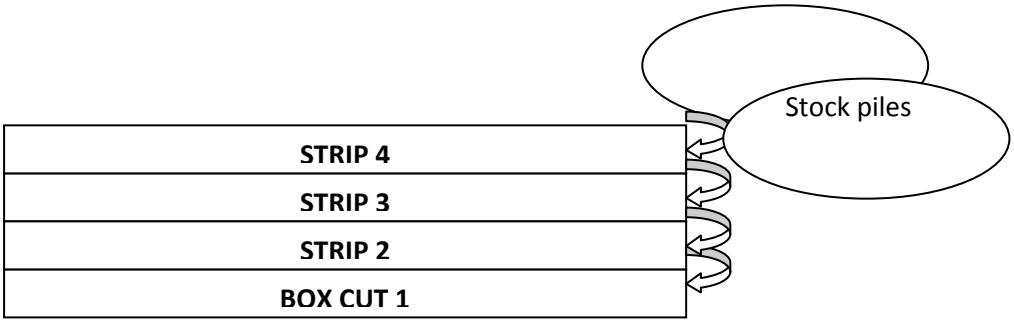

Figure 5: Diagram illustrating roll-over coal mining methodology

Initial two box cuts to be mined.

All identified topsoil, to a minimum depth of 300mm, will be removed from the area identified as the initial two box cuts and stockpiled at the areas marked as Topsoil Stockpile, adjacent to the south-western portion of the pits before the next phase of mining is initiated. This soil will subsequently be spread back over the pit area marked for the initial two box cuts to a depth of at least 300mm after the area has been mined.

Strip 3 and 4.

All identified topsoil, to a minimum depth of 300mm, will be removed from the area marked as strips 3 and 4 and stockpiled at the areas marked as Topsoil Stockpile, adjacent to the north-eastern portion of the borrow-pit. This soil will subsequently be spread back over the pit area marked as strips 3 and 4 to a depth of at least 300mm after the area has been mined.

The following basic principles of rehabilitation form the basis of the roll-over mining method:

- Prepare a rehabilitation plan prior to the commencement of mining;
- Agree on the long-term post-mining land use objective for the area with the relevant government departments, local government councils and private landowners. The land use must be compatible with the climate, soil, topography of the final landform and the degree of the management available after rehabilitation;
- Progressively rehabilitate the site, where possible, so that the rate of rehabilitation is similar to the rate of mining;
- Prevent the introduction of noxious weeds and pests;
- Minimise the area cleared for mining and associated facilities to that absolutely necessary for the safe operation of the mine;
- Reshape the land disturbed by mining so that it is stable, adequately drained and suitable for the desired long-term land use;
- Minimise the long-term visual impact by creating landforms which are compatible with the surrounding landscape;
- Reinstate natural drainage patterns disrupted by mining wherever possible;
- Minimise the potential for erosion by wind and water both during and following mining;

- Characterise the topsoil and retain it for use in rehabilitation. It is preferable to reuse the topsoil immediately rather than storing it in stockpiles. Only discard if it is physically or chemically undesirable, or if it contains high levels of weed seeds or plant pathogens;
- Consider spreading the cleared vegetation on disturbed areas;
- Deep rip compacted surfaces to encourage infiltration, allow plant root growth and key the topsoil to the subsoil, unless subsurface conditions dictate otherwise;
- Ensure that at the surface one or two metres of soil is capable of supporting plant growth;
- If topsoil is unsuitable or absent, identify and test alternatives substrates, e.g. overburden that may a suitable substitute after addition of soil improving substances;
- Re-vegetate the area with plant species consistent with the post mining land use; and
- Monitor and manage rehabilitated areas until the vegetation is self-sustaining.

Rehabilitation guidelines during the decommissioning phase should adhere to the following guidelines:

Site grading

The local environment in un-rehabilitated disturbed mining areas is unfavourable to vegetation establishment. Lack of topsoil, combined with uneven and often quite steep slopes hinders plant germination and establishment. While the disturbed slopes are being graded, care must be taken to ensure proper drainage of the site. Consideration should at this time be given to the creation of berms at the pit entrance, to screen the site and to prevent further unauthorized access.

Spreading of stored topsoil

Once the disturbed area's – box cuts as well as the new pit area - backfilling, grading and sloping is complete, subsoil and topsoil from storage berms located outside the mining area should be spread on the slopes as evenly as possible. When this has been completed, the next stage in the rehabilitation program should immediately commence to prevent erosion and topsoil loss.

Decommissioning and closure will entail the following:

- Slope and whaleback the slopes of both the old box cuts as well as the new pits to a gradient of at least 1:6 in order to accommodate any future agricultural activities within the area;
- The topsoil will be stockpiled as detailed in the previous section;
- Topsoil will be spread out over prepared areas to a depth of no less than 300mm, unless otherwise stated (see the 'topsoil stockpiling' section above);
- Neat stockpiling of oversized rock in the one corner of the pit or alternatively clustering rocks on long slopes with gradients of 1:6 to reduce erosion through water run-off and facilitate plant growth by providing seedlings and seeding of the disturbed area;
- Remove the concrete/impermeable floor where refuelling occurred;
- Remove all containers;
- Decontaminate any hydrocarbon spills by removing the soil and disposing of it at a licensed disposal facility;
- Remove the temporary fencing;

- Maintain the area by doing regular site inspections ensuring the establishment of vegetation and the eradication of alien invader species; and
- Reinstate natural drainage patterns disrupted by mining wherever possible.

All of the topsoil must be utilised as a growing medium in the rehabilitation process of the site, in other words it must be spread over all prepared areas (ripped to a depth of 300mm and sloped) and be re-vegetated with seeds found within the area or prepared in such a way as to satisfy the agricultural requirements of the area and/or the land owner.

It is imperative that rehabilitation occurs concurrently with mining activities, as topsoil, containing seeds from plants within the area, degrades over time with the result that the soil environment becomes unfavourable for germinating seeds.

3.3 Closure processes

The closure objective is to ensure that all the significant impacts have been mitigated against. All rehabilitated areas will be left in a stable, self sustainable state. Proof of this will be submitted at closure.

The closure objectives for the Usutu opencast coal mine can be summarised as follows:

- Make all areas safe for both humans and animals;
- Make all areas stable and sustainable;
- Ensure impact on any water bodies, water courses and catchment areas have been avoided or minimised;
- Rehabilitate disturbed areas as soon as possible; and
- Minimise the impact on the local community.

With specific reference to the ground water environment, the following closure objectives should be pursued:

- Rehabilitation of the surface infrastructure where necessary to minimize infiltration into the underground water regime (the philosophy of concentration and containment); and
- Rehabilitation to minimise contamination of surface water resources (the philosophy of dilution and dispersion).

When and if necessary suitable structures and or systems are to be put, and kept in place to limit contamination of water resources to concentrations in accordance with the Target Water Quality Ranges for human consumption.

The goals upon decommissioning and closing of the Usutu opencast coal mine will include that all significant impacts have been mitigated and that there are no alterations to the environment that are apparent as far as is practically possible. All land will be rehabilitated to a state that facilitates compliance with current national environmental quality objectives including air quality objectives and water quality guidelines.

3.4 Storage of ore

The Run of Mine stockpile will store a maximum of 80 000 ton of ore at any one time, at a steady state in the beginning, a stockpile will be built of up to 30 000 tons so as to start up the contractor.

The topsoil and subsoil will be removed and stockpiled separately. Ore will be stockpiled near the processing plant on a pre-prepared area, where soils will be treated, compacted and provided with adequate Bitumen product to prevent seepage of acid drainage. The stockpile areas will be connected to evaporation ponds which will also be lined to ensure impermeability. Ore will be stockpiled for a maximum of two to three months, or until the operations at Portion 6A of the Farm Jan Hedriksfontein ends.

The water collected in the evaporation ponds will be used for dust suppression on the mine.

3.5 Waste rock dump

After the ore is extracted, waste rock will be placed on the waste rock dump by means of a conveyor belt. The waste rock dump will be positioned near the plant area. It is estimated that the ROM waste rock dump would be approximately 1 000 000m^3.

The footprint of the waste rock dump is calculated to be 600m by 800m with a height of 30m; therefore the total volume is estimated at approximately 14 400 000m^3.

The position of the waste rock dump is planned to reduce the initial hauling distance, at a position where it can be used to for the rehabilitation of the final void.

4. LEGAL FRAMEWORK FOR THE PROPOSED DEVELOPMENT

This section includes a list of Acts applicable to this project and a brief description of the relevant aspect(s) of the relevant Acts. The aim of this component of the report is to provide a brief overview of the pertinent policies as well as legal and administrative requirements applicable to the proposed development of the Usutu Coal Colliery.

The legislative motivation for this project is underpinned by the Constitution of South Africa (Act No. 108 of 1996), which states that:

The State must, in compliance with Section 7(2) of the Constitution, respect, protect, promote and fulfil the rights enshrined in the Bill of Rights, which is the cornerstone of democracy in South Africa. Section 24 of the Constitution states:

24. Environment.-Everyone has the right-
(a) to an environment that is not harmful to their health or well-being; and

(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-
(i) prevent pollution and ecological degradation;
(ii) promote conservation; and
(iii) secure ecologically sustainable development and use of natural resources while promoting a justifiable economic and social development.

Section 24 of the Constitution of South Africa (Act No. 108 of 1998) requires that all activities that may significantly affect the environment and require authorisation by law must be assessed prior to approval. In addition, it provides for the Minister of Environmental Affairs and Tourism or the relevant provincial ministers to identify:

- new activities that require approval;
- areas within which activities require approval; and
- existing activities that should be assessed and reported on.

Section 28(1) of the Constitution of South Africa (Act No. 108 of 1998) states that "*every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring*". If such pollution or degradation cannot be prevented then appropriate measures must be taken to minimise or rectify such pollution or degradation. These measures may include:

- Assessing the impact on the environment;
- Informing and educating employees about the environmental risks of their work and ways of minimising these risks;
- Ceasing, modifying or controlling actions which cause pollution/degradation;
- Containing pollutants or preventing movement of pollutants;
- Eliminating the source of pollution or degradation; and
- Remedying the effects of the pollution or degradation.

4.1 NEMA and Environmental Impact Assessment Regulations

The National Environmental Management Act, 1998 (Act 107 of 1998)[NEMA] was first enacted in November 1998 and the amended Act came into effect in June 2010. The NEMA strives to legislate National Environmental Management Policy and has repealed a number of the provisions of the Environment Conservation Act, 1989 (Act 73 of 1989)[ECA]. NEMA is focussed primarily on co-operative governance, public participation and sustainable development.

NEMA makes provisions for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of the State and to provide for matters connected therewith. Section 2 of the Act establishes a set of principles, which apply to the activities of all organs of state that may significantly affect the environment. These include the following:

- Development must be sustainable;
- Pollution must be avoided or minimised and remedied;
- Waste must be avoided or minimised, reused or recycled;
- Negative impacts must be minimised and positive enhanced; and
- Responsibility for the environmental health and safety consequences of a policy, project, product or service exists throughout its entire life cycle.

These principles are taken into consideration when a Government department exercises its powers, for example, during the granting of permits and the enforcement of existing legislation or conditions of approval.

The authorities may direct an industry to rectify or remedy a potential or actual pollution or degradation problem. If such a directive is not complied with, the authorities may undertake the work and recover the costs from the responsible industry.

The Environmental Impact Assessment (EIA) process followed is in compliance with the National Environmental Management Act, 1998 (Act 107 of 1998) [NEMA], as amended and the Environmental Impact Assessment Regulations of 2010 (Government Notice No's R544, 545 and 546 of 2010). The proposed development involves 'listed activities', as defined by the NEMA. Listed activities are activities, which may have potentially detrimental impacts on the environment and therefore require environmental authorisation from the relevant authorising body. The proposed development occurs in Mpumalanga Province and the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) is the responsible regulatory authority.

The proposed development involves the following listed activity, as stipulated in the EIA Regulations of 2010, and as such is required to undergo a Scoping/EIA exercise in support of any application to MDEDET for environmental authorisation (Government Notice No. 545 of April 2010):

The proposed development includes the development of a opencast coal mine (Usutu Coal Colliery) for the opencast mining of coal Leeuwenburg 137 IT, Roodewal 270 IT, Holbank 265 IT, Vlakfontein 266 IT, Vlakfontein 269 IT, Mooiplaats 290 IT, Witpunt 267 IT, Transutu 257 IT and Jan Hendriksfontein 263 IT, in the Msukaligwa Local Municipality:

The proposed development involves the following listed activity as stipulated in the EIA Regulations of 2010:

NEMA (Act 107 of 1998) GNR 544 of 2010:

Item 9: The construction of facilities and infrastructure exceeding 1 000 meters in length for the bulk transportation of water, sewage or storm water –

i) With an internal diameter of 0,36 meter or more; or

ii) With a peak throughput of 120 litre per second or more.

Excluding:

a) Such facilities or infrastructure are for the bulk transportation of water, sewage or storm water drainage inside a road reserve; or

b) Where such facilities will occur within urban areas but further than 32 meters from a water course, measured from the edge of the water course.

Item 10: The construction of facilities or infrastructure for the transmission or distribution of electricity –
ii) Outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;

Item 11: The construction of:
i) canals;
ii) channels;
iii) bridges;
iv) dams;
v) weirs;
vi) bulk storm water outlet structures;
vii) marinas;
viii) jetties exceeding 50 square metres in size;
ix) slipways exceeding 50 square metres in size;
x) buildings exceeding 50 square metres in size; or
xi) infrastructure or structures covering 50 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.

Item 13: 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;

Item 18: The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from
i) a watercourse;
ii) the sea;
iii) the seashore;
iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater-
but excluding where such infilling, depositing, dredging, excavation, removal or moving
a) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or
b) occurs behind the development setback line.

Item 22: The construction of a road outside urban areas –
i) With a road reserve wider than 13,5 meters; or
ii) Where no reserve exists where the road is wider than 8 meters; or
iii) For which an environmental authorization 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.

NEMA (Act 107 of 1998) GNR 545 of 2010:

Item 13: The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation.

Item 14: 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:

i) Purposes of agriculture or afforestation inside areas identified in spatial instruments adopted by the competent authority for agriculture or afforestation purposes;
ii) The undertaking of a process or activity 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 activity is regarded to be excluded from this list;
iii) The undertaking of a linear activity falling below the thresholds in Notice 544 of 2010.

Item 15: 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.

Item 20: Any activity which requires a mining right or renewal thereof as contemplated in section 22 and 24 respectively of the Mining and Petroleum Resources Development Act, 2002 (Act 28 of 2002).

4.2 National Heritage Resource Act, 1999 (Act No. 25 of 1999)

In terms of the National Heritage Resources Act, 1999 (Act 25 of 1999), a Heritage Impact Assessment has been undertaken for the site since the site is greater than 0,5 hectares (ha) in extent.

The Act makes provision for the potential destruction of existing Heritage sites, pending the archaeologist recommendations through permitting procedures. Permits are administrated by the South African Heritage Resources Agency (SAHRA).

Section 38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as-

(a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
(b) the construction of a bridge or similar structure exceeding 50m in length;
(c) any development or other activity which will change the character of a site-
    (i) exceeding 5 000 m^2 in extent; or
    (ii) involving three or more existing erven or subdivisions thereof; or
    (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
    (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
(d) the re-zoning of a site exceeding 10 000 m^2 in extent; or

(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

Archaeological impact assessments (AIAs) are often commissioned as part of the heritage component of an Environmental Impact Assessment (EIA) and are required under Section 38(1) of the National Heritage Resources Act NHRA of 1999 (Act 25 of 1999), Section 38(8) of the National Environmental Management Act (NEMA) and the Mineral and Petroleum Resources Development Act (MPRDA).

The process of archaeological assessment usually takes the form of:
A scoping or initial pre-assessment phase where the archaeologist and developer's representative establish the scope of the project and terms of reference for the project;
A Phase 1 archaeological impact assessment;
A Phase 2 archaeological mitigation; and
A Phase 3 heritage site management plan.

Phase 1 archaeological impact assessment

Phase 1 archaeological assessments generally involve the identification and assessment of sites during a field survey of a portion of land that is going to be affected by a potentially destructive or landscape-altering activity. The location of the sites is recorded and the sites are described and characterised. The archaeologist assesses the significance of the sites and the potential impact of the development on the sites, and makes recommendations.

It is essential that the report supply the heritage authority with sufficient information about the sites to assess, with confidence, whether or not it has any objection to a development, indicate the conditions upon which such development might proceed and assess which sites require permits for destruction, which sites require mitigation and what measures should be put in place to protect sites that should be conserved.

Minimum standards for reports, site documentation and descriptions are clearly set out by the South African Heritage Resources Agency (SAHRA) and supported by ASAPA.

The sustainable conservation of archaeological material (*in situ*) is always the best option for any sites that are deemed to be of importance. The report needs to indicate which sites these are, explain why they are significant and recommend management measures.

In certain kinds of developments which involve massive intervention (mining, dam construction etc), it is not possible to reach a conservation solution other than to develop a programme of mitigation which is likely to involve the total or partial "rescue" of archaeological material and its indefinite storage in a place of safety.

Archaeological mitigation or Phase 2

If a Phase 1 report finds that certain archaeological sites in a development area are of low significance, it is possible to seek permission from the heritage authority for their destruction. The final decision about this is taken by the heritage resources authority, which should give a permit or a formal letter of permission, or in the case of an EIA (in South Africa) issue a comment supporting destruction.

Phase 2 archaeological projects are primarily based on salvage or mitigation excavations preceding development that will destroy or impact on a site. This may involve collecting of artefacts from the surface, excavation of representative samples of the artefactual material to allow characterisation of the site and the collection of suitable materials for dating the sites. The purpose is to obtain a general idea of the age, significance and meaning of the site that is to be lost and to store a sample that can be consulted at a later date for research purposes. Phase 2 excavations should be done under a permit issued by SAHRA, or other appropriate heritage agency, to the appointed archaeologist. Permit conditions are prescribed by SAHRA, or other appropriate heritage agencies, and include as minimum requirements reporting back strategies to SAHRA, or other appropriate heritage agencies, and deposition of excavated material at an accredited repository.

Should further material be discovered during the course of development, this must be reported to the archaeologist or to the heritage resources authority and it may be necessary to give the archaeologist time to rescue and document the findings. In situations where the area is considered archaeologically sensitive the developer will be asked to have an archaeologist monitor earth-moving.

Phase 3: Management plan for conservation and planning, site museums and displays

On occasion, the Phase 2 may require a Phase 3 programme involving the modification of the site or the incorporation of the site into the development itself as a site museum, a special conservation area or a display. Alternatively it is often possible to re-locate or plan the development in such a way as to conserve the archaeological site or any other special heritage significance the place may have. For example in a wilderness area or open space when sites are of public interest the development of interpretative material is recommended and adds value to the development.

Permission for the development to proceed can be given only once the heritage resources authority is satisfied that measures are in place to ensure that the archaeological sites will not be damaged by the impact of the development or that they have been adequately recorded and sampled. Careful planning can minimise the impact of archaeological surveys on development projects by selecting options that cause the least amount of inconvenience and delay.

The process as explained above allows the rescue and preservation of information relating to our past heritage for future generations. It balances the requirements of developers and the conservation and protection of our cultural heritage as required of SAHRA and the provincial heritage resources authorities.

4.3 National Water Act, 1998 (Act No.36 of 1998)

The National Water Act aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected as well as

integration of management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways, which take into account:

- Meeting the basic human needs of present and future generation;
- Promoting equitable access to water;
- Redressing the results of past racial discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Providing for growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations; and
- Managing floods and droughts.

The National Water Act (Act 36 of 1998) chapter 14, part 3 Section 144 specifically applies to this development and therefore no construction or development may take place within the 1:100 year flood line of a river and this area was also included into the buffer area; excluded for development:
"For the purposes of ensuring that all persons who might be affected have access to information regarding potential flood hazards, no person may establish a township unless the layout plan shows, in a form acceptable to the local authority concerned, lines indicating the maximum level likely to be reached by floodwaters on average once in every 100 years."

The project will require the submission of a Water Use License Application (WULA) in terms of Section 21 of the NWA which will include the following activities:

a. abstraction of water from a water resource;
b. storage of water (not containing waste);
c. impeding or diverting the flow of water in a watercourse;
d. discharging of waste or water containing waste into a water resource partially through a pipe, canal, sewer, sea outfall or other conduit;
e. disposing of waste in a manner which may detrimentally impact on a water resource;
f. altering the beds, banks, course or characteristics of a watercourse;
g. removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity, or for safety of people;

The WULA will be undertaken as a process within the scope of this environmental authorisation process. Therefore, the above activities as described under Section 21 of the National Water Act (Act 36 of 1998) will form an important component of the Public Participation process.

4.4 Integrated Environmental Management

Integrated Environmental Management (IEM) is a philosophy, which prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development process. This philosophy

aims to achieve a desirable balance between conservation and development (Department of Environmental Affairs: DEAT, 1992). The IEM guidelines intend endearing a pro-active approach to sourcing, collating and presenting information at a level that can be interpreted at all levels.

4.5 National Environmental Management: Air Quality Act (Act No 39 of 2004)

The objective of the Atmospheric Air Pollution Prevention Act, 1965 is to regulate air quality in order to protect, restore and enhance the quality of air in the Republic, taking into account the need for sustainable development. Furthermore, the provision of national norms and standards regulating air quality monitoring, management and the control by all spheres of government; for the specific air quality measures should be adhered to.

4.6 National Environmental Management: Waste Management Act (Act No 58 of 2009)

The National Environmental Management: Waste Act (Act 59 of 2009) aims to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters. Furthermore this Act aims to provide for national norms and standards for regulating the management of waste by all spheres of government. It provides guidance for the licensing and control of waste management activities and gives regulations for the rehabilitation and remediation of contaminated land.

4.7 Mineral and Petroleum Resources Development Act (Act 28 of 2002)[MPRDA]

Mining operations require environmental authorisation from the DMR for the mining right application in terms of Section 22 of the MPRDA. The following issues require consideration whilst compiling the Environmental Impact Assessment Report.

- The objectives of the MPRDA include giving effect to Section 24 of the Constitution by ensuring that the Nation's mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development. (Section 2(h) of the MPRDA);
- The principles set out in Section 2 of the National Environmental Management Act, 1998 (Act 107 of 1998)[NEMA] serve as guidelines for the interpretation, administration and implementation of the environmental requirements of the MPRDA. (Section 37(1)(b) of the MPRDA);
- Section 38(1)(a) of the MPRDA requires that effect be given to the general objectives of Integrated Environmental Management laid down in the NEMA;
- The environmental management programme to be submitted is not limited to but must inter alia include the requirements of regulation 51 of the MPRDA. For instance, where regulation 51(a)(ii) refers to measures for the prevention, management and remediation of each environmental impact, these clearly must be understood in the context of the NEMA where the general objectives of the IEM include ensuring that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them. This clearly requires a description of the mining project that lists each activity pertaining to the mining project, in order that each such activity can be assessed.

The MPRDA Amendment Act further states that:

- Environmental reports, as required in terms of Chapter 5 of the NEMA must be submitted to the DMR (Section 18);
- Consultation with the landowner, lawful occupier and any interested and affected party must occur in the prescribed manner and the result of the consultation must be included in the relevant environmental reports (Section 18); and
- The mining right may only be granted if the mining will not result in unacceptable pollution, ecological degradation or damage to the environment and an environmental authorisation is issued (Section 19).

However, the MPRDA Amendment Act has not yet been enacted and will only come into effect 18 months after the Minister has signed and enacted the amendment Act.

4.8 Occupational Health and Safety Act (Act 85 of 1993)[OSHAct]

To provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith.

In Section 8 General duties of employers and their employees it is stated that:
"Every employer shall provide and maintain, as far as is reasonably practicable, a working environment that is safe and without risk to the health of the employees."

(2) The matters to those duties refer include in particular:

a. The provision and maintenance of systems of work, plant and machinery that, as far as reasonably practicable, are safe and without risk to health;
b. Taking such steps as may be reasonably practicable to eliminate or mitigate any hazard or potential hazard to the safety and health of employees;
c. Making arrangement for ensuring as far as reasonably practicable, the safety and absence of risks to health in connection with the production. Processing, use, handling, storage and transport of articles or substances;
d. Establishing, as far as reasonably practicable, what hazards to the health or safety of persons are attached to any work which is performed, any article or substance which is produced, processed, used, handled, stored or transported and any plant or machinery which is used in his business, and he shall, as far as reasonably practicable, further establish what precautionary measures should be taken with respect to such work, article, substance, plant or machinery in order to protect the health and safety or persons, and he shall provide the necessary means to apply such precautionary measures;
e. Providing such information, instruction, training and supervision as may be necessary to ensure, as far as reasonably practicable, the health and safety of employees;
f. As far as reasonably practicable, not permitting any employee to do any work or to produce, process, use, handle, store, or transport any article or substance or to operate any plant or machinery, unless

precautionary measures contemplated in paragraph (b) and (d), or any precautionary measures which may be prescribed, have been taken;

g. Taking all necessary measures to ensure that the requirements of this Act are complied with by every person in his employment or on the premises under his control where plant and machinery is used;
h. Enforcing such measures as may be necessary in the interest of health and safety;
i. Ensuring that work is performed and that plant and machinery is used under the general supervision of a person trained to understand the hazards associated with it and who has the authority to ensure that precautionary measures taken by the employer are implemented; and
j. Causing any employees to be informed regarding the scope of their authority as contemplated in Section 37(1) (b).

4.9 Mine Health and Safety Act (Act 29 of 1996)

To provide for protection of the health and safety of employees and other persons at mines and, for that purpose -

- to promote a culture of health and safety;
- to provide for the enforcement of health and safety measures;
- to provide for appropriate systems of employee, employer and State participation in health and safety matters;
- to establish representative tripartite institutions to review legislation;
- promote health and enhance properly targeted research;
- to provide for effective monitoring systems and inspections, investigations and inquiries to improve health and safety;
- to promote training and human resources development;
- to regulate employers' and employees' duties to identify hazards and eliminate, control and minimise the risk to health and safety;
- to entrench the right to refuse to work in dangerous conditions; and to give effect to the public international law obligations of the Republic relating to mining health and safety;
- and to provide for matters connected therewith.

4.10 Explosives Act (Act 26 of 1956)

To provide for the health and safety of persons employed in connection with the use of explosives; the transport of explosives and safety arising out of or in connection with the activities of persons working with explosives; to establish an advisory council for the management of explosives; and to provide for matters connected therewith.

5. DETAILS OF THE APPLICANT

Project applicant:	Vunene Mining (Pty) Ltd

Project title:	Usutu Coal Colliery underground and opencast coal mining on portion 3, 4, 6, 9 and 14 of the Farm Jan Hendriksfontein 263 IT, Portions 2, 8, 9, 11, 17, 21 of the Farm Witpunt 267 IT, Portions 5, 6, 7, 8 of the Farm Vlakfontein 266 IT, Farm Vlakfontein 269 IT, Holbank 265 IT and Roodewal 270 IT, Twyflaar 298 IT; Vlakfontein 269 IT
Reg Nr.	2006 / 006702/07
Mining Right	MP30/5/1/2/2/323 MR
Contact person:	Mr. George Dyman
Contact details	(011) 484 6004
Postal address:	P.O. Box 90349 Bertsham JOHANNESBURG 2013

6. NEED AND DESIRABILITY (Reg 31(2)(f) &(g))

The growth in peak electricity demand in South Africa is increasing. To provide for the increasing peak demand for electricity Eskom is re-opening three power stations to service. These power stations have been held in cold reserve storage (mothballed) since the early 1990's. One of these power stations is the Camden Power Station located about ten kilometres south east of Ermelo. Camden Power Station is a coal fired power station (refer to Table 5: Planned burn rate of Camden Power). The first generation unit at the power station was commissioned in 2004 with the last of the units commissioned in early 2006.

Eskom wishes to secure a dedicated source of coal supply to the power station. Consequently, different coal mining companies and Eskom are evaluating various mining projects, for long terms coal supply to the power station. The proposed Usutu Coal Colliery is one such project and forms part of a feasibility study being carried out by Eskom.

Coal from Usutu Colliery meets the Eskom's quality specification, and Eskom will accept coal of such quality. Since Liketh Investments (Pty) Limited has operations that sells its product to Eskom, it was decided that the coal from Usutu Colliery would also be sold to Eskom. In view of the above, Usutu Colliery will entered into an agreement with Eskom for the sale of the ROM coal. Liketh Investments (Pty) Limited is a valued client of Eskom having concluded several agreements with Eskom.

Table 5: Planned burn rate of Camden Power Station

YEAR	Units Run	Com (t)	Running (t)	Stock pile (t)	Total (t)
2004	1	77,000			
2005	3	407,000	734,000	83	160,000
2006	5	360,000	2,195,000	247	1,338,000
2007	7	360,000	3,654,000	220	2,775,000

2008	8	316,000	5,115,000	110	4,234,000
2009	8	-	5,841,000	-	5,541,000
2010 - 2025	8	-	5,841,000	-	5,841,000

Eskom purchased the coal rights of the Usutu reserve from Ingwe in 1992 when the Camden Power station was decommissioned and have the right to develop the coal reserves previously mined by Usutu Colliery. There is insufficient geological information available at this time on which to plan the development of a large underground mine. Further exploration drilling will be required to raise the geological confidence of the balance of the underground coal reserves, forming the basis of a large mine feasibility study. However, there is adequate geological information available for the shallow coal reserve areas that can be mined because Usutu Colliery was an underground mine and was not geared for opencast mining. Vunene Mining (Pty) Ltd has therefore decided to separate the opencast and underground reserve areas and to apply for a mining right to develop the opencast reserves to serve as an interim coal supply to Camden Power Station, during which time feasibility studies were carried out on the balance of the reserves. Evaluation of the potential to develop a new underground mine will only continue if additional exploration drilling is conducted and raise the geological confidence of the remaining Usutu central underground coal reserve.

Camden Power Station started to burn coal in October 2004 for boiler commissioning purposes and the first unit became operational in 2005 with the final commissioning in 2008. During this period coal to the power station was trucked in from other mines. The proposed opencast mine will serve as an interim coal supply to the power station. To allow for sufficient time to complete the exploration and feasibility study, and to secure long term coal supply to the power station.

The location of the proposed opencast mine is immediately adjacent and contiguous to the power station which means that, should Vunune Mining (Pty) Ltd receive approval to develop the opencast mine, it will be possible to transport the coal directly from the opencast mine to the power station using the existing conveyor infrastructure, reducing the volume of coal that need to be supplied to the power station from other sources by road.

7. DESCRIPTION OF THE PROPOSED PROJECT (Reg 31(2)(b)

7.1 Regional context (reg 31(2)(c))

The N2 National road straddles the proposed mining area, bisecting the mineable coal resources into a northern block (block of coal north of the N2 National Road) and a southern block (block of coal south of the N2 National Road).

A single unnamed tarred private road exists approximately 400 meters to the northwest of the proposed mining area. This tarred road currently provides access to the Usutu Colliery, West Shaft Complex. A second unnamed tarred private road exists within the proposed mining area. This tarred road provides access to Camden Power Station and Camden Village, the latter of which is currently owned and operated by the State and used by the South African National Defence Force.

7.2 Surrounding land uses

The surrounding land uses in the area consists of predominantly vacant and cultivated land parcels with a few mining activities (proposed, current, and post mining) as well as the Camden Power station. There are several towns in close proximity to the proposed mine, including Camden, Ermelo, Lothair and Breyton. Mining areas are located in the south eastern and northern regions, while agricultural land can be found in the eastern and western regions.

7.2.1 Railway lines

The Richard's Bay railway line is located approximately 2.4 kilometres to the south west of the proposed mining area.

7.2.2 Power lines

Numerous power lines straddle the north eastern coal block. Electricity is supplied by Camden Power Station to an Eskom substation on the mine. From there power is supplied to various parts of the mine. These power lines are located within Eskom held servitudes and will not be moved since no mining will be undertaken within their areas of occupancy.

7.2.3 Pipelines

Eskom's servitude protects a pipeline forming part of the Grootdraai Dam water scheme. This servitude, with pipeline, is located approximately 500 meters to the east of the proposed opencast mining area.

7.2.4 Conveyor belt

A five kilometre overland conveyor belt is partially located south of the proposed mining area. This is an Eskom owned conveyor belt that is protected by an Eskom held servitude. This conveyor belt served to connect the Usutu Coal Colliery West Mine Shaft complex and underground mine that was owned and operated by Trans-Natal Collieries (Pty) Ltd prior to 1992, to the Camden Power Station.

7.3 Services

7.3.1 Water Supply

For the purposes of the proposed Usutu Coal Colliery it is intended to make use of the existing borehole on the farm. The water abstracted from this borehole will be utilised for dust suppression and human consumption in the offices. A Water Use License Application process was undertaken in conjunction with the Scoping Environmental Impact Assessment process.

7.3.2 Electricity

Numerous main distribution lines radiate out from Camden Power Station, some of which cross the proposed opencast mining area. These Eskom power lines are protected by Eskom servitudes and the lines themselves tie Camden Power Station into the National Power Grid.

Proposed mining activities will take place around these main transmission lines and take cognisance of the requirements of the mine Health and Safety Act, which will be followed when mining within close proximity to these and all other surface features.

The most significant distribution line is a line that runs due north. This is an 88kV line and supplies power to an Eskom main substation located at Usutu West Colliery, West Shaft Complex. This substation supplies power not only to the mine but also to adjacent users via 22kV feed (Delta Colliery Washing Plant and Siding).

The proposed mine will utilise the existing power reticulation system of the Usutu West Colliery, West Shaft Complex.

Usutu Coal Colliery presently receives electricity from ESKOM.

7.3.3 Sewage services

The current situation on Portion 6, 9 and 14 of the Farm Jan Hendriksfontein 263 IT, Msukaligwa Local Municipality is that the colliery is provided with a Waste Water Treatment Works (WWTW).

The WWTW provides the basic sanitary services to the mining offices and hostels where employees are housed. The WWTW is located on the Farm Transutu 257 IT and therefore does not fall within the ambit of this environmental authorisation process

7.3.4 Access Roads

The N2 national road bisects the proposed mining area into two portions. Opencast mining will take place on both sides of the national road; however a 30 meter wide barrier pillar will be left to protect the structure of the road. Blasting will be undertaken in accordance with prescriptive methods legislated in the Mine Health and Safety Act. The N2 National road will not form part of the mining area.

One unnamed road and the Old Oak road intersect the N2 national road in the vicinity of the proposed mining area and continue in a southerly direction linking Camden Village, the SANDF-Group 12 and Camden Power Station to the N2 and in the easterly direction linking the Usutu West Shaft Complex, which the mine intends to use.

The existing unnamed tarred access road linking the Usutu West Shaft Complex to the N2 national road will be utilised by the proposed opencast mining operation mainly at Block A mining area. This road will, if necessary, be upgraded to be at least eight meters wide and will be maintained throughout the life of the proposed mining operation. Two ramps connecting to haul roads will be constructed at the Block A mining area. These ramps and haul roads will be used as access to the initial box cut. Each of the ramps and connecting haul roads will be 25

meters wide and will cover a distance of 386 meters. The roads and ramps will be extended to cater for the preceding cuts at Block A as mining progresses. These roads will link the Block A opencast area to the Run of Mine Stockpile areas and the Usutu West Colliery, West Shaft Complex via the Usutu West tarred access road. Access roads will be constructed for the use by the mine vehicles that will also cater for the smaller vehicles (ldv's). These roads will be 10 metres wide and will cover a length of 1524 meters. Access to Block B will be via a new access road. This access road will be at least ten to fifteen meters wide and will connect to the existing Old Oak road that leads to the Camden Village and Camden Power Station. A temporary road (25 meters wide and approximately 500 meters long) will be constructed when Block B is being mined. This temporary road will be a dirt road which will be regularly graded and maintained. Once Block B has been mined and rehabilitated, the Old Oak road will be reconstructed (25 meters by 500 meters long).

Block B will also have two 15 m wide ramps and 10 m wide access/haul roads. The access/haul roads will cover a length of 1 400 meters. These roads will link the Block B mining area to its Run of Mine Stockpiles and the tarred road that links to the Camden Power Station. Note that the coal from Block B will be transported directly to the Camden Power Station via the unnamed tarred road. The roads will also be constructed for the use by the mine's smaller vehicles (ldv's).

7.3.5 Solid Waste Disposal

Two industrial waste disposal sites are located within the Usutu Coal Colliery. The first is located to the east of the hostels and the second is located west of the stores and workshop.

The industrial waste disposal site located to the east of the hostel complex will not be utilised during the operation of the proposed mine, however the industrial waste disposal site located to the west of the stores and workshop areas will be utilised. The western waste disposal site will be maintained in the current serviceable state and utilised by the current mining operations. The site is walled in and is constructed with a concrete floor. Once 75% of the holding capacity is reached, the waste will be removed to a suitable waste disposal site licensed for the purposes and application.

Domestic waste is stored within the industrial waste disposal and removed and disposed of in the Ermelo Municipal refuse dump on a weekly basis. No additional domestic waste sites will be required.

No coal processing, alternative dense medium beneficiation processes will be undertaken, hence there will be no mine residue disposal site or discard dams required.

All coal crushed by the mobile in-pit crusher will be fed directly onto vehicles and taken to the stockpile area where it will be made available to clients.

7.3.6 Water pollution management facilities

Surface water drainage measures will be implemented. Water drainage will be undertaken by diverting clean runoff water around the mining areas and all other contaminated areas. Dirty water from contaminated areas will be collected via drains and diverted to a settling dam. This water will be utilised for dust suppression.

The water management will be undertaken in accordance with the requirements as set out in the Environmental Management Programme that will be compiled.

The sewage plant is an existing plant that is currently being operated by Vunene Mining (Pty) Ltd, although the infrastructure is the property of Eskom (Pty) Ltd. The sewage plant is located north of the workshops within the Usutu Coal Colliery complex.

The design of the sewage plant is as follow:

Table 6: Sewage works design

Capita	1 000
800 load per day	58,3 kg 800
Hydraulic flow: 1000 capita @250ℓ/capita	250kℓ/day
Hydraulic flow: Average dry weather flow	104kℓ/hour
Hydraulic flow: Peak flow	31.2kℓ/ hour

Raw sewage passes through the bar screen to eliminate rags and large objects detrimental to the system. Screenings are to be removed daily, allowed to dry and should be buried or burnt. The sewage system is provided with twin grid channels, equipped with sluices for isolating each channel from the other. Grit should be removed at least once per shift when on full production (1000 capita). From the grid channels, the incoming raw sewage is pumped to the aeration chamber or alternatively a percentage can be by-passed to the anaerobic mixing tank to be used for a deflector plate.

The purpose of the anaerobic tank is to facilitate the removal of phosphates biologically. A vertical mixer is centrally installed in the tank and is equipped with a variable speed drive. The mixer will keep all areas in the tank properly mixed and in suspension.

Adjacent to the anaerobic tank is the chemical dosing unit, feeding alum / lime into the raw sewage inlet launder. The purpose of this dosing unit is to assist in the facilitation of removal of phosphates chemically by creating a larger flocculent in the Mixed liquids suspended solids (MLSS) in the aeration ditch by dosing alum, or alternatively to maintain pH value of the MLSS below 9 by dosing lime.

The liquor from the anaerobic tank now passes to the aeration ditch where it is oxidised by means of mechanical rotors. The purpose of the mechanical rotors is to introduce oxygen into the mixed liquor and also to ensure complete mixing in the aeration chamber. Dissolved oxygen content in the mixed liquor should be maintained at 0,5 to 1 mg/ℓ.

In the clarifier the heavier items settle to the bottom forming a sludge which is returned to the anaerobic tank by sludge pumps. The effluent at the top overflows the vee notch weir plate and passes to the chlorine contact tank for sterilization by the introduction of chlorine, before being released into the stream or suitable watercourse.

The sewage plant has the capacity to treat sewage for 800 people per day. At the most the proposed mine will employ including outsourced mine operators and contractors approximately 112 individuals, of which none will be residing on site. The sewage facility will be approximately 16% of its design capacity.

7.3.7 Potable water plant

Potable water is supplied by Camden Power Station and is capable of meeting the proposed mine's potable water requirements. The potable water is pumped from Camden Power Station via a 152mm diameter pipeline to a 75 000 cubic litre reservoir / header tank located on Usutu Coal Colliery from where it is further reticulated for mine use.

The potable water facility can supply water to the reservoir / header tank at a rate of 500 litres per hour if required. Booster pumps could further increase this supply rate if required.

7.3.8 Mineral processing plant

The proposed mine will not be beneficiating coal, hence no coal processing or dense medium plants will be built on site. Only existing infrastructure will be utilised.

Coal will be tipped over the grizzly or scalping screen, undersize material will pass through the grizzly that will have an aperture of 600mm. The minus 600mm will enter the in-pit mobile crusher where it will be reduced to minus 200mm. The minus 200mm crushed coal product will be directed via a transfer chute to an in-pit overland conveyor that will transport the minus 200mm crushed coal to the existing Camden overland belt infrastructure. Transfer of coal from the in-pit overland conveyor will be facilitated by transfer chute, with coal always being tipped on overland conveyor B.

The minus 200mm crushed coal will be conveyed through Conveyor B to Conveyor C, through Conveyor D where it will be transferred via a McNally to a double set of jaw crushers, where the minus 200mm coal is crushed to a minus 40mm size fraction and conveyed via Conveyor E into Camden Power Station. Run of Mine (ROM) coal loaded onto the stockpile area will be approximately 40mm.

7.3.9 Workshops, administration and other buildings

The existing Usutu Coal Colliery infrastructure will be used in the proposed mine operations. No new infrastructure areas will be developed.

The following existing infrastructure facilities will be utilised:

- Existing main office block;
- Existing mine change rooms;
- Existing first aid station;
- Existing mine stores (2);
- Existing workshops;
- Existing hostels;
- Existing sub-stations
- Existing road infrastructure; and
- Existing sewage plant.

No housing facilities will be provided to Usutu employees, similarly no recreational facilities will be constructed on site for any employees.

7.4 Mining operations

7.4.1 Construction phase

Very little construction phase activities will be undertaken, hence the surface infrastructure footprint of the current developed situation will remain for the proposed mine. The majority of the work will be associated with the re-equipping and re-furbishing existing infrastructure to meet new legislative requirements. Infrastructure that has been vandalised will need to be replaced.

There will be a need for the construction of access and haul roads, construction of the initial box cut and the formation of stockpiling areas (overburden and run of mine coal).

7.4.2 Operational phase

The proposed mining operation has a five year life (opencast) and thirty year LOM underground. The preliminary mining plan and sequencing is indicated in Mine Layout Plan attached.

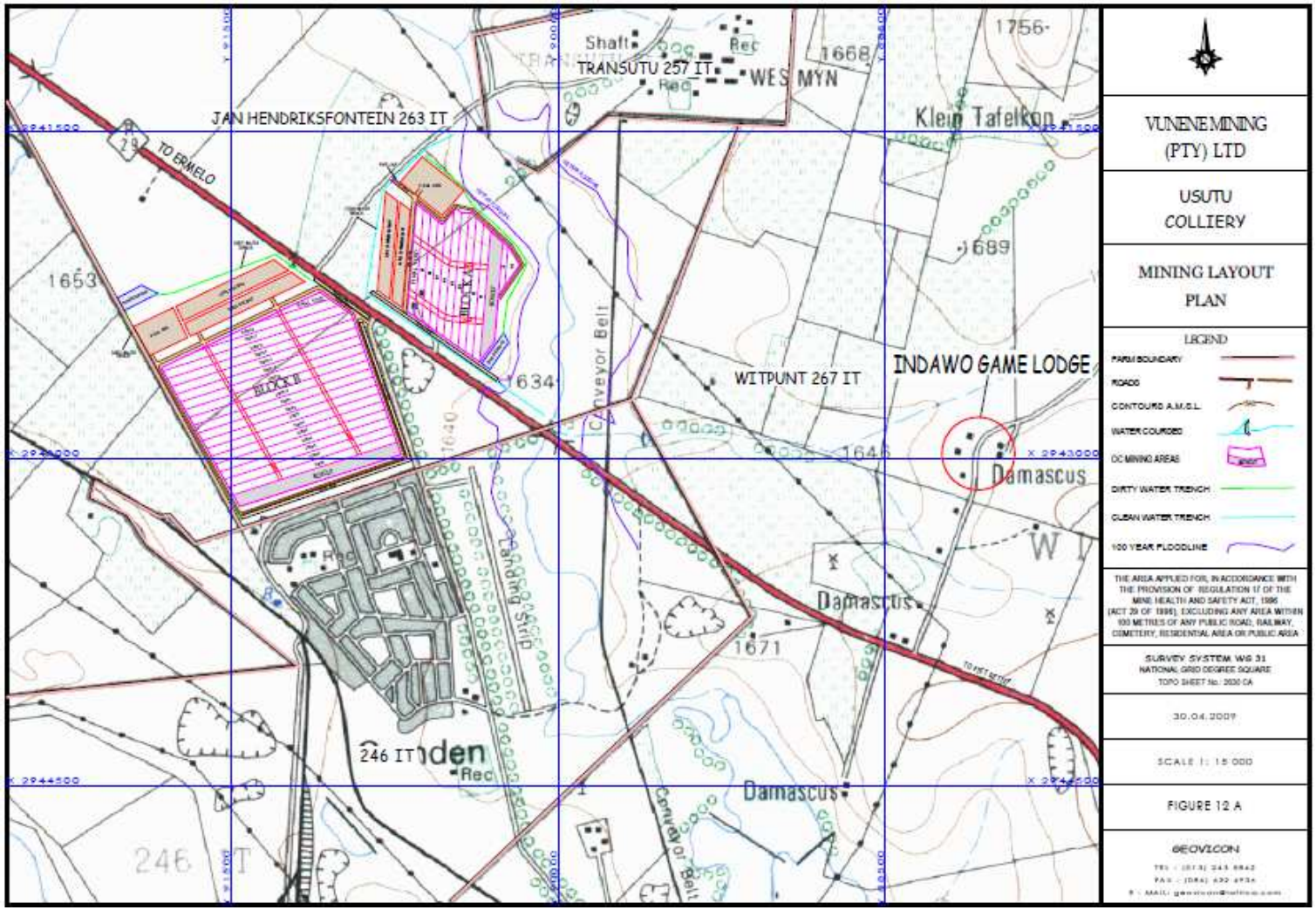

Figure 6: Mining layout plan

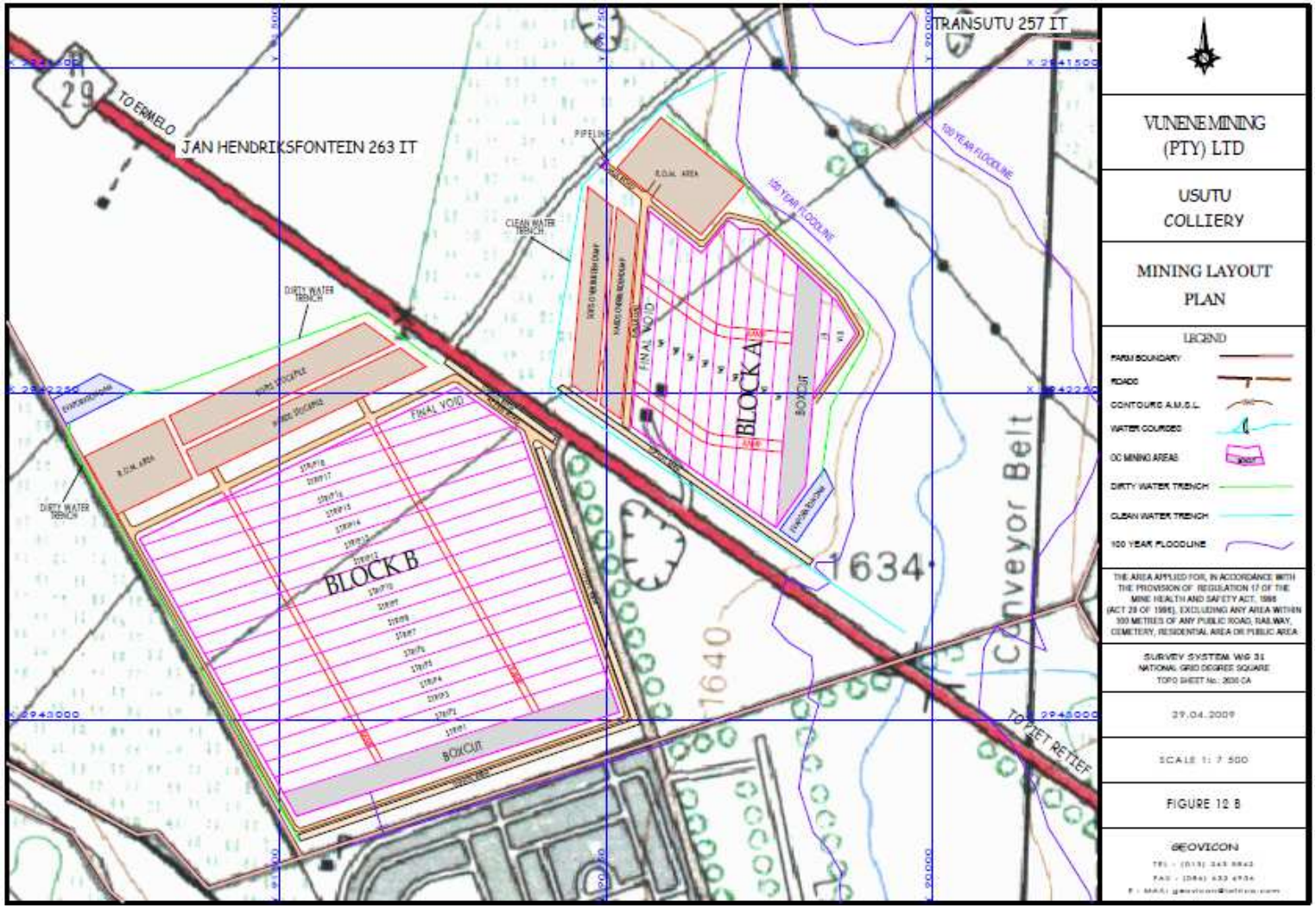

Figure 7: Mining layout plan for opencast areas

8. DESCRIPTION OF THE RECEIVING ENVIRONMENT (Reg 31(2)(d))

8.1 Biophysical environment

8.1.1 Soils and geology

The entire Usutu Coal Colliery surface is approximately 13 540 hectares in extent. Of this area less than 200 hectares will be disturbed by the opencast pits. The soils on Usutu opencast site are typical of the Mpumalanga Highveld with well to moderately drained sandy loam and clay soils in the floodplains. The pit will result in the stripping and replacement of deep agricultural soils and shallower soils on the lower slope.

The Usutu Coal Colliery occurs in the Ermelo coalfield within the upper catchment of the Vaal River. The coal reserves are hosted in the Ecca group sediments of the Karroo Super group. The coal reserves are divided into the B and C seams. Both seams will be mined.

The Ermelo coalfields extend from Carolina in the north to Dirkiesdorp in the south and includes the districts of Hendrina, Breyton, Davel, Ermelo and Morgenzon encompassing a surface area of approximately 11 250km^2. The Ermelo coalfield to the west, and the Klipriver and Utrecht coalfields to the south, whilst the eastern and northern boundaries are delineated by Pre–Karoo basement outcrop.

The sediments of the Karroo basin were deposited in fluvial floodplains and shallow shelves over a period of more than one hundred million years extending from the late Carboniferous (290 million years ago) to the early Jurassic (190 million years ago). Locally, siltstones and sandstones of the Vryheid Formation (Ermelo coalfield), Ecca Group are encountered. These rock types weather to fine grained sands, silts and clays. In the lower terrain units are transported, wet, clayey sand with occasional gravels overlies the residual profile.

The underlying geology of the area forms part of the Vryheid Formation which consists of a sequence of sandstone siltstones and mudstones, with carbonaceous shales overlying the coal seams.

The coal seams present within the Ermelo sector are alphabetically numbered from the top as follows: A, B, C, D and E seams. The A and D seams are generally too thin (< 0,6 meters) to be of economically importance. The B seam generally attains a thickness of between 2,0 – 3,7m and consists of alternating layers of poor and good quality coal can generally high ash content. The C seam can attain a thickness of between 0,6m – 2,0 meters and is generally the target seam within the Ermelo area. The E seam is generally well developed in the Caroline – Breyton sector of the coal Province and may attain a thickness of 3 meters.

There are two major factors which control the aerial distribution of the coal seams within the Ermelo Coalfield. The first is the topography of the pre-Karoo basement, which affects the distribution of the lower seams, whilst

the present day erosional surface has affected the distribution of the upper seams, as occasionally the entire coal measure package.

The influence of pre-Karoo ridges may also propagate their effects upwards due to differential compaction of the sediments within the valleys and ridge areas resulting in a thinning or non deposition of the coal seams.

On a local scale, fluvial channels have given rise to erosion (during sediment formation), non-deposition, and thinning of the coal seam.

The host rocks of the coal seams vary from fine grained laminated and micaceos to course and gritty sandstones with alternating zones of shale and shaly sandstones. The total thickness of the middle Ecca is up to 170 meters and the main coal zone within it, up to 85 meters. The thickness of the partings between seams A and B, B and C, and C and D are 30 -60 meters, 6 -9 meters and about 12 meters respectively.

The A Seam
The A seam occurs in isolated outliers in the sector. Although of moderate quality, it has no reported economic importance. It occurs usually as an interbanded shaly coal seam with a thickness of 1 meter.

The B seam
The B seam may be split into in seam bands and occurs as three discrete leaves. These are designated as the BX, B and B1 seams (also locally known as the B upper, B and B1 seams).

The BX seam (B upper) attains a thickness of approximately 1 meter and is separated from the B seam by a thin shale or sandstone (~0,4m) parting. This seam consists of dull coal with occasional bright bands. The B seam varies in thickness from 1 – 2,7 meters. This seam consists of a bright-banded coal of good quality and low ash content within the Carolina area.

The C seam
The C seam is a complex seam, consisting of several plies separated by partings of variable thickness.
Traditionally the C seam group is subdivided into the C upper and C lower seams. The C upper seam may be split into two seams.

The C upper seam
The seam is well developed over this sector. However, it is usually a complex seam of two or three plies, split by a seam sandstones, siltstones and mudstones of variable extent and thickness.

In the Carolina – Breyton sector, the seam is more complex, due to the proximity of large channel fill sandstones. A further complication is the occurrence of a thin although laterally persistent seam (locally known as the B1). This thin seam may either be separated from the C upper by a thin parting, or may gradually migrate up the sequence to the base of the B seam.

The upper portion of the C upper seam is typically poor quality and may be torbanitic over large areas. The lower portion of the seam is a good quality coal and consists of vitrain and durain bands.

The C lower seam

The C lower seam is usually thin and seldom greater than 0,6m in thickness. The floor of the seam is usually sandstone or interbedded sandstone and shale, whilst the roof is generally interbedded carbonaceous shale. The upper portion of the seam is generally of good quality, with interbanded vitrain and durain bands. The lower portion of the seam normally becomes more torbanitic towards the base.

The D seam

The D seam seldom attains a thickness greater than 0,6m and thus is usually too thin to be of economic importance. The overlaying and underlying sediments are predominantly sandstones with minor siltstone intercalations. The coal is vitrainitic with occasional durain bands.

E seam

The E seam is well developed and is of economic significance. It attains a thickness of over three meters (although thinning to a maximum thickness of 1,2m within the Carolina area). The roof and floor of the seam are generally compressed of competent sandstone. Elsewhere, it may be of reasonable quality, but becomes too thin for viable mining.

8.1.2 Local Geology

Generally, the palaeo-topography structure of the field is characterised by gentle palaeo-slopes. Steeper palaeo-slopes do occur in the vicinity of four major northwest – southeast trending drainage channels.

The Usutu Colliery coalfield is divided into reserve blocks by sill intersections and zones of devolatilisation (viz, The West field, Central field, Southeast field and the northeast field).

The Usutu Colliery coalfield has a high dyke frequency and dyke swarms causing major zones of devolatilisation. A thick dolerite sill overlies the Northeast and Southeast, the West and Central fields are separated and uplifted as a result of the intersection of the coal bearing strata by the sill. The uplifted West field has the thinnest overburden (averaging 55 meters) and opencastable reserves have been identified in the area.

The thickness of the parting between the B, C upper and C lower seams varies widely throughout the coalfield and has a major influence on the areas in which multi seams mining can be done.

The B and C coal seams are the target coal seams on Usutu Colliery. The B and C coal seams reserve at the proposed mining area extends over an area of approximately 13 540 hectares. The seam thickness varied between 1.20 meters and less than 3 meters at the depth of 55 to 90 meters.
The B and C coal seams: 84 million in situ tonnes.

The Usutu opencast extractable reserves and raw qualities (AD) are shown in the table below:

Table 7: The Usutu opencast extractable reserves

Area	Seam	Thickness	Tonnages	CV (Mj/kg)	Moist	Ash (%)	VM (%)	TS
West O/C	B	1.71	6096614	25.04	4.20	18.4	24.0	1.53
	CU	1.60	6242544	22.24	4.33	26.8	21.8	1.07
				23.63	4.27	22.7	22.9	1.30

8.1.3 Soils and agricultural potential

The soils at the site consist predominantly of soils of the Highveld catena, dominated by Avelon, Hutton and Bainsvlei farms. The Witpuntspruit has a broad floodplain in which Katspruit soils dominate.

Twenty one (21) percent of the Mining Rights area is classified as having high arable potential; fifty six (56) percent has grazing potential with twenty two (22) percent being classified as wetlands. The remaining area has shallow soils and is wilderness land. About twenty five (25) percent of the site is currently occupied by the Camden Village.

The majority of the site is grazing land with deep soil areas of arable land capability (>600mm soil depth) and areas of wetland capability making up most of the remainder of the area at 20,2%. Wilderness areas, where soil cover is very thin, account for 1,4% of the site area.

The river channel a small pan like depression adjacent to the N2 road embankment and the road servitude itself, covers less than 1% of the area. Mining will not disturb any of these identified areas.

About 20% of Usutu area has arable potential. The majority of this land has been cultivated in the past, although not all the lands are being cropped and there are a number of cultivated pastures used for supplementary grazing and hay production. The surrounding veldt is in good condition with no clear sign of erosion and little to no evidence of overgrazing. Other than large established tree screens comprising Eucalyptus trees east of Camden village and exotic vegetation associated with gardens and tree avenues in the village itself, there is no evidence of exotic vegetation.

8.1.4 Topography and hydrology

The topography of the pre-mining environment is very flat, dipping into the valley of the Witpuntspruit which bisects the site. The proposed Usutu Coal Colliery is situated on the Mpumalanga Highveld, towards the south eastern escarpment. The mining area is located roughly north northeast of the Camden Village, which is immediately north of the Camden Power Station.

Other important topographical features in the area include the Witpuntspruit, which has an incised bed with a broad floodplain. The area is further characterised by a gently undulating topography which falls from 1 756 mamsl to the north east of the mining area to about 1 634 mamsl adjacent to the Witpuntspruit, climbing to 1 645 mamsl east of the mine site. The lowest point is 1 640 mamsl, at the Witpuntspruit, from the eastern and western

edge of the mining area the change in altitude varies between 11 and 16 meters, this is typical of the regional topography.

The Witspuntspruit joins the Vaal River about 6,5 kilometre from the mine site, approximately 69 kilometres from the Grootdraaidam. A small seasonal stream flowing from east to west joins the Witpuntspruit immediately above the N2 bridge, while a second stream flowing from west to east runs to the south of Camden village to join the Witpuntspruit above Usutu mine conveyor crossing.

The Witpuntspruit catchment measures 117km^2. The Witpuntspruit rises at the eastern limits of Ermelo, it flows in an easterly direction before turning south westerly and southerly. The river channel, in the vicinity of the mine, is relatively well defined. The Witpuntspruit is regulated by two impoundments, located approximately halfway between Ermelo and the N2. These impoundments are farms dams with earth walls. The riverbed gradient is relatively flat with limited rocks, and typical of a Highveld stream.

The catchment is relatively flat with no significant topographical features other than small hills and undulations. Elevations vary between 1 835 mamsl and 1 630 mamsl in the southeast. The majority of the catchment is used for agriculture. The N2 between Ermelo and Piet Retief runs through the centre of the catchment in a northwest, south easterly direction.

The Witpuntspruit is a perennial river, however during dry seasons the flow is extremely low. During excessively dry periods, the stream may even stop flowing. The Usutu WWTW discharges into a tributary of the Witpuntspruit and this may contribute to the dry weather flows of the stream.

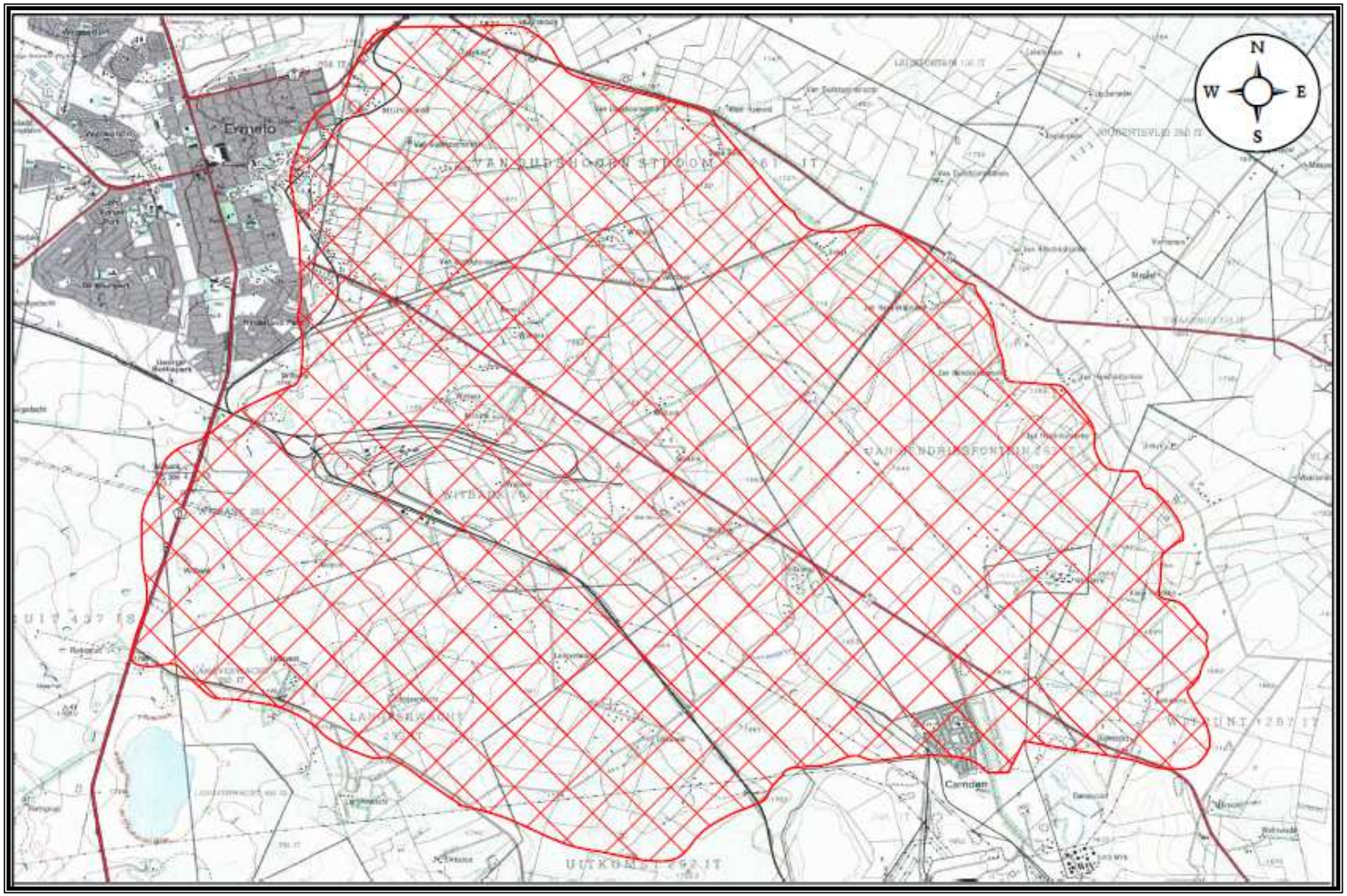

Figure 8: Witpuntspruit catchment area

The Vaal River in the vicinity of the Witpuntspruit is a perennial river. The flow in the Vaal River shows typical seasonal trends with dry weather flows being significantly less than wet weather flows. The 50 year flood peak for the Witpuntspruit at the N2 bridge is 277m^3/s and the 100 year flood peak is 379m^3/s.

Water quality data was measured by Environmental Assurance at the upstream and downstream ends of the proposed opencast mine. The water quality in the Vaal River upstream of the mine deteriorates from the origin of the river to the N2 crossing. At the N17 crossing, the water quality is still relatively good, typical coal mining influences are absent. The results indicate high organic concentrations possibly as a result of sewage pollution and other domestic influences.

At the N2 bridge the Vaal River shows signs of pollution from coal mining activities. These include the pH which has dropped significantly, while the SO_4 is elevated. Nutrient pollution levels appear to be similar and possibly even improved compared to the upstream samples.

At the N11 bridge the Vaal River shows a general improvement. This is due to the tributaries contributing clean water to the Vaal River upstream of the N11 bridge. The tributaries drain a mainly agricultural catchment southeast of the Grootdraai Dam catchment.

Water quality in the Witpuntspruit is not good when compared with the Vaal River. The water quality shows definite signs of domestic and coal related pollution. Ermelo's sewage treatment works discharges into the Klein Drinkwaterspruit. The sewage works is therefore not responsible for adding nutrients to the Witpuntspruit, however the WWTW at Usutu discharges into a tributary of the Witpuntspruit and this may result in the high nutrient levels.

The water downstream of the site in the Witpuntspruit is used for livestock watering. The Witpuntspruit flows into the Vaal River downstream of this confluence; water is mainly used for irrigation, livestock watering and consumption.

Figure 9: Tertiary and quaternary drainage regions in the vicinity of Usutu Colliery (situated in Water Management Area 8)

8.1.4.1 Groundwater

The proposed Usutu Coal Colliery opencast mine area is bounded to the northwest by the decommissioned and sealed underground workings of the Usutu underground mine. The current mining plan will see a boundary pillar of at least 30 meters wide between these old workings and the open pit. The Usutu south underground mine lies to the east and south-east of the proposed mining area, at a depth of in excess of 80 meters below ground level.

Groundwater occurrence is controlled by the presence of zones of weathering and fracturing within the Karroo country rock and dolerite sills, and by the presence of fracturing associated with the dolerite intrusions. Karroo sandstone, siltstone and shale are characterised by low permeability and transmissivity and yields from boreholes are usually <0,5ℓ/s. Groundwater occurrence along the fractured contact zones of dolerite dykes and sills is often enhanced within the strip aquifers associated with these features due to permeability associated with fracturing. Water levels tend to mirror the topography, and are generally shallow, < 30 meter below ground level. Aquifers in the Karroo strata are confined, anisotrophic and secondary with limited storage.

The baseline groundwater environment was initially interpreted using desktop review of available information that included regional geological mapping, preliminary geological reporting on Usutu, groundwater modelling associated with Camden Power Station, water level and quality data for boreholes monitored by Usutu over the last ten years, 1:50 000 topographical maps, 1:10 000 orthographical maps, geological information from the mining exploration database and knowledge of structural features and lineaments that could act as preferential flow paths and barriers to groundwater flow.

Groundwater is restricted to the shallow weathered shale horizon above the lower B coal seam with little to no groundwater in the coal seams or the intervening horizon. Vertical movement of groundwater from the shallow weathered zone is insignificant, as confirmed by the fact that during the mining of Usutu underground mine immediately northwest of the proposed open pit, dry mining conditions were experienced and the water level in the monitored borehole only rose by 6 meters over the last 10 years.

8.1.4.2 Wetlands

Four wetland types have been recognised in the study area. These wetland types have been described and comprise:

- Riparian vegetation along the open water of the riparian channel;
- Tall emergent vegetation communities associated with backwater channels and reed beds connected to the riparian channel;
- Sedge dominated communities associated with old cut off channels and localised depressions in the floodplain; and
- A Mesophytic grassland community across most of the floodplain.

In addition to these wetland types which fall within the floodplain of the Witpuntspruit there are localised small seepage fronts at the foot of the upland slope associated with sandy soils of the upland slope (predominately Avelon) and associated lateral movement of water within these strata. These localised features are however of secondary importance to the functioning of the wetland, the primary driver of which appears to be the river channel and temporary inundation associated with seasonal overtopping of the river banks. The interpretation is supported by the soils present in the wetland which are predominantly weakly to well developed Katspruit soils. There is a lack of heavy clays typically associated with a wetland area subject to more regular inundation, while the mesophytic grasslands dominating the floodplain and common to the upslope areas lack a prominent reed / sedge component.

The main wetland type in the study area can further be described as a channelled valley bottom wetland which largely follows the river course. It exhibits clear evidence of floodplain features such as cut off meanders. The dominant water source is surface flow. Such areas develop where drainage off the landscape can no longer be accommodated within the substrate and overland flow reaches velocities that cause scouring and channel formation. Water supply in this case is seasonal, and is fed by surface water.

Three different types of wetland areas were classified within the study area and were categorised into hydro-geomorphic (HGM) units. These include hillslope seepage wetlands not feeding a watercourse, hillslope seepage wetlands feeding a watercourse and a depression wetland.

HGM units encompass three key elements (Kotze et al., 2005):

- Geomorphic setting. This refers to the landform, its position in the landscape and how it evolved (e.g. through the deposition of river borne sediment);
- Water source. There are usually several sources, although their relative contributions will vary amongst wetlands, including precipitation, groundwater flow, stream flow, etc.; and
- Hydrodynamics, which refers to how water moves through the wetland.

8.1.5 Climate

8.1.5.1 Temperature and precipitation

Usutu Colliery falls within the summer rainfall region of South Africa. The climate is temperate with characteristically warm summers and cold winters. Frost occurs during the winter months peaking with an average occurrence of nine days in July. Summer precipitation occurs in the form of mist, drizzle, hail and more frequent thunder showers and lightning storms.

The mean annual rainfall is 748mm, 83% of which occur during the months of October to March. The mean rainfall is given in Table 8: Mean rainfall measured over 54 year period at Ermelo weather station.

Table 8: Mean rainfall measured over 54 year period at Ermelo weather station

MONTH	MEAN RAINFALL (mm)
January	126
February	94
March	83
April	35
May	19
June	8
July	9
August	11
September	28
October	87
November	131
December	124
MEAN ANNUAL	748

The highest recorded rainfall for periods of between 30 minutes and 24 hours are given in Table 9: Maximum below together with the 1:50 and 1:100 year computed rainfall events for a period of 24 hours.

*

Table 9: Maximum precipitation

24 hr max recorded	24 hr 50 year recurrence	24 hr 100 year recurrence	24 hr RMF recurrence
79mm	98.8mm	108.1mm	118.1mm

The mean daily maximum exceeds 23˚C between October and March, the hottest months. The daily maximum temperatures in the winter months (May to August) vary between 16˚C and 19˚C. The daily minimum temperatures during the winter months vary between <-11.1˚C and 4˚C.

Table 10: The mean maximum and minimum temperatures

MONTH	MEAN	DAILY MAX	DAILY MIN	EXTREME MAX	EXTREME MIN
January	18.7	25.4	12.1	34.4	3.3
February	18.3	24.9	11.7	35.0	4.4
March	17.2	23.7	10.7	32.8	0.0
April	14.8	22.2	7.4	30.0	-3.3
May	11.8	19.8	3.8	28.3	-6.8
June	8.6	16.4	0.8	25.0	-8.9
July	8.4	16.5	0.4	25.1	-11.1
August	11.2	19.6	2.8	29.4	-11.1
September	14.3	22.4	6.1	33.3	-6.8
October	17.0	24.7	9.4	34.4	-2.2
November	17.5	24.6	10.4	35.6	0.0
December	18.4	25.2	11.7	34.2	3.3
AVERAGE	14.7	22.1	7.3	30.5	-3.2

8.1.5.2 Wind

Owing to the location of the site, the gentle undulating topography and the non-existing mountain ranges and ridges, no localised wind system will be generated. The wind patterns at the mine will conform to the regional wind patterns. The average wind speed and directions as recorded at the Ermelo Weather Station are presented in Table 11: Average wind speed and direction, below. From Table 11: Average wind speed and direction it is evident that the predominant wind direction is north north-easterly and during the months of May to December, strong west north westerly winds also develop.

The mean monthly evaporation for the region obtained from Ermelo Weather Station is presented in Table 12: Mean monthly evaporation. The gross average “A” pan evaporation recorded amounts to 1728mm, with the maximum evaporation occurring during the summer months, from October to January, due to the high summer temperatures.

Thunderstorms occurring frequently in summer and usually accompanied by lightning, heavy rain, strong winds and occasional hail. Average of 3.8 hail incidents per annum can be expected at any particular site. Frost occurs in the winter months, peaking with an average occurrence of nine days in July.

Table 11: Average wind speed and direction

MONTH	N		NE		E		SE		S		SW		W		NW	
	N	V	N	V	N	V	N	V	N	V	N	V	N	V	N	V
Jan	161	3.0	287	3.2	109	3.7	48	3.1	44	3.1	92	3.3	122	3.6	96	3.3
Feb	142	2.9	295	3.2	141	3.9	60	4.2	44	3.1	74	3.4	112	3.4	101	2.9
Mar	152	2.8	304	3.3	139	3.4	63	3.5	36	3.1	54	3.1	100	3.4	104	2.9
Apr	170	2.7	211	3.3	87	3.4	39	3.0	47	3.2	95	3.4	149	3.6	146	2.8
May	172	2.6	166	2.9	67	3.0	51	3.3	59	3.4	89	3.7	162	3.9	167	2.9
Jun	146	2.5	149	3.0	86	3.2	43	3.2	54	3.4	117	3.6	157	3.8	166	2.7
Jul	162	2.5	184	2.9	79	3.4	53	4.2	51	3.9	99	3.9	142	3.6	153	2.8
Aug	174	5.4	180	3.4	83	3.2	40	4.4	40	3.5	86	4.1	141	4.1	182	3.0
Sep	197	3.2	223	3.8	84	4.0	41	3.9	27	3.5	70	3.9	131	4.4	171	3.3
Oct	190	3.4	243	3.7	83	4.3	42	3.6	33	3.6	71	3.6	142	4.0	160	3.8
Nov	174	3.2	225	3.6	92	4.1	40	3.9	28	3.1	68	3.1	185	3.8	154	3.6
Dec	180	3.1	254	3.4	95	4.0	40	4.0	34	3.0	69	3.3	154	3.4	135	3.3
Avg	168	2.9	227	3.3	95	3.7	47	3.8	41	3.3	82	3.6	141	3.8	145	3.1

n = average direction frequency per thousand readings

v = average velocity in meters per second

Table 12: Mean monthly evaporation

MONTH	EVAPORATION (mm)
January	179
February	152
March	150
April	110
May	95
June	81
July	91
August	135
September	176
October	196
November	170
December	198
TOTAL	**1728**

8.1.6 Flora

The study site is situated on various farms in the Ermelo area, which lies within the summer rainfall area. Bredenkamp and van Rooyen (1995) classifies the study site within the Moist Sandy Highveld Grassland biome, and should be dominated by *Erogistis sp*. and *Themeda triandra*. *Dicotyledonous forbs* although well represented within the biome, should not be abundant. The biome into which Accocks (1988) classifies the area is the North eastern sandy Highveld, specifically the Near Bankenveld veldt type occurring in the western side of the Drakensburg. The area should most likely be dominated by *Graminoid* species, such as *Tristachya leucothrix*, *T. triandra* and *E. racemosa*.

This biome according to Accocks, is dominated by sourveld species, and while not considered suitable for grazing is typically utilised for agricultural purposes.

The study area covers approximately 17 247 058 ha consisting of low undulating hills. These are covered by predominately short *sclerophyllis* plant species occurring near the crests of these hills, with taller more palatable species occur towards the bases of the hills. The study areas are predominantly used for grazing areas. Pastures are also established widely in the area.

A total of 29 species in seven (7) families were recorded over the study area. *Graminoid* species (*Poaceae*) were the most dominant, accounting for 45% of the total species diversity. Members of the daisy (*Asterceae*) family were also well represented, accounting for 28% of the total species diversity.

8.1.7 Fauna

The disturbance of the site due to agricultural and mining activities has resulted in many animal species moving out of the area to lesser disturbed locations. Thus, species that are known to occur within the greater area may

not occur on the survey area. Hence, community structure and ecosystem functioning will already have been altered, particularly as a result of noise generation, cultivation and habitation.

Signs of animal life that were noted on the mining area included abundant molehills, hares and a duiker.

Table 13: Mammals and reptiles that may occur in the Ermelo area

Scientific name	English name	Afrikaans name
Mammals		
Atelerix frontalis	Hedgehog	Krimpvarkie
Raphicerus campestris	Steenbok	Steenbok
Papio ursinus	Chacma Baboon	Bobejaan
Lepus saxatilis	Scrub Hare	Kolhaas
Pedetes capensis	Springhare	Springhaas
Paraxerus cepapi	Tree squirrel	Boomeekhoring
Thryonomys swinderianus	Greater Cane rat	Grootrietrot
Hystrix africaeaustralis	Porcupine	Ystervark
Canis mesomelas	Black Back Jackal	Rooijakkals
Vulpes chama	Cape Fox	Silwervos
Ictonyx striatus	Striped Polecat	Stinkmuishond
Poecilogale albinucha	Striped Weasel	Slangmuishond
Melivora capensis	Honey Badger	Ratel
Aonyx capensis	Cape clawless Otter	Groototter
Lutra maculicollis	Spotted necked Otter	Kleinotter
Civettictis civetta	African civet	Siwetkat
Genetta tigrina	Large spotted Genets	Grootkolmuskuljaatkat
Genetta genetta	Small spotted Genets	Kleinkolmuskuljaatkat
Suricata suricatta	Suricate	Stokstertmeerkat
Cynictis penicillata	Yellow mongoose	Rooimeerkat
Ichneumia albicaudda	White tailed mongoose	Witstertmuishond
Atilax paludinosus	Water Mongoose	Kommetjiegatmuishond
Galerella sanguinea	Slender Mongoose	Rooimuishond
Proteles cristatus	Aardwolf	Aardwolf
Orycteropus afer	Aardvark	Erdvark
Felis seval	Serval	Tierboskat
Felis lybica	African Wild cat	Vaalboskat
Sylvicapra grimmia	Common duiker	Duiker
Raphicerus campestris	Steenbok	Steenbok
Phacochoerus aethiopicus	Warthog	Vlakvark
Pelea capreolus	Grey Rhebok	Vaalribbok
Redunca fulvorufula	Mountain Reedbok	Rooiribbok
Myosorex varius	Forest Shrew	Bosskeerbek
Crocidura maiquensis	Swamp Musk Shrew	Vleiskeerbek
Crocidura fuscomurina	Tiny Musk Shrew	Dwergskeerbek
Crocidura cyanea	Reddish-grey Musk Shrew	Rooigrysskeerbek
Crocidura silacea	Peter's Musk Shrew	Peters se Skeerbek
Crocidura hirta	Lesser Red Musk Shrew	Klein Rooiskeerbek
Amblysomus hottentotus	Hottentot Golden Mole	Hottentot Goue Mol
Elephantulus myurus	Rock Elephant Shrew	Klipklaasneus
Epomophorus crypturus	Peter's Epauletted Fruit Bat	Peter se Witkolvrugtevlermuis
Eidolon helvum	Straw coloured Fruit Bat	Geel vrugtevlermuis

Taphozous mauritianus	Tomb Bat	Witlyfvlermuis
Tadaria condylura	Angola Free-tailed Bat	Angola losstertvlermuis
Tadaria aegyptiaca	Egyptian Free-tailed Bat	Egiptiese losstertvlermuis
Eptesicus capensis	Cape Serotine Bat	Kaapse Dakvlermuis
Cryptomys hottentotus	Common Molerat	Vaalmol
Otomys laminatus	Laminate Vlei Rat	Bergvleirot
Otomys irroratus	Vlei Rat	Vleirot
Lemniscomys rosalia	Single striped Mouse	Eenstreepmuis
Rhabdomys pumilio	Striped Mouse	Streepmuis
Mus musculus	House Mouse	Huismuis
Mus minutoides	Pygmy Mouse	Dwergmuis
Aethomys namaquensis	Namaqua Rock Mouse	Namakwalandse Klipmuis
Aethomys chrysophilus	Red Veld Rat	Afrikanse Bosrot
Rattus rattus	House Rat	Huisrot
Gerbillurus setzeri	Setzeri's Hairy footed Gerbil	Setzer se Haarpootnagmuis
Tatera leucogaster	Bushveld Gerbil	Bosveldse nagmuis
Tatera brantsii	Highveld Gerbil	Hoëveldse nagmis
Saccostomus campestris	Pouched Mouse	Wangsakmuis
Dendromus melanotis	Grey Climbing Mouse	Grysklimmuis
Steatomys pratensis	Fat Mouse	Vetmuis
Reptiles		
Bitis arietans	Puff Adder	Pofadder
Britis atropos	Berg Adder	Bergadder
Causus rhombeatus	Common Night Adder	Nagadder
Naja annulifera	Snouted Cobra	Egiptiese kobra
Naja mossambica	Mozambique Spitting Cobra	Mosambiekse Speogkobra
Hemachatus haemachatus	Rinkhals	Rinkhals
Dispholidus typus	Boomslang	Boomslang
Thelotornis capensis	Twig snake	Voelslang
Atractaspis bibronii	Stiletto snake	Suidelike sypikslang
Psammophis mossambicus	Olive Grass snake	Olyfgrasslang
Psammophis brevirostris	Short snouted snake	Kortsnoetgrasslang
Psammophylax rhombeatus	Spotted Skaapsteker	Gevlekte Skaapsteker
Croptaphopeltis hotamboeia	Herald snake	Rooilipslang
Telescopus species	Tiger snake	Tierslang
Aparallactus capensis	Cape Centipede Eater	Swartkopslang
Python sebae	Southern African Rock Python	Luislang
Lamprophis fuliginosus	Brown House Snake	Bruin Huisslang
Lycodonomorphus rufulus	Common Brown water snake	Bruin waterslang
Pseudaspis cana	Mole Snake	Molslang
Philothamnus semivariegatus	Spotted Bush Snake	Gespikkelde Bosslang
Philothamnus hoplogaster	Green Water Snake	Groen waterslang
Duberria lutrix	Common slug eater	Gewone slakvreter
Lycophydion capense	Cape Wolf Snake	Kaapse Wolfslang
Dasypeltis scabra	Common Egg Eater	Gewone eiervreter
Typhlops species	Blind Snakes	Bilndeslang
Rhinotyphlops species	Blind Snakes	Bilndeslang
Leptotyphlops species	Thread Snakes	Erdslangetjie

Birds occurring in the 2630AA quarter degree square were obtained from the Robert's multimedia birds of Southern Africa list. All birds encountered during the site visit were identified and marked on the bird species list.

8.1.8 Demographics

Given the location of the study area in Mpumalanga Province, South Africa, the section commences with a brief overview of the socio-economic values and indicators of this Province. This provides a means of assessing and comparing the Greater Ermelo area within the context of Mpumalanga Province.

Mpumalanga with its capital Bombela (Nelspruit), occupies 6,4% of the surface area of South Africa. Approximately 3,3 million people or 8,2% of the population of South Africa is resident in this province. Manufacturing, mining, electricity generation, tourism, agriculture and forestry support its fairly diverse economy. The GGP of approximately R28 billion (1993) or 8.1% of South Africa's GGP.

During the period 1980 – 1991, the province experienced an economic growth rate of 4,4% per annum despite depressed economic conditions in South Africa. This figure is well in excess of the 1,3% for South Africa as a whole for the same period. However, the socio-economic conditions and quality of life in some of the more densely populated areas of the province remains a cause of concern.

Mpumalanga recorded an economic growth rate of 2,1% during 2003, as compared to a growth rate of 2,6% in 2002. In 2003, the largest industries in the economy were the manufacturing industry (18,9%) and in mining and quarrying industry (18,0%) in terms of their contribution to the GDP at market prices of Mpumalanga.

Table 14: Age and greater composition of the Ermelo Magisterial District (1980 – 1991)

STATISTICS	1980	1991	2005
Total population	126 535	140 015	124 819
0 – 14 years	44 760	42 865	43 558
15 – 64 years	77 770	92 591	76 162
65+	4 005	4 559	5 099
Males	71 990	76 711	60 19
0 – 14 years	22 200	21 790	21 687
15 – 64 years	47 816	52 928	36 447
65+	1 974	1 993	1 984
Females	54 546	63 304	64 700
0 – 14 years	55 560	21 075	21 871
15 – 64 years	29 954	39 663	39 715
65+	2 032	2 566	3 114

From Table 14: Age and greater composition of the Ermelo Magisterial District (1980 – 1991) it is evident that the population in the Greater Ermelo area is on the decline. This can be attributed to the current diseases that are currently ravaging mankind. However, employment opportunities should be created and change in lifestyle of the population at large should be encouraged in order to obviate the current situation.

The population density for Mpumalanga Province is 37,5 persons per km^2. This is high when compared to the population density of South Africa (31 persons per km^2). Statistics for urban and non-urban population determined in 1991, indicate a 5% increase in urban population and a 20% decrease in non-urban population, over a 10 year period.

The major economic activities and sources of employment are indicated in Table 15: Formal employment by economic sector for 1994 for the Ermelo Magisterial District.

Table 15: Formal employment by economic sector for 1994 for the Ermelo Magisterial District

SECTOR	1994		2005	
	NUMBER	%	NUMBER	%
Agriculture, forestry and fishing	6 177	13.9	7 190	30.9
Mining and quarrying	10 636	23.9	1 918	8.2
Manufacturing	6353	14.3	2 183	9.4
Electricity and water	4 090	9.2	241	1.0
Construction	1 196	2.7	959	4.1
Trade and catering	3 681	8.3	3 693	15.9
Transport and communication	1 102	2.5	1 458	6.3
Finance and real estate	774	1.7	1 459	6.3
Services	10 535	23.7	4 168	17.9
TOTAL	44 544	100	23 269	100

The unemployment estimate for the Ermelo Magisterial District is indicated in Table 16: Labour statistics for the Ermelo Magisterial District

Table 16: Labour statistics for the Ermelo Magisterial District

STATISTICS	1980	1991	2005
Participation rate	72,3	70,8	54,6
Unemployment rate	3,9	11	33
Dependency rate			
Total	1,3	1,1	0,9
Youth (< 1 to 14 years)	0,8	0,7	0,6
Persons not active (15 – 64 years)	0,4	0,4	0,3
Aged (65+)	0,1	0,1	0,1

Table 17: Sectoral composition of the labour force of the Ermelo Magisterial District

STATISTIC	1980	1991	2005
Total labour force (A+B+C)	55 805	65 584	51 403
Formally employed (A)	49 014	44 544	28 077
Unemployed (B)	2 149	7 232	17 384
Active in the informal sector (C)	4 642	13 808	5 302
Total labour force (D+E+F)	100	100	100
Formally employed (D)	87,8	67,9	54,7
Unemployed (E)	3,9	11	33,9
Active in the informal sector (F)	8,3	21,1	10,4

Table 18: Population (2005) group by gender for the Greater Ermelo

RACE	MALE	FEMALE
Asian	408	403
Black	53 539	57 986
Coloured	170	172
White	6 002	6 139

Together with the estimated population growth and the proclaimed stands available in the residential areas, it is evident that there is sufficient residential land to satisfy the medium to long term housing demand. The proposed mining activities will not place a burden on the housing availability.

The Ermelo CBD boasts a variety of shops, chain stores and small businesses. It has one provincial hospital as well as a wide range of municipal health care services. Cultural and recreational facilities are typical of any rural towns. There are churches of various denominations. Roads around the area are well maintained and accessible to all residents.

8.1.9 Visual

The landscape of the study area is fairly flat with gently undulating hills and gentle slopes. Due to the scale and nature of the proposed development, the visual impact of the development on surrounding communities will be quite significant.

This property will impose the greatest visual impact on the current landscape. Screening elements such as trees and berms, can soften the visual impact this development will have on the roads and neighbouring mines.

8.1.10 Heritage Resources

Based on what was found during the initial site evaluation and the recommendation of the EAP a Heritage Impact Assessment was undertaken. The Heritage Resources Act 25 of 1999 states:
"Section 38 (3) of the National Heritage Resources Act, 1999 (Act 25 of 1999) states that subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as-
(c) any development or other activity which will change the character of a site-
(i) exceeding 5 000 m^2 in extent
must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development."

The proposed development area lies to the south of Ermelo (10km). The area has been intensively mined over a long period of time which would have destroyed any possible heritage sites.

8.1.11 Noise

Existing noise sources on site and the immediate surrounds include:

- Agricultural activities on surrounding land;
- Processing Plant: Transportation of raw materials to site, product from the site and transport of staff to and from site;
- Blasting as a result of mining operations;
- Mining and mineral processing activities at the mining areas to the south east and north east of the site; and
- Vehicles serving the existing mines and farming communities.

In terms of Regulation 66 of the Mineral and Petroleum Resources Act (Act 28 of 2002) Regulations GN R527, a holder of a permit or right in terms of the Act must comply with the provisions of the Mine Health and Safety Act (Act 29 of 1996); as well as other applicable law regarding noise management and control.

Many aspects of mining operations lead to an increase in noise levels over the ambient environmental levels. This can be temporarily enhanced or the regional impact increased in any direction under the influence of specific climatic factors such as wind direction, cloud cover and temperature inversion layers.

The impacts of noise levels can be both physical and physiological at the high end of the spectrum but more commonly impact on communication or create psychological effects at the lower level of the spectrum.

The highest magnitude noise impacts are commonly the high intensity, short duration noise levels created by blasting in surface or opencast mines. Blasting should not be carried out under very overcast conditions or low level cloud cover as this increases the noise and vibration transmission. The impact can be reduced through selection of explosives, sequencing the blasts, deflection by structures and timing of the blasts to coincide with

periods of high activity or increased ambient noise levels. Drilling and blasting contractors will monitor the blast noise, shock and vibration felt at the boundary of the mine.

In terms of Regulation 67 of the Mineral and Petroleum Resources Development Act (Act 28 of 2002) Regulations GN R527, a holder of a permit or right in terms of the Act must comply with the provisions of the Mine Health and Safety Act (Act 29 of 1996) as well as other applicable legislation relating to blasting, vibration and shock control and management.

The repetitive operation of machinery also creates a range of noise levels. Although of low intensity these have an impact due to long periods of operation at the crushing plant and mills. The Mineral and Petroleum Resources Development Act (Act 28 of 2002) requires these areas be effectively screened to reduce or deflect noise and stipulates that cladding on structures be adequately fastened and separated with soft spacers and washers. Vehicle engines or loading noise and even reverse warning alarms on trucks and loaders can impact communities near and around the mine. Machinery such as compressors, generators, metal workshops tools such as angle grinders, pneumatic drills and jackhammers create high noise levels that are difficult to screen.

8.1.12 Air quality

Dust originating from disturbed areas and mining operations as well as vehicle emissions may contribute to poor air quality.

Air quality monitoring and modelling should for future activities concentrate on dust fallout and ambient PM_{10} and sulphur dioxide monitoring. Dust fallout monitoring will be undertaken to assess compliancy with dust fallout limits and will be reviewed annually.

Monitoring will also be undertaken during the mining phase to assess sulphur dioxide compliancy with the ambient air quality guidelines and standards. The monitoring is conducted according to the main impact zone of the mine operations.

Current sources of pollution (predominantly in the form of dust) in the vicinity of the site include the following:

- Dust from mining;
- The handling of ore,
- Ore processing operations;
- Stockpiled materials;
- Disturbed land or land denuded of any vegetation;
- Vehicle movements on un-surfaced roads; and
- Disposal facilities.

Mining activities in the general region as well as burning of wood and coal by the residents of many of the local communities (due to there being no formal electricity infrastructure), are primary contributors to the air pollution experienced in the region.

Dust suppression

Dust suppression must be undertaken in conjunction with a dust monitoring programme that places dust deposition gauges or receiving buckets, directional dust collection receptacles, high volume active air samplers or continuous particle monitors or even personal exposure samplers around the proposed mining area as well as adjacent areas.

An Air Quality Management Programme will be implemented to ensure compliance with the National Environmental Management Air Quality Act (Act 39 of 2004). These should be monitored regularly to ascertain the dust load and emission rates as well as particle size and distribution. Mine Health and Safety requirements for the use of dust masks should be followed and compliance audited regularly.

8.1.13 Social Facilities

It has been acknowledged that social facilitates in the Msukaligwa Local Municipality area are lacking. Public concern has raised this issue. Through the environmental process, the relevant or correct government bodies can be alerted. The issue of social facilities needs to be addressed by local municipalities and government bodies. The proposed development will create taxable land parcels, thereby increasing the income of the council. With these funds and additional pressure for social facilitates, the correct authorities can be pressed for the establishment of schools, hospitals, public libraries etc.

During the Public Participation announcement phase of this project several Interested and Affected Parties raised interest in investment opportunities for the proposed development as well as job creation. Facilities e.g. schools and churches for the local residents, can be developed through investment from investment groups and individuals.

9. ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

9.1 Approach to the EIA

An Environmental Impact Assessment (EIA) is a good planning tool. It identifies the environmental impacts of a proposed development and assists in ensuring that a project will be environmentally acceptable and integrated into the surrounding environment in a sustainable way.

The EIA for this project complies with the National Environmental Management Act (1998) of the Mpumalanga Department of Economic Development, Environment and Tourism, and the NEMA EIA Regulations of the Department of Environmental Affairs (DEA). The guiding principles of an EIA are listed below.

Box 1. Definition of the term "environment"

The term "environment" is used in the broadest sense in an environmental impact assessment. It covers the physical, biological, social, economic, cultural, historical, institutional and political environments.

9.2 Guiding principles for an EIA

The EIA must take an open participatory approach throughout. This means that there should be no hidden agendas, no restrictions on the information collected during the process and an open-door policy by the proponent.

Technical information must be communicated to stakeholders in a way that is understood by them and that enables them to meaningfully comment on the project.

There should be ongoing consultation with interested and affected parties representing all walks of life. Sufficient time for comment must be allowed. The opportunity for comment should be announced on an on-going basis.
There should be opportunities for input by specialists and members of the public. Their contributions and issues should be considered when technical specialist studies are conducted and when decisions are made (Refer to Figure 10: The four phases of an EIA.)

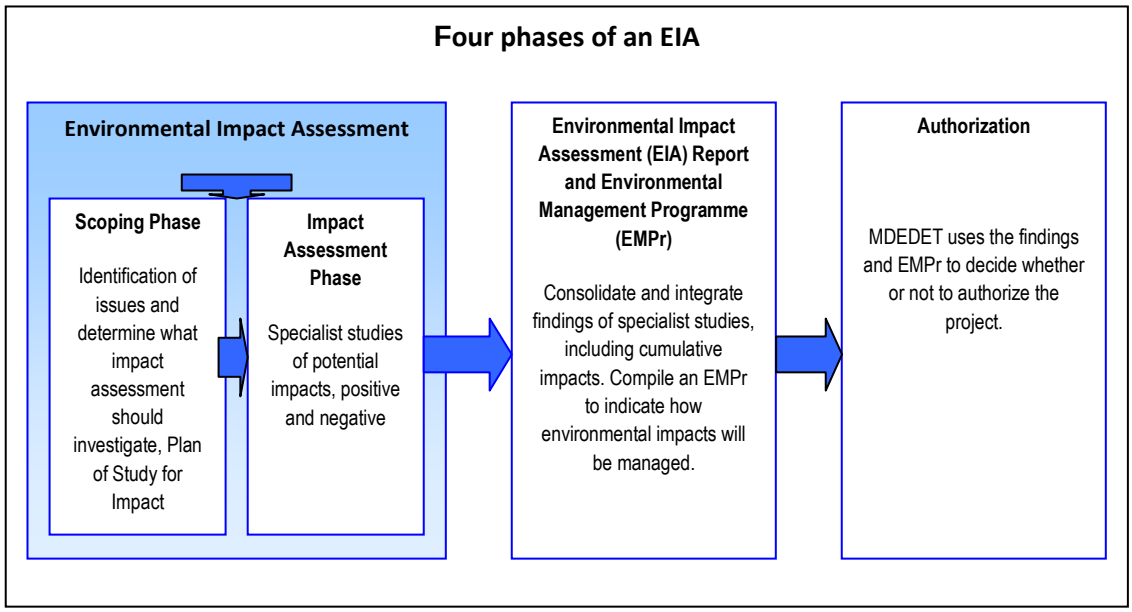

Figure 10: The four phases of an EIA

9.3 Pre-application consultation with authorities

Since the land involved is zoned as agricultural land, the Department of Agriculture was approached early on in the process to explain the concept. The local Municipality was also contacted to ensure that the development type falls within the definition of mining according to the Msukaligwa Local Municipality Spatial Development Framework (SDF).

The application for the NEMA EIA process was submitted to the Mpumalanga Department of Economic Development, Environment and Tourism on 12 November 2010 and the following reference number (17/2/4/GS/ -26) was received on 26 November 2010 (Refer to Annexure 1: Authority correspondence).

The Scoping phase of the project was undertaken and the final Scoping Report was submitted for review and decision-making purposes on Friday, 27 July 2012. The Final Scoping Report was accepted and Environmental Assurance received permission to proceed with the Environmental Impact Assessment phase of the project on Thursday, 23 August 2012.

9.4 Information gathering

Early in the EIA process, the Environmental Practitioner identified the information that would be required for the impact assessment and the relevant data were obtained. In addition, available information about the receiving environment was gathered from reliable sources, interested and affected parties, previous documented studies in the area and previous EIA Reports. The project team then visited the site to gain first-hand information and an understanding of the existing operations and the proposed project.

9.5 Raising issues for investigation by EIA specialists

The following specialist studies were identified to be undertaken during the EIA:

- Land capability Impact Assessment;
- Geohydrological Report;
- Surface water Impact Assessment;
- Wetland delineation and functionality report focussing on the Ecological Impact Statement (EIS) and Present Ecological Status (PES);
- River Health Assessment (SASS 5);
- Visual Impact Assessment;
- Ambient air quality Impact Assessment;
- Noise baseline Assessment;
- Ecological Assessment (including a Fauna and Flora Assessment);
- Heritage Impact Assessment; and
- Traffic Impact Assessment.

9.6 Public Participation Process (Reg 31(2)(e))

The principles of NEMA govern many aspects of EIAs, including consultation with interested and affected parties (I&APs). These principles include the provision of sufficient and transparent information to I&APs on an ongoing basis, to allow them to comment, and ensuring the participation of historically disadvantaged individuals, including women, the disabled and the youth. Public participation forms the most important component of the entire project. Public Participation is the involvement of all parties who are either potentially interested or affected by the proposed development. The principle objective of public participation is to inform and enrich decision-making. This is also its key role in the Environmental Impact Assessment (EIA) process.

Public Participation is the cornerstone of any EIA. The principles of NEMA as well as EIA Regulations govern the EIA process, including public participation. The Public Participation Process for the proposed development has been undertaken according to Guideline 4 of the EIA Regulations. These include provision of sufficient and transparent information on an ongoing basis to stakeholders to allow them to comment, and ensuring that participation of previously disadvantaged people, women and youth.

The Public Participation Process is primarily based on two (2) factors; namely:

- Ongoing interaction with the environmental specialists and technical teams in order to achieve integration of technical assessment and public participation throughout; and
- To obtain the bulk of the issues to be addressed early on in the process, with the latter half of the process designed to provide environmental and technical evaluation of these issues.

The findings are presented to stakeholders for verification that their issues have been captured and for future comment.

Input into the public participation process by members of the public and stakeholders can be given at various stages in the EIA process. Registration of the project can take place at any time during the EIA process up until the final EIA report is submitted to MDEDET. There are however set periods in which comments are required

from Interested and Affected Parties (I&APs) in order to ensure that these are captured in time for submission of the various reports. The comment periods during the EIA phase will be implemented according to the Guideline 4 of the NEMA (107/1998), Environmental Impact Assessment Regulations in terms of Section 24(5).

The EIA Regulations emphasises the importance of public participation. In terms of the EIA regulations, registered interested and affected parties:

- May participate in the application process;
- May comment on any written communication submitted to the competent authority by the applicant or environmental consultant;
- Must comment within the timeframes as stipulated in the EIA Regulations;
- Must send a copy of all comments to the applicant or Environmental Assessment Practitioner (EAP) if the comments were submitted directly to the competent authority; and
- Must disclose any direct business, financial, personal or other interests that the person has in the application being granted or refused.

The following actions were taken upon receiving comments / queries / issues:

- The contact details provided were entered into the project database for use in future notifications;
- Communication of receipt of comments; and
- Addressed comments in the Issue and Responses Report.

9.6.1 Identification of interested and affected parties

Public Participation is the involvement of all parties who are either potentially interested or affected by the proposed development. The principle objective of public participation is to inform and enrich decision-making. This is also its key role in the Environmental Impact Assessment (EIA) process. Generally, the following information is included:

Interested and affected parties (I&APs) representing the following sectors of society have been identified (see Annexure 2: Public Participation) for a complete I&AP distribution list:

- National, provincial and local government;
- Agriculture, including local landowners;
- Community Based Organisations;
- Non-Governmental Organisations;
- Water bodies;
- Tourism;
- Industry and mining;
- Commerce;
- Historically disadvantaged groups, including women, youth and the disabled;
- Research; and
- Other stakeholders.

9.6.2 Public announcement of the project

The project was announced as follows:

- Publication of a media advertisement in Middelburg Observer on Friday, 11 February 2011.
- In order to inform surrounding communities and adjacent landowners of the proposed development, four (4) site notices were erected on site and at visible locations close to the site on Friday, 11 February 2011.

Key stakeholders, who included the abovementioned sectors, were directly informed of the proposed development by e-mail and fax on Friday, 11 February 2011.

Distribution of Background Information Documents and Registration and Comment sheets by fax/post/email to I&APs on Friday, 11 February 2011:

- Letters were hand–delivered to adjacent landowners on Friday, 11 February 2011, notifying and informing them of the proposed development.
- I&APs were given 40 days to comment and / or raise issues of concern regarding the proposed development. The comment period expired on Wednesday, 23 March 2011.

9.6.3 Meetings with I&APs

A public meeting was held subsequent to the submission of the Scoping Report to the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET). The issues raised by the registered Interested and Affected Parties were captured and addressed in the Issues and Response Report (IRR).

The Minutes of the public meeting is also available and attached as Annexure 2: Public Participation.)

9.6.4 Raising issues for investigation by EIA specialists

I&APs had the opportunity to raise issues either in writing, during the public meeting, by telephone, fax and/or email. Concerns raised, as well as responses to these concerns, are detailed in the Comment and Response Report (see Annexure 2: Public Participation).

All the issues raised by I&APs during the EIA process were captured in a Comment and Response Report (see Annexure 2: Public Participation) and I&APs received letters acknowledging their contributions.

9.6.5 Draft scoping report

All the issues raised to date was captured in the Draft Scoping Report which was available in English. The EIA Regulations specify that I&APs must have an opportunity to verify that their issues have been captured. A period of 40 days was made available for public comment on the Draft Scoping Report (1 March 2012 until 9 April 2012). The availability of the Draft Scoping Report was announced as follows:

- personal letters, fax and e-mail to all the registered I&APs on the distribution list.

In addition, the Draft Scoping Report was distributed for comment as follows:

- left in public places (Ermelo Community Library); and
- Hand-delivered to the relevant authorities;
- ENVASS website http://www.envass.co.za;

Public review of the Draft Scoping Report was done by the following methods:

- Written comment, including email – a comment sheet requesting I&APs to respond to specific questions accompanied the report; further written submissions were encouraged.

9.6.6 Final Scoping report

The Final Scoping Report was prepared after the end of the public review period; this document will be made available for a period of 21 days. It will be updated with additional issues raised by I&APs and new information generated as a result. The public, stakeholders and registered Interested and Affected Parties have another 21 days to verify that the issues raised have indeed been captured and addressed in the Final Scoping Report.

The Final Scoping Report was submitted for review and decision-making purposes on Friday, 27 July 2012. The Final Scoping Report was accepted and Environmental Assurance received permission to proceed with the Environmental Impact Assessment phase of the project on Thursday, 23 August 2012.

9.6.7 Draft Environmental Impact Assessment (EIA) Report

The EIA Regulations specify that I&APs must have an opportunity to verify that their issues have been captured. The Draft Environmental Impact Assessment Report which will be available for forty days (40) from 5 November 2012 until 21 January 2013. The availability of the Draft Environmental Impact Assessment Report will be announced as follows:

- personal letters, fax and email to all the registered I&APs on the distribution list.

In addition, the Draft Environmental Impact Assessment Report will be distributed for comment as follows:

- left in public places (Ermelo Community Library); and
- Hand-delivered to the relevant authorities;
- ENVASS website http://www.envass.co.za;

9.6.8 Public Participation during the Impact Assessment phase

Public participation during the Impact Assessment Phase of the EIA will revolve around a review of the findings of the EIA and inputs into the Environmental Management Programme (EMPr). The findings will be presented in an Environmental Impact Assessment Report and EMPr and the volume of specialist studies.

9.7 Identification of important environmental issues

Potential impacts resulting from the proposed opencast and underground mining of coal were identified using input from the following sectors:

- Views of interested and affected parties;
- Existing Information;
- Site visit with the project team; and
- Legislation.

The following potential impacts were identified:

- Ground and Surface Water contamination;
- Geology, Soil and Land Capability;
- Socio-Economic Issues;
- Waste Products;
- Floral and Faunal Displacement;
- Impacts on the wetland and drainage patterns;
- Dust and Noise Impacts;
- Disturbance as a result of the blasting operations;
- Traffic; and
- Identified heritage sites.

The impacts can further be summarized as follows

Environmental impacts – a regional concern

Comments received from I&AP's during the scoping phase reflected concerns about the potential cumulative effects of the proposed opencast and underground coal mine on the biodiversity in the area. Furthermore, it was indicated that the proposed coal mine will affect the farmer's sense of place as well as definite traffic impacts and a deterioration of the public road.

Environmental impacts – Water quality

I&APs are concerned about the cumulative impacts of the proposed coal mine on surface water and groundwater quality of the Humanspruit as well as Witpuntspruit. There are concerns that water quality in these two tributaries may deteriorate further as a result of the proposed mining. Water pollution may affect recreation activities of the community further downstream. I&APs are also concerned about the possible disruption of the sensitive floodline, riparian section and the wetlands and drainage lines.

The proposed coal mine will take the sensitive Humanspruit and Witpuntspruit with the associated floodline, riparian section and wetland area into consideration. This means that the recommended 100 meter buffer for wetlands will be respected and no development will be allowed in this sensitive area.

Environmental Impacts – Property access roads

I&APs are concerned about the manner in which the mining of the proposed coal will affect access to and from

their properties and how the mining activities will affect the condition of the surrounding roads.

Environmental Impacts – Socio-Economic

I&APs have enquired as to whether the proposed mining of the coal will provide any additional employment opportunities in the area.

10. ASSESSMENT METHODOLOGY (Reg 31(2)(h))

10.1 Methodology of Impact Assessment

The EIA methodology assists in evaluating the overall effect of a proposed activity on the environment. The determination of the effect of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts was undertaken through an assessment of the significance of the impacts.

The criteria for the description and assessment of environmental impacts were drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environment Conservation Act (ECA), 1989 (Act No. 73 of 1989). Although the ECA EIA Regulations have been repealed, the Guideline Document still provides good guidance for significance determination.

The level of detail as depicted in the EIA regulations were fine tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes each aspect was assigned a value, ranging from one (1) to five (5), depending on its definition. This assessment is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. The impact assessment criteria used to determine the impact of the proposed development are as follows:

- Nature of the impact;
- The source of the impact;
- Affected Stakeholders;
- Extent - The physical and spatial scale of the impact;
- Duration - The lifetime of the impact, that is measured in relation to the lifetime of the proposed development;
- Intensity - The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself;
- Probability - This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time;
- Mitigation. The impacts that are generated by the development can be minimised if measures are implemented in order to reduce the impacts. The mitigation measures ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development.
- Determination of Significance – Without Mitigation. Significance is determined through a synthesis of impact characteristics as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact “without mitigation” is the prime determinant of the nature and degree of mitigation required.

- Determination of Significance – With Mitigation. Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the identified mitigation measures.
- All identified impacts will be assessed in accordance with the abovementioned criteria and the extended criteria.

10.2 Determination of significance of impacts

Significance is determined through a synthesis of impacts characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e. site, local, national, global whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

10.3 Impact rating system

Impact assessment must take cognisance of the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages:

- Planning;
- Construction;
- Operational; and
- Decommissioning.

Where necessary the proposal for mitigation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

10.4 Assessment of Biophysical and Cumulative Impacts

The criteria for the description and assessment of environmental impacts were drawn from the EIA Regulations and in terms of the Environmental Conservation Act, 1989 (Act No 73 of 1989) [ECA]. Although the ECA EIA Regulations have been repealed the Guideline Document still provides good guidance for significance determination.

Activities within the framework of the proposed development and their respective construction and operational phases, give raise to certain impacts. For the purpose of assessing these impacts, the project has been divided into two phases from which impacting activities can be identified, namely:

a) *Construction phase:*
All the construction related activities on site, until the contractor leaves the site.

b) *Operational phase:*
All activities, including the operation and maintenance of the proposed development.

The activities arising from each of these phases have been included in the tables. This is to identify activities that require certain environmental management actions to mitigate the impacts arising from them. The criteria against which the activities were assessed are given in the next section.

10.4.1 Assessment criteria

The assessment of the impacts has been conducted according to a synthesis of criteria required by the integrated environmental management procedure.

10.4.1.1 Extent

The physical and spatial scale of the impact is classified as:

a. Footprint
The impacted area extends only as far as the activity, such as footprint occurring within the total site area.

b. Site
The impact could affect the whole, or a significant portion of the site.

c. Regional
The impact could affect the area including the neighbouring properties, the transport routes and the adjoining towns.

d. National
The impact could have an effect that expands throughout the country (South Africa).

e. International
Where the impact has international ramifications that extent beyond the boundaries of South Africa.

10.4.1.2 Duration

The lifetime of the impact, that is measured in relation to the lifetime of the proposed development.

a. Short term
The impact would either disappear with mitigation or will be mitigated through natural processes in a period shorter than that of the construction phase.

b. Short to Medium term

The impact will be relevant through to the end of the construction phase.

c. Medium term

The impact will last up to the end of the development phases, where after it will be entirely negated.

d. Long term

The impact will continue or last for the entire operational lifetime of the development, but will be mitigated by direct human action or by natural processes thereafter.

e. Permanent

This is the only class of impact, which will be non-transitory. Mitigation either by man made or natural process will not occur in such a way or in such a time span that the impact can be considered transient.

10.4.1.3 Intensity

The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself. The intensity is rated as:

a. Low

The impact alters the affected environment in such a way that the natural processes or functions are not affected.

b. Medium

The affected environment is altered, but functions and processes continue, albeit in a modified way.

c. High

Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

10.4.1.4 Probability

This describes the likelihood of the impacts actually occurring. The impact may occur for any length during the life cycle of the activity, and not at any given time. The classes are rated as follows:

a. Impossible

The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0%).

b. Possible

The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined as 25%.

c. Likely

There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50%.

d. Highly likely

It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75%.

e. Definite

The impacts will take place regardless of any provisional plans, and or mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100%.

10.4.1.5 Mitigation

The impacts that are generated by the development can be minimised if measures are implemented in order to reduce the impacts. The mitigation measures ensure that the development considers the environment and the predicted impacts in order to minimise impacts and achieve sustainable development.

10.4.1.6 Determination of significance – Without Mitigation

Significance is determined through a synthesis of impacts as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact "without mitigation" is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as "positive". Significance is rated on the following scale:

a. No significance

The impact is not substantial and does not require any mitigation action.

b. Low

The impact is of little importance, but may require limited mitigation.

c. Medium

The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.

d. High

The impact is of major importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation is therefore essential.

10.4.1.7 Determination of significance – With Mitigation

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. Significance with mitigation is rated on the following scale:

a. No significance

The impact will be mitigated to the point where it is regarded as insubstantial.

b. Low

The impact will be mitigated to the point where it is of limited importance.

c. Low to Medium

The impact is of importance however, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels.

d. Medium

Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.

e. Medium to High

The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels.

f. High

The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

10.4.1.8 Assessment weighting

Each aspect within the impact description was assigned a series of quantitative criteria. Such criteria are likely to differ during the different stages of the project's life cycle. In order to establish a defined base upon which it becomes feasible to make an informed decision, it is necessary to weigh and rank all criteria.

10.4.1.9 Ranking, Weighting and Scaling

For each impact under scrutiny, a scale weighting Factor is attached to each respective impact (refer to Figure 11: Description of biophysical assessment parameters with its respective weighting). The purpose of assigning such weight serve to highlight those aspects considered most critical to the various stakeholders and ensure that each specialist's element of bias is taken into account. The weighting factor also provides a means whereby the impact assessor can successfully deal with the complexities that exist between the different impacts and associated aspects criteria.

Simply, such a weighting factor is indicative of the importance of the impact in terms of the potential effect that it could have on the surrounding environment. Therefore, the aspects considered to have a relatively high value will score a relatively higher weighting than that which is of lower importance.

Extent	Duration	Intensity	Probability	Weighting Factor (WF)	Significance Rating (SR)	Mitigation Efficiency (ME)	Significance Following Mitigation (SFM)
Footprint 1	Short term 1	Low 1	Probable 1	Low 1	Low 0-19	High 0,2	Low 0-19
Site 2	Short to medium 2		Possible 2	Low to medium 2	Low to medium 20-39	Medium to high 0,4	Low to medium 20-39
Regional 3	Medium term 3	Medium 3	Likely 3	Medium 3	Medium 40-59	Medium 0,6	Medium 40-59
National 4	Long term 4		Highly Likely 4	Medium to high 4	Medium to high 60-79	Low to medium 0,8	Medium to high 60-79
International 5	Permanent 5	High 5	Definite 5	High 5	High 80-100	Low 1,0	High 80-100

Figure 11: Description of biophysical assessment parameters with its respective weighting

10.4.1.10 Identifying the Potential Impacts Without Mitigation (WOM)

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures).

Equation 1:

Significance Rating (WOM) = (Extent + Intensity + Duration + Probability) x Weighting Factor

10.4.1.11 Identifying the Potential Impacts With Measures (WM)

In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it was necessary to re-evaluate the impact.

a. Mitigation Efficiency (ME)

The most effective means of deriving a quantitative value of mitigated impacts is to assign each significance rating value (WOM) a mitigation effectiveness (ME) rating. The allocation of such a rating is a measure of the efficiency and effectiveness, as identified through professional experience and empirical evidence of how effectively the proposed mitigation measures will manage the impact.

Thus, the lower the assigned value the greater the effectiveness of the proposed mitigation measures and subsequently, the lower the impacts with mitigation.

Equation 2:

Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency

or WM = WOM x ME

b. Significance Following Mitigation (SFM)

The significance of the impact after the mitigation measures are taken into consideration. The efficiency of the mitigation measure determines the significance of the impact. The level of impact is therefore seen in its entirety with all considerations taken into account.

11. ALTERNATIVES (Reg 31(2)(i))

11.1 Identification of alternatives

The IEM procedure stipulates that the environmental investigation needs to consider feasible alternatives for any proposed development. Therefore, a number of possible proposals or alternatives for accomplishing the same objectives should be identified and investigated. The various alternatives are assessed in terms of both environmental acceptability as well as economical feasibility. The preferred option is to be highlighted and presented to the authorities. The following alternatives are an example of the different kinds of alternatives that may be considered and investigated for a particular development.

- Input alternatives;
- Activity alternatives;
- Location alternatives;
- Status quo / no-go alternatives;
- Demand alternatives / Supply alternatives;
- Scheduling alternatives; and
- Process alternatives.

11.2 Input alternatives

Various types of material can be used for the Usutu Coal Colliery. Although the suggestions are usually referring to residential construction; it will be possible to implement some of it into the construction of offices.

These suggestions include but are not limited to:

Energy effective building construction and orientation have not been considered to date. However, the following recommendations regarding structural designs are recommended by the environmental consultant:

- Use of building material that requires excessive amounts of energy to manufacture should be minimised;
- Use of building material originating from sensitive or scarce environmental resources should be minimised. E.g. no tropical hardwood may be used;
- Building material should be legally obtained by the supplier, e.g. wood must have been legally harvested, and sand should be obtained only from legal borrow pits and from commercial sources;
- Building material that can be recycled / reused should be used rather than building material that cannot; and
- Use highly durable building material for parts of the building that is unlikely to be changed during the life of the building (unlikely to change due to e.g. renovation, fashion, changes in family life cycle) is highly recommended.

11.3 Location alternatives

No alternative locations have been considered by the proponent, as this location is owned by the proponent and therefore it is the only available site for this type of development. The investigation concluded that the subject

location is the most suitable due to its ideal location in terms of the requirements for opencast and underground coal mining.

The geological and geotechnical assessment as well as prospecting boreholes indicated that the quality of the coal in the area where the proponent proposes to mine, is of the best quality and therefore no alternative site has been investigated.

11.4 Layout alternatives

Following the site visit it was established that a portion of the area is abutted by a sensitive river floodlines (Humanspruit and Witpuntspruit), wetland and associated riparian ecosystems. This discovery lead to additional specialist studies to be conducted for the wetland as well as the sensitive ecological area. The conclusion of the specialist studies will delineate a buffer zone along the wetland which should be honoured. The buffer zone for wetlands for mining purposes is 500 meters (as required by the National Water Act (Act 36 of 1998); hence a portion of the total area was excluded for development purposes.

No mining of coal will be allowed in this portion.

11.5 Status quo / no-go alternatives

One of the options to be considered for this report is that of no development. Currently the area is being utilised for opencast coal mining, however should the decision of the authorities be that this project should not continue, the area would still require intensive rehabilitation.

The No-Go option will ensure water supply to other users in the scheme be increased and a portion of land deemed as having high Agricultural potential will remain intact.

However the positive impacts the development of an opencast and underground coal mine could have on the surrounding community's economy cannot simply be ignored. This coupled with the fact that South Africa imported most of its food supplies since 2008; and that it is economists' view that this trend will continue; it is highly doubtful that the loss of 200 ha Agricultural soil (for the purposes of the opencast coal mining) will be noticeable. In addition to this the property will generate more GGP for the Gert Sibande District Municipality than the farming of maize and cattle could. The income of coal opencast and underground mining compared to farming (income per ha) makes this option a very limited short term solution to impacts that can be mitigated and managed.

11.6 Alternative mining methods

The traditional way of mining opencast coal is to stockpile overburden and under lying soil material together; thus limiting the possibility of recovering sufficient overburden and good quality topsoil to rehabilitate the disturbed areas.

Alternative mining and stock piling methods has since been integrated into mining methods and therefore the applicant are investigating the roll-over method of opencast mining. This mining method is currently viewed as

having the least detrimental environmental impacts on the surrounding environment as rehabilitation is continuous with mining operations.

In terms of this project various mining methods alternatives were investigated and are discussed below.

11.6.1 Area Mining

The most used surface mining method for coal is strip or area mining (Refer to Figure 12: An example of an open cast mine depicting the visual impact). Strip mining exposes the coal by removing the overburden (the earth above the coal seam(s)) in long cuts or strips. The spoil from the first strip is deposited in an area outside the planned mining area. Spoil from subsequent cuts is deposited as fill in the previous cut after coal has been removed. Usually, the process is to drill the strip of overburden next to the previously mined strip. The drill holes are filled with explosives and blasted. The overburden is then removed using large earthmoving equipment such as draglines, shovel, excavator and trucks, or bucket-wheels and conveyors. This overburden is put into the previously mined (and now empty) strip.

When all the overburden is removed, the underlying coal seam is exposed as a 'block' of coal. This block of coal may be drilled and blasted (if hard) or otherwise loaded onto trucks or conveyors for transport to the coal preparation (or wash) plant. Once this strip is empty of coal, the process is repeated with a new strip being created next to it. This method is most suitable for areas with flat terrain.

The suitability of equipment is governed by geologic conditions. For example, to remove overburden that is loose or unconsolidated, a bucket wheel excavator might be most productive. The life of some area mines may be more than 50 years.

Figure 12: An example of an open cast mine depicting the visual impact

11.6.2 Contour Mining

The contour mining method consists of removing overburden from the seam in a pattern following the contours along a ridge or around a hillside (Refer to Figure 13: Contour mining in Brazil). This method is most commonly used in areas with rolling to steep terrain. It was once common to deposit the spoil on the down slope side of the bench thus created, but this method of spoil disposal consumed much additional land and created severe landslide and erosion problems.

To alleviate these problems, a variety of methods were devised to use freshly cut overburden to refill mined-out areas. These haul-back or lateral movement methods generally consist of an initial cut with the spoil deposited down slope or at some other site and spoil from the second cut refilling the first. A ridge of undisturbed natural material 6.1m wide is often intentionally left at the outer edge of the mined area. This barrier adds stability to the reclaimed slope by preventing spoil from slumping or sliding downhill.

The limitations on contour strip mining are both economic and technical. When the operation reaches a predetermined stripping ratio (tons of overburden/tons of coal), it is not profitable to continue. Depending on the equipment available, it may not be technically feasible to exceed a certain height of high wall. At this point, it is possible to produce more coal with the augering method in which spiral drills bore tunnels into a high wall laterally from the bench to extract coal without removing the overburden.

Figure 13: Contour mining in Brazil

11.6.3 Underground Mining

Most coal seams are too deep underground for opencast mining and require underground mining, which method currently accounts for about 60% of world coal production (Refer to Figure 14: Underground coal mining methodology). In deep mining, the room and pillar or board and pillar method progresses along the seam, while pillars and timber are left standing to support the mine roof. Once room and pillar mines have been developed to a stopping point (limited by geology, ventilation, or economics), a supplementary version of room and pillar mining, termed second mining or retreat mining, is commonly started. This is when miners remove the coal in the

pillars, thereby recovering as much coal from the coal seam as possible. A work area that is involved in pillar extraction is called a pillar section.

Modern pillar sections use remote-controlled equipment, including large hydraulic mobile roof-supports, which can prevent cave-ins until the miners and their equipment have left a work area. The mobile roof supports are similar to a large dining-room table, but with hydraulic jacks for legs. After the large pillars of coal have been mined away, the mobile roof support's legs shorten and it is withdrawn to a safe area. The mine roof typically collapses once the mobile roof supports leave an area.

There are five principal underground mining methods:

- ***Longwall mining*** accounts for about 50% of underground production. The longwall shearer has a face of 300 m or more. It is a sophisticated machine with a rotating drum that moves mechanically back and forth across a wide coal seam. The loosened coal falls on to a pan line that takes the coal to the conveyor belt for removal from the work area. Longwall systems have their own hydraulic roof supports which advance with the machine as mining progresses. As the longwall mining equipment moves forward, overlying rock that is no longer supported by coal is allowed to fall behind the operation in a controlled manner. The supports make high levels of production and safety possible. Sensors detect how much coal remains in the seam while robotic controls enhance efficiency. Longwall systems allow a 60-to-100% coal recovery rate when surrounding geology allows their use.

- ***Continuous mining*** utilizes a machine with a large rotating steel drum equipped with tungsten carbide teeth that scrape coal from the seam. Operating in a “room and pillar” (also known as “board and pillar”) system—where the mine is divided into a series of 6-9m “rooms” or work areas cut into the coalbed—it can mine as much as five tons of coal a minute, more than a non-mechanised miner of the 1920s would produce in an entire day. Continuous miners account for about 45% of underground coal production. Conveyors transport the removed coal from the seam. Remote-controlled continuous miners are used to work in a variety of difficult seams and conditions, and robotic versions controlled by computers are becoming increasingly common.

- ***Blast mining*** is an older practice that uses explosives such as dynamite to break up the coal seam, after which the coal is gathered and loaded on to shuttle cars or conveyors for removal to a central loading area. This process consists of a series of operations that begins with “cutting” the coalbed so it will break easily when blasted with explosives.

- ***Shortwall mining***, a method currently accounting for less than 1% of deep coal production, involves the use of a continuous mining machine with moveable roof supports, similar to longwall. The continuous miner shears coal panels 45-60 m wide and more than 805 m long, having regard to factors such as geological strata.

- ***Retreat mining*** is a method in which the pillars or coal ribs used to hold up the mine roof are extracted; allowing the mine roof to collapse as you retreat. This is one of the most dangerous forms of mining owing to imperfect predictability of when the ceiling will collapse and possibly crush or trap workers in the mine.

Figure 14: Underground coal mining methodology

11.7 Scheduling alternatives

It is recommended that construction takes place during the drier winter months to avoid any complications in the wet weather. No detailed information regarding the proposed time frame for the project is yet available. However, it is anticipated that construction starts as soon as possible all the necessary approvals are obtained.

11.8 Process alternatives

Process alternatives relate to design configurations of industrial and service facilities. Developments and process alternatives have been considered for the proposed open cast and underground coal mine to date.

The process alternative (coal washing methodology) was not considered feasible due to the resulting by-products, the cost implications thereof, and its overall potential impacts on the environment.

12. SUMMARY OF FINDINGS AND RECOMMENDATIONS OF SPECIALISTS REPORTS (Reg 31(2)(j))

12.1 Ecological assessment

The Usutu Colliery is located in the Msukaligwa Local Municipality (MP302) 5-10 kilometers south East of Ermelo in the Mpumalanga Province. From a biodiversity point of view, the area has no formal land base protected areas, thus it has been prone to extensive natural habitat loss due to land-use activities within the area.

The study has found and concluded that the proposed mining activity will cause a significant environmental impact to the remaining natural environment. The study area contains numerous wetlands types. A few of those wetland types, mainly the floodplains still maintain their functionality and offer a series of species ecological important ecosystem services. These include their use as breeding sites and as general species habitat.

The proposed activity will include the removal of vegetation thus causing habitat loss for species such as African grass owl. The obstruction of water flow would result in wetland drainage or dryness which will prevent species functioning, mainly for birds that use this environment for breeding and migratory purposes. Further disturbance to the area will lead to more alien species invasion and remaining natural area loss.

It is therefore recommended that the proposed mining, should it be authorized, includes rehabilitation, especially of wetlands in their Environmental Management Plans. Furthermore, there should be an allowance for species movement by leaving strips of natural vegetation that would serve as corridors for species movement. The client should adhere to the buffering zones recommended by the specialists. Lastly, further monitoring of the ecological function pre- and during mining should be considered in order to maintain and manage the biodiversity of the area prior to rehabilitation.

Due to the intensity of land-use activity in the area, it should be understood that the cumulative environmental impacts on the area are the results of the combination of the agricultural, infrastructure and mining activities in the vicinity. Therefore, it is important to consider the severity of each activity and where they interlink in order to implement a correct ecological management of the area.

12.2 Ambient air quality report

The South and East are the only monitoring points that exceeded the lower limit of 600 mg/m^2/day. None of the monitoring point exceeded the 2400 mg/m^2/day limit and none of the monitoring points exceeded the 1200 mg/m^2/day limit more than 3 times in a calendar year. The North monitoring point is the only monitoring point that exceeded the 1200 mg/m^2/day limit in two sequential months. It can be concluded that the current mining operation is compliant with the South African National Standards 1929:2004 most of the time. The Ambient Air Quality at Usutu Mine is of a very high standard and although the mining activities, such as blasting and transportation of coal is having a negative effect on the receiving environment. This impact is mitigated by means of dust suppression and other management measures to such a level that the impact is negligible small.

It is recommended that the following area be managed to ensure that dust fallout across the site do not increase to such levels that the dust exceeds the 2400 mg/m^2/day.

12.3 Pollution control dam design report

The conclusions that were reached during the design process can be summarised as follows:

- Choose an appropriate lining to be used when constructing the pollution control dam;
- Construct a 4 450m^3 pollution control dam with emergency overflow at the position to be determined on site;
- Construct trenches / berms in close proximity to the mining activities to minimise the amount of clean water (storm water run-off) that will infiltrate into the mining area; and
- Construct trenches / berms (channel type 12) with 2 000mm base width and minimum 660mm depth at minimum 1:50 gradient

12.4 Geohydrological report

The results of the investigation were:

- Groundwater levels were measured in twelve boreholes during a hydrosensus conducted in November 2011 for the proposed Usutu opencast mine on the Farm Jan Hendriksfontein portion 263 IT and Transitu 257 IT. The depth of the static groundwater level was found to vary between 1m and 10m below ground level;
- A seasonal aquifer perched on the bedrock probably develops in the upper weathered soil layer, especially after high rainfall events. Flow in the perched aquifer is expected to follow the surface contours closely and emerge as fountains or seepage at lower elevations;
- From the chemical analysis of the water samples an overall assumption can be made that the groundwater sampled in the proposed mining area is of poor quality and not acceptable for domestic use. It can be deducted from the water quality of the sampled boreholes that the groundwater has been negatively affected by historic mining related contaminants;
- The acid base analysis (ABA) of exploration drill cores from the six opencast areas showed material that is intermediate to potentially acid forming material;
- Geophysics indicated that structures such as dykes are present across the opencast mining area.

12.5 Surface water report

Resource Sensitivity and Integrity:

The Present Ecological State (PES) of the Witpuntspruit is classified as moderately modified (class C). This status is caused by upstream anthropogenic and agricultural activities as well as mining operations in close proximity to the stream.

In addition the area is characterised by 14 hectares of seasonal wetlands and permanent wet zones. All wetlands in the area are described as palustrine wetland types with areas adhering to non-channelled and valley bottom descriptions. Most of the wetlands in the study area obtained a low PES category status. In terms of the wetland study it was found that the biodiversity of the wetlands range from sensitive to less sensitive in the study area. The wetlands are considered to be of ecological importance and sensitivity but due to their current low significance status rehabilitation measures need to be instated.

Surface water impacts:
Surface water resources within the vicinity of the project area are already impacted due to mining activities. The historic water quality of the Witpuntspruit exceeds the Resource Quality Objectives for the catchment. Currently there is no evidence of further degradation of the water quality as measured upstream and downstream of Usustu Coal operations. Water quality could be classed as unacceptable in terms of variables such as pH, TDS, SO_4, Mn, Al and Fe. Mining at Usutu Colliery may cause further degradation of the water resource if appropriate water management practises are not in place. Mining will impact on the aquatic ecology as well as wetlands within the project area. These impacts are rated as moderate to high and with the implementation of mitigation measures, impacts will have a rating of low to moderate.

Water Use and Management:
The approach in water management for the mine is founded in the requirements set for a water resource management framework on a catchment level. This entails that the mine will strive to follow a pro-active, coherent and consistent management strategy in accordance with the objectives to be achieved as provided in the Internal Strategic Perspective of the Upper Vaal.

It is further envisaged that the mine will impact on the wetland area as significant coal reserves are located in these areas. The water management approach of the mine will be to replace the affected wetlands with artificially constructed wetlands as part of the rehabilitation program.

The current footprint of the mine will be considered in the layout of new infrastructure to ensure that clean areas are maximised, dirty areas minimised, and that adequate containment facilities are in place to prevent spillages and discharge to the environment. The settling pond will be phased out and replaced with an appropriately designed pollution control dam. The proposed mining footprint will be rehabilitated by means of an artificial wetland to assist with further improvement of water quality.

Recommendations:
The feasibility of the mine is dependent on the mining of coal reserves on the Farm Jan Hendriksfontein 263 IT. The sterilisation of coal reserves in close proximity to the wetland areas will create a situation where not sufficient funding through mining will be generated to implement the entire pollution prevention infrastructure. The mining of coal adjacent to the wetland areas could be approved as the wetland specialist study has stated that the relatively small scale of the mining activity and the low conservation status of the wetlands will result in no major negative impact.

The commitment by the mine to reinstate affected wetlands and to rehabilitate disturbed areas will result in a situation where the water management practices adopted by the water management area will become effective. It is recommended that the water uses as applied for by the mine be approved on condition that all water management measures as specified are implemented.

12.6 Wetland delineation and functionality report

The wetlands were assessed as having a combined impaired Class D rating. It was determined that the wetlands are considered to be ecological important and sensitive. The biodiversity of these wetlands are usually very

sensitive to flow and habitat modifications and plays a role in moderating the quantity of water in major rivers. However, in some instances, these functions could no longer be attributed to some of the wetlands.

The Wethealth assessment revealed that in terms of natural and human services the wetlands are moderately to seriously modified. The loss of natural habitats and basic ecosystem functions are extensive and were caused due to extensive anthropological activities in the catchment. In the event that this wetland is subject to further degradation due to road construction and mining, Usutu Colliery will have to apply for a Section 21 (i) and (c) Water Use License authorisation. The water use authorisation will entail a proper rehabilitation plan as part of the closure plan.

12.7 River health assessment

Biomonitoring was conducted at two points in the Witpuntspruit upstream from the confluence with the Vaal River on the Farm Jan Hendriksfontein 263 IT and upstream from the Camden Power station. The reference site was selected in the upper parts of the Wipuntspruit upstream from the confluence with the Humanspruit. However, the reference site was also situated downstream from several coal mining operations in the catchment. Biomonitoring was conducted along with surface water monitoring to determine the current state of the surface water resource and its associated aquatic community.

The biomonitoring points selected in the Wipuntspruit and Humanspruit respectively were at the two bridges where these watercourses transect the N2 road with a third point (UCREF) selected in the Witpuntspruit to act as a reference site. UC01 was located in the Witpuntspruit upstream of Camden power station and just downstream from the Usutu west coal operations at the bridge on the N2 opposite the turn off to Camden Village.
UC02 was a further 300 meters upstream from the rehabilitated mining areas of Usutu West coal operations at the bridge on the N2 crossing the Humanspruit just before the Camden power station turnoff. The tributary falls within the C11B quaternary drainage area. According to the Ecological Water Requirements Assessment conducted by Department of Water Affairs and Forestry (2001), the Present Ecological Status (PES) of C11B quaternary drainage area is D, largely modified. This category was used to determine the current reference scores for the stream.

The measured biota-specific water quality viables indicated that the stream could support aquatic life. The invertabrate Habitat Assessment Sytem (IHAS) showed that UC01 and UC02 were within the range expected from largely impaired stream that could not support a diverse macro-invertabrate fauna. It is also important to remember that this biomonitoring was conducted directly downstream of mining operations. This might have influenced the availibility of habitats. The SASS5 scores at both monitoring points were much lower than the reference score. Of the 13 taxa that were found during the study, only two families found at UC01 were sensitive to pollution while no sensitive species were found at UC02. The reference site hosted five sensitive species out of a total of 21 taxa identified. Compared to the reference scores, UC01 was severely impaired, while UC02 was largely impaired. Impacts on both monitoring points include upstream impacts from the agricultural land use activities, sediment from the coal mining activities and power generation, litter from the N2 and erosion.

12.8 Visual impact assessment

The construction and operation of the Usutu mine related activities and its associated infrastructure will have a visual impact on the natural scenic resources and the topography. However, with the correct mitigation measures the impact can be decreased to a point where the visual impact can be seen as insignificant.

The moderating factors of the visual impact of the facility in the close range are the following:

- Short exposure time of road users
- The time the structure will be visual due to roll-over mining
- Number of human inhabitants located in the area
- Natural topography and vegetation
- Mitigation measures that will be implemented
- Medium to high absorption capacity of the landscape

In light of the above mentioned factors that reduce the impact of the facility, the visual impact is assessed as LOW VISUAL IMPACT after mitigation measures have been implemented.

12.9 Traffic impact assessment

This traffic impact assessment was done as part of the environmental impact assessment for the Vunene Colliery (Pty) Ltd located on Leeuwenburg 137IT, Roodewal 270IT, Holbank 265IT, Vlakfontein 266IT, Mooiplaats 290IT, Witpunt 267IT, Transutu 257IT and Jan Hendriksfontein 263IT in the Msukaligwa Local Municipality, Mpumalanga Province.

The mining area covers a large area and opencast as well as underground mining operations are envisaged. The opencast mine has an expected life of 30 years with the production off approximately 3 000 000 tons/ annum. The underground portion of the mine has the same expectancy. This project is an extension of the existing mining operations at Usutu West Colliery. The colliery has an existing access to the N2 just west of the access to the Camden Power Station.

A traffic assessment was conducted by Via Magna for the relocation of the Camden Power Station access in June 2012. The reason for the relocation of the access on the N2 was to mine the coal underlying the existing access road to Camden Power Station. The intention is to relocate the access approximately 1km (towards Witpuntspruit).

The proposed relocation was approved by SANRAL subject to a number of conditions. One of the conditions is that the Usutu West Colliery access (current access to the mine) must be relocated at the same time that the Camden Power Station access is relocated.

The extension of the mine requires a separate access for mining activities in Block D on the N2. This was discussed with SANRAL and an access could be supported, again subject to conditions that will be imposed if the access is approved.

The mine is not a land use for which trip generation figures are available in the “SA Trip Generation Rates”. The trip generation will be based on employment figures and operational information provided to the sub-consultant

for the project. Shift changes times and the method of moving product between the mine and Camden Power Station plays a major role in the trip generation. In this instance the mine is and existing operation with trucks delivering coal to Camden Power Station. This will continue with between 120 and 150 thirty ton truckloads per day for 24 hour operations.

12.10 Land capability assessment

The soils vary somewhat in physical and chemical composition over the different areas, are strongly influenced by the parent materials (geology) from which they are derived, as well as by their position in the topography and the origin of the soils (in-situ versus colluvial derived).

The major soil forms that occur on the proposed development are as follow:
On the crests and mid-slopes the typical catena is Glencoe soils followed by Avalon soils on the lower mid- and foot-slopes and then Westleigh, Longlands, Katspruit and Rensburg soils associated with wetlands.

Glencoe (Gc)

The Glencoe soils have an Orthic A Horizon over a Yellow Brown Apedal B Horizon over Hard Plinthite. The average depth of the Glencoe soils range from 30-60cm on the crests to 60-90cm on the mid-slopes. Sub-dominant to Glencoe soils are Clovelly soils and shallow Dresden with hard rock and/or hard plinthite in the sub soil.

RECOMMENDATION: Suitable for irrigation development. Good irrigation/water management needed. The soils shallower then 40cm is suitable for grazing only.

Avalon (Av)

The Avalon soils have an Orthic A Horizon over a Yellow Brown Apedal B Horizon over Soft Plinthite. The average depth of the Avalon soils Glencoe soils range from 60-90cm on the mid- and foot-slopes. Sub-dominant to Avalon soils are Longlands soils on the foot-slopes.

RECOMMENDATION: Cultivation of dry land agriculture is possible. Under irrigation these soils become wetter for prolonged periods, giving rise to a rise in the water table, and occasional waterlogged conditions develop for extended periods if not well managed (drainage installed).

Westleigh (We)

The Westleigh soil has an Orthic A Horizon over a soft Plinthic B horizon with some signs of wetness in the sub-soil. The depth ranges from 0—60cm depending on the wetness of the soil. Sub dominant to the Westleigh soils are Longlands, Katspruit and Rensburg soils forms.

The abovementioned soils forms are by definition soils with hydromorphic characteristics and all associated with wetland conditions.

RECOMMENDATION: Unsuitable for irrigation. It is marginal for dry land crop production due to position in the landscape. These soils should not be disturbed and are classified as wetland soils.

13. DESCRIPTION OF ENVIRONMENTAL IMPACTS (Reg 31(2)(k))

13.1 Water resources

13.1.1 Impact on ground water levels

Table 19: Impacts on dewatering of the groundwater aquifer

Activity	**Depletion of the underground aquifer Lowering of ground water levels**			
Nature of the impact	Dewatering during operational phase of the mine		Status	-
Receiving environment	Underground aquifer			
Magnitude	Extent (footprint; site; regional; national; international)		REGIONAL	
	Intensity (low; medium; high)		HIGH	
	Duration (short; short-med; medium; long; permanent)		LONG TERM	
	Probability (Improbable; possible; likely; highly likely; definite)		DEFINITE	
Weighting factor (WF)	WF (low; low-medium; medium; medium-high; high)		HIGH	
Mitigation Efficiency (ME)	ME (high; medium-high; medium; low-medium; low)		LOW	
Significance	Without mitigation (WOM)	(Extent + Intensity + Duration + Probability) x Weighting Factor (3 + 5 + 4 + 5) x 5 = 85 Medium		
	With mitigation (WM)	WOM x ME = WM 85 x 1.0= 85 Medium		
Significance With Mitigation (WM)	MEDIUM			

Source of impact:

Opencast and underground coal mining operations on at the Usutu colliery site.

Description of impact:

Mining operations may lead to the dewatering of areas surrounding the main mining area during the operational phase of the mine. The dewatering of areas surrounding the orebody may in turn lead to the influx of water into the incline and areas below surface level, during the operational phases of the Usutu mining operation. Ground water modelling was undertaken to determine the influx of water into the box cuts.

Significance:

The Significance of the impact is assessed as medium. Further modelling is required to refine the predictions.

Mitigations:

Lowering of groundwater levels during mining:

Since the drawdown or the groundwater levels during mining could influence some boreholers, the following measures are recommended:

- The static level of groundwater in all boreholes within a distance of less than one kilometers must be measured regularly to establish a database against which future groundwater levels can be compared;
- Such measurements must be made preferably quarterly, but at least twice annually following the dry and rainy seasons;
- In the event of an unacceptable decrease of the yield of any affected boreholes, alternative water supply be supplied to the affected parties until such time that the groundwater recovers following closure of the pit;
- As the wetland could be affected, monitoring of the wetland is essential. Should clean mine water be available, it is suggested that it be released in the wetland. A wetland specialist should be consulted to ensure correct volumes and timing of the added water;
- It is recommended that the closets box cut to the Witpuntspruit and wetland keep a distance of at least 150m from the edge of the wetland; and
- Another very important aspect to consider is the layout and order to the opencast cuts. The best possible scenario for minimizing impacting on the wetland / Witpuntspruit is to start the box cut parallel to the wetland / stream and at the farthest point from the wetland. In such a mining scenario the impact on the wetland will be delayed to the latest possible time before closure of the opencast.

13.1.2 Ground and surface water contamination

Acid Rock Drainage (ARD) is a natural process whereby sulphuric acid is produced when sulphides in rocks are exposed to air and water. Acid Mine Drainage (AMD) is essentially the same process, greatly magnified. When large quantities of rock containing sulphide minerals are excavated from an open pit or opened up in an underground mine, it reacts with water and oxygen to create sulphuric acid. Acid is carried off the mine site by rainwater or surface drainage and deposited into nearby streams, rivers, lakes and groundwater. AMD can severely degrade water quality, and can kill aquatic life and make water virtually unusable.

Table 20: The impact on ground and surface water by migration of contaminated water from the mining operations

Activity	**Contamination of the underground aquifer and surface water resources**			
Nature of the impact	Seepage from mining operations etc. and pollution form vehicles operating on site		**Status**	**-**
Receiving environment	**Underground aquifer and surface water resources**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**REGIONAL**	
	Intensity (low; medium; high)		**MEDIUM**	
	Duration (short; short-med; medium; long; permanent)		**PREMANENT**	
	Probability (Improbable; possible; likely; highly likely; definite)		**DEFINITE**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**MEDIUM HIGH**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**LOW**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (3 + 3 + 5 + 5) x 4 = 64 Medium High**		
	With mitigation (WM)	**WOM x ME = WM 64 x 1.0= 64 Medium High**		
Significance With Mitigation (WM)	**MEDIUM HIGH**			

Source of impact

Seepage from the stockpiles and AMD from mining operations causes a contamination plume affecting the underground resources which in turn affects surface water resources. Contamination may also occur directly into surface watercourses.

Hydrocarbon-based fuels or lubricants spilled from construction vehicles.

Description of the impacts

Surface mining generally removes 90% or more of the coal (which often contains the highest sulphide content and hence the acid-producing potential) thereby leaving little in the backfill for continued reaction and acid generation. Pyrite is often dispersed among other rocks above and below the coal seam. The pyrite-bearing rocks and coal left behind are broken apart by blasting giving high surface area, and the acid products are leached fairly rapidly, typically within 10 to 20 years (Demchak et al, 2004). Carbonate rocks within the overburden may neutralise some or all of the AMD generated during surface mining. Special handling of toxic materials may reduce the amount of pyrite oxidized, and the addition of alkaline material during mining may neutralize acid *in situ*, both of which decrease the total acid load coming from the site (Demchak et al, 2004). During the ensuing 20 yr after reclamation, discharge water quality may reach pre-mining levels.

Hydrocarbon-based fuels or lubricants spilled from construction vehicles, construction materials that are not properly stockpiled and litter deposited by construction workers may also be washed into the surface water bodies. Should appropriate toilet facilities not be provided for construction workers at the construction crew camps, the potential exists for surface water resources and surroundings to be contaminated by raw sewage. The utilisation of the water courses for disposal of water used for washing will decrease the abundance and diversity of aquatic macroinvertebrates inhabiting wetlands associated with the proposed development and further downstream. Contaminated runoff from concrete mixing and sediment release including hydrocarbon spillages may lead to the infiltration of toxicants into the groundwater.

Significance:

The significance is assessed to be medium high.

Mitigation:

- To assess the impacts of the stockpile area on the groundwater regime a groundwater analysis need to be undertaken;
- A contaminant plume after 5, 10, 15, years should be modeled. Contaminated groundwater from the stockpile area will migrate and this assessment need to determine the direction and propose possible mitigation measures;
- The contaminant plume could result in an impact on downstream water bodies, aquatic ecosystems and surrounding landowners, especially in the long term (more than 50 years);
- Disposal of coal stockpile on natural clay;
- Management of the stockpile in accordance with Section 73 of the MPRDA Regulations (No. R527, 2004).
- Vehicles are to be maintained in good working order so as to reduce the probability of leakage of fuels and lubricants.

- A walled concrete platform, dedicated store with adequate flooring or bermed area should be used to accommodate chemicals such as fuel, oil, paint, herbicide and insecticides, as appropriate, in well-ventilated areas.
- Storage of potentially hazardous materials should be above any 100-year flood line, or as agreed with the Environmental Controlling Officer. These materials include fuel, oil, cement, bitumen etc.
- Surface water draining off contaminated areas containing oil and petrol would need to be channelled towards a sump which will separate these chemicals and oils.
- All materials prone to spillage are to be stored in appropriate structures with impermeable flooring.
- Portable septic toilets are to be provided and maintained for construction crews. Maintenance must include their removal without sewage spillage.
- Under no circumstances may ablutions occur outside of the provided facilities;
- No uncontrolled discharges from the construction crew camps to any surface water resources shall be permitted. Any discharge points need to be approved by the relevant authority.
- In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs must be informed immediately.
- Store all litter carefully so it cannot be washed or blown into any of the water courses within the study area.
- Provide bins for staff at appropriate locations, particularly where food is consumed; the construction site should be cleaned daily and litter removed.
- Conduct ongoing staff awareness programs so as to reinforce the need to avoid littering.

Table 21: Assessment of the possible impacts on surface water during the construction and operational phase

Activity	**Pollution of surface water**			
Nature of the impact	Discharge and/or seepage of process water from the plant area.		**Status**	**-**
Receiving environment	**Surface Watercourses and the Underground aquifer**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**SITE**	
	Intensity (low; medium; high)		**HIGH**	
	Duration (short; short-med; medium; long; permanent)		**LONG TERM**	
	Probability (Improbable; possible; likely; highly likely; definite)		**LIKELY**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**LOW**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**HIGH**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (2 + 5+ 4+ 3) x 1 = 14 Low**		
	With mitigation (WM)	**WOM x ME = WM 14 x 0.2 = 2.8 Low**		
Significance With Mitigation (WM)	**LOW**			

Source of impact:

Discharge and or seepage of process water from the plant area.

Description of impact:

Construction phase:

It should be noted that the mine is located in an area classified as a high yield area that needs to be conserved. During the construction phase, the catchment yield (mean annual runoff) will be affected as construction activities within the footprint of the mining area could cause pollution. This water needs to be retained in a pollution control or storm water dam which will result in a decrease in storm water runoff.

Operational phase:

Opencast and proposed underground mining activities will increase the surface water pollution threat. Water found or contained within the open pit to be used for re-cycling and for coal washing purposes is characterised by elevated levels of nitrate, sodium, sulphate, hardness and conductivity. Exposure of "fresh" weathered overburden materials to natural elements such as water and oxygen might have the potential to accelerate the acidification of pyritic material by the generation of Acid Rock Drainage (ARD) leachate with the concomitant decrease in pH and mobilization of metals such as Fe, Al and Mn.

Significance:

The impact on surface water quality will be negative, possible of medium term duration low magnitude, may extent from the site and is of low significance overall. Mitigation will be required.

Mitigation:

- Prevention of overspill of mining activities, and associated activities into the surrounding streams and rivers. Implementation of the necessary monitoring and management programmes to ensure the integrity of all water resources in the area during the construction, and operational lifespan of the mine;
- Containment of return waters in a clay lined return water dam;
- Re-cycling of contaminated runoff waters from lined settling and evaporation dams;
- Sealing of process waters circuit and containment structures;
- Separate clean and dirty water systems; and
- Provide sufficient storage capacity to contain contaminated waters i.e. adopt a zero discharge policy.

Table 22: Destruction of Wetland Habitat

Activity	**Mining Activities and construction of an access road during the Operational Phase**			
Nature of the impact	**Destruction of Wetland Habitat**		**Status**	**-**
Receiving environment	**Wetlands on the Usutu Site**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**SITE**	
	Intensity (low; medium; high)		**HIGH**	
	Duration (short; short-med; medium; long; permanent)		**PERMANENT**	
	Probability (Improbable; possible; likely; highly likely; definite)		**LIKELY**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**HIGH**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**MEDIUM**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (2 + 5+ 5+ 3) x 5 = 75 Medium – High**		
	With mitigation (WM)	**WOM x ME = WM 75 x 0.6 = 45 Medium**		

Significance With Mitigation (WM)	**MEDIUM**

Source of impact:

Mining activities and construction of an access road during the Operational Phase

Description of impact:

Wetland habitat in the region of the study site shelters several sensitive faunal and invertebrate species. Cumulative disturbance of the natural vegetation cover in the wetland areas and also in the surrounding landscape will result in the eventual loss of this habitat type, and consequently to the loss of the species dependant on the vegetation cover.

Significance:

The overall significance of the impact on the wetland habitats is considered to be medium after the implementation of mitigation measures.

Mitigation:

- No mining activities should take place within buffered the wetland areas or in their associated buffer zones.
- Wetland areas and their associated buffer zones should be fenced during the construction phase to prevent any human activity from encroaching onto these areas.
- Wetland areas outside the study area that are affected by access to the site by machinery and the labour force should also be fenced off and protected.
- No animals may be trapped, hunted or handled in any way.
- No vegetation may be collected or used for firewood.

Table 23: Altered Hydrological Regime

Activity	**Mining Activities during the Operational Phase**			
Nature of the impact	**Altered Hydrological Regime**		**Status**	**-**
Receiving environment	**Water resources associated with the Usutu site**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**SITE**	
	Intensity (low; medium; high)		**HIGH**	
	Duration (short; short-med; medium; long; permanent)		**LONG**	
	Probability (Improbable; possible; likely; highly likely; definite)		**HIGHLY LIKELY**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**HIGH**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**MEDIUM**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (2 + 5+ 4+ 4) x 5 = 75 Medium – High**		
	With mitigation (WM)	**WOM x ME = WM 75 x 0.6 = 45 Medium**		
Significance With Mitigation (WM)	**MEDIUM**			

Source of impact:
Mining activities during the operational phase.

Description of impact:
The location of the study site in relation to the catchment area of water bodies surrounding the study site mean that the proposed coal mining activities potentially expose surrounding water users to severe water quality concerns. The significance of this potential impact should be quantified by means of a detailed geohydrological assessment which describes the hydrological linkages between pans and regional aquifers.

Significance:
The overall significance of the impact on the hydrological regime is considered to be medium after the implementation of mitigation measures.

Mitigation:

- In order to minimise artificially generated surface stormwater runoff, total sealing of paved areas such as parking lots, pavements and walkways should not be permitted. Permeable material should rather be utilized for these purposes.
- Establish water quality parameters before mining activities commence which can serve as future benchmark data against which regular water quality monitoring can be measured to determine the impact of the mining activities on the regional aquatic resources.
- Implement an ecologically-sensitive stormwater management plan that includes not allowing stormwater to be discharged directly into the identified buffer zone of the wetland area.

13.2 Air quality

13.2.1 Air Quality deterioration

Table 24: Assessment of the possible impacts on air quality during the construction and operational phase

Activity	**Atmospheric pollution associated with coal transport, waste stockpiles, uncontrolled spillages, disturbed land and vehicles on un-surfaced roads. Emissions from ventilating systems.**			
Nature of the impact	**Pollution and nuisance from dust emissions.**		**Status**	**-**
Receiving environment	**The immediate and surrounding land owners**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**REGIONAL**	
	Intensity (low; medium; high)		**MEDIUM**	
	Duration (short; short-med; medium; long; permanent)		**LONG-TERM**	
	Probability (Improbable; possible; likely; highly likely; definite)		**HIGHLY LIKELY**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**LOW MEDIUM**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**MEDIUM HIGH**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (3 + 3+ 4+ 4) x 2 = 28 Low to Medium**		

	With mitigation (WM)	**WOM x ME = WM 28 x 0.4 = 11.28 Low**
Significance With Mitigation (WM)	**LOW**	

Significance

- Materials Handling Operations:

Materials handling operations associated with mining and predicted to result in significant fugitive dust emissions include the transfer of material by means of tipping, loading and off-loading trucks. A temporary storage pile will be located near the mining process and heavy vehicles will transport materials from this stockpile area to the processing plant.

- Wind erosion from exposed areas:

The source that was identified to be significantly prone to wind erosion was the stockpile area. However, studies at other mines have also indicated that the topsoil and overburden stockpiles will be affected.

- Vehicle activity on paved roads:

The client intents to make use of 60 000t vehicles to transport material to the process plant area. Currently there is not a lot of vehicle movement on the portion identified for mining, although areas to the southeast (near the silos) are affected by vehicles accessing and leaving the coal loading site. These vehicle movements generate dust which contributes to the overall air quality in the area.

- Synopsis of Particulate Emissions from various sources:

Dust emissions from material handling represent the largest source of emissions, constituting 87% of the total TSP emissions and 84% PM_{10}. Wind erosion of open areas is calculated to contribute 12% of total TSP fugitive dust emissions and 9% to PM_{10}. Dust generated from processing was found to comprise generally less than 5% of the total TSP and PM_{10} fugitive dust emissions. Paved roads are the least contributing source to both TSP and PM_{10}, with emissions being less than 1% of the total TSP en PM_{10} fugitive dust emissions.

Description of the impact:

Dust emissions will impact on the ambient air quality of the region and contribute to cumulative impacts of mine activities on the air quality (cumulative impacts are discussed in a later section).

Significance:

- PM_{10}

The predicted mitigated daily average ground level concentrations for the proposed operations at the Usutu opencast and underground coal mine is not expected to exceed the current daily South African standard of 180µg/m^3 or the proposed South African standard of 75µg/m^3 at the mine boundary or at the sensitive receptor sites surrounding the mine.

The predicted annual average ground level concentrations for the proposed Usutu opencast and underground coal mine do not exceed the current annual South African standard of 60µg/m^3 and the proposed South African standard of 40µg/m^3 outside the mine boundary.

- Dust Deposition

The predicted mitigated maximum daily dust deposition rates for the proposed operations do not exceed the SANS residential dust fallout limit of 600mg/m^2/day and the SANS annual target threshold of 300mg/m^2/day at all the sensitive receptor sites surrounding the proposed mine.

Mine operations (stockpiling and processing) were identified as having the most significant potential for air pollution however with the implementation of mitigation measures as recommended in the EMP will significantly reduce the impact. The roads in the study area are to be tarred so as to reduce the impact of dust associated with movement of vehicles on dirt roads. The impact of air quality as a result of materials handling on conveyors is not expected to pose an impact because the conveyors will not be used for the larger mining area.

Mitigation:

Dust suppression activities are required during the construction and operational phase in order to minimise dust generation. Air quality is a requirement as per the EMP.

13.3 Flora and fauna

13.3.1 Destruction of Flora and Fauna

Table 25: Destruction of sensitive vegetation types and protected plant and animal species

Activity	**Impacts on Rare and Endangered Flora and Fauna**			
Nature of the impact	**Vegetation clearance, habitat destruction and disruption of natural behaviour**		**Status**	**-**
Receiving environment	**Faunal and Floral Species located on site**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**SITE**	
	Intensity (low; medium; high)		**HIGH**	
	Duration (short; short-med; medium; long; permanent)		**PERMANENT**	
	Probability (Improbable; possible; likely; highly likely; definite)		**PROBABLE**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**LOW MEDIUM**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**LOW MEDIUM**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (2 + 5+ 5+ 1) x 2 = 26 Low to Medium**		
	With mitigation (WM)	**WOM x ME = WM 26 x 0.4 = 10.4 Low**		
Significance With Mitigation (WM)	**LOW**			

Source of impact:

- The clearance of vegetation on the proposed site during construction of mining infrastructure such as the plant area, change houses, offices and workshops.
- Clearing of vegetation for the construction of roads from the box cut and opencast operations and the processing area;

- The clearing of vegetation for the construction camp, temporary access onto the site, spoil areas, materials storage and topsoil stockpiles.

Description of the impact:
Construction will destroy natural vegetation and alter the habitat in such a way that species cannot colonise the area. This could lead to certain species becoming rare in the local context.

Significance
Overall the site is poorly conserved with large portions utilised for agricultural purposes including maize farming. The agricultural fields are separated by open savannah patches, in which numerous small mammal and bird species are present. In light of the fact that most of the site is disturbed and fragmented and has been converted to farmland in the past or is currently under cultivation the proposed mining operations will not have a significant detrimental impact on the terrestrial ecology of the site.

The development of the Vunene Colliery (Pty) Ltd surface infrastructure will result in a loss of plant and animal habitats at the site of the surface infrastructure. Unnecessary habitat disturbance by the Vunene Colliery (Pty) Ltd mining and processing activities will be limited and contained to the construction area.

The area surrounding the proposed mining operations has been fragmented by linear infrastructure such as roads, conveyor belts and other land uses such as agriculture. Fragmentation of plant habitats can lead to attrition of the communities occupying these habitats. Vehicles travelling off road can lead to further fragmentation of plant habitats.

Disturbed land is susceptible to colonisation of invader species. The invader species can spread on to surrounding land and disrupt natural plant communities. Timeous rehabilitation of disturbed land is required to reduce the potential for invader species to proliferate on the land. Care should also be taken to ensure that species used in rehabilitation programmes are not invasive.

Plant and animal communities are likely to be adversely affected by contamination of habitats. Contamination of water on site (especially in the sensitive B11B quaternary catchment area within Water Management Area 4, which is known as the Olifants water management catchment area) is of greatest concern in this respect and could result in a decrease in the diversity of communities in the aquatic and riparian zones along the Olifants water management catchment area, if not managed properly.

Mitigation:
- Prevention of overspill of the mining activities onto the surrounding environment by making sure that clearance is only confined to the proposed site;
- Access roads should be kept to a minimum, and where possible existing tracks should be used;
- New access roads should be aligned so as to remain on the flattest terrain possible for as long as possible;
- Roads should not be constructed in wetlands, rivers or streams or dry watercourses or within the 1:100 years floodline of any of these unless no other alternative can be found. Where roads must be constructed through these areas, sufficient culverts should be provided to allow water to flow through;

- Construction vehicles should remain only in the area to be disturbed by the road and other works at the time. Disturbance should be restricted to the actual project area;
- The use of herbicides should be limited as far as possible. Herbicides should only be used under strict control and only when no other options are available. Herbicides should not be used near sensitive environments especially wetland areas;
- Materials such as sand and stone should, wherever possible, be sources from areas which are free of alien plants;
- An important aspect of ongoing maintenance is the monitoring of the rehabilitated sites and access road verges for alien plant species; and
- Should alien plant species be identified then these should immediately be removed.

13.3.2 Destruction of Habitat

Table 26: Destruction of natural habitat

Activity	**Construction and operational activities**			
Nature of the impact	**Vegetation clearance and habitat destruction**		**Status**	**-**
Receiving environment	**Usutu Site**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**SITE**	
	Intensity (low; medium; high)		**MEDIUM**	
	Duration (short; short-med; medium; long; permanent)		**PERMANENT**	
	Probability (Improbable; possible; likely; highly likely; definite)		**LIKELY**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**LOW MEDIUM**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**LOW MEDIUM**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (2 + 3+ 5+ 3) x 2 = 26 Low to Medium**		
	With mitigation (WM)	**WOM x ME = WM 26 x 0.4 = 10.4 Low**		
Significance With Mitigation (WM)	**LOW**			

Source of impact:

- The clearance of vegetation on the proposed site during construction of mining infrastructure such as the plant area, change houses, offices and workshops.
- Clearing of vegetation for the construction of roads from the box cut and opencast operations and the processing area;
- The clearing of vegetation for the construction camp, temporary access onto the site, spoil areas, materials storage and topsoil stockpiles.

Description of the impact:

Due to the nature of the construction activities across the site, even with mitigation much of the existing natural habitat will be destroyed. Heavy motor vehicle usage over the study site and adjacent land will expose the soils

on the site to erosion and compaction. This will have a negative effect on the terrestrial ecosystems and wetlands in that siltation and habitat fragmentation could occur.

Significance

It should however be noted again that a large proportion of the site is currently cultivated and only a small percentage of natural habitat remains on site. The significance of this impact with mitigation measures is thus given as low.

Mitigation:

- Cordon off the sensitive vegetation (hydrophilic and primary grassland) to restrict the movement of construction vehicles and construction personnel.
- Construction areas should be inspected for any occurrence of erosion. Appropriate remedial action (rehabilitation) must be undertaken should any eroded areas be identified.
- Areas designated as sensitive should be incorporated into an open space system which must be managed in accordance with an Environmental Management Plan.
- A comprehensive surface runoff and storm water management plan should be compiled, indicating how all surface runoff generated as a result of the development (during both the construction and operational phases) will be managed.
- No development should take place within any area demarcated as sensitive.

13.3.3 Destruction of faunal habitat and faunal displacement

Table 27: Destruction of natural habitat and displacement of species

Activity	**Construction and operational activities**			
Nature of the impact	**Destruction of faunal habitat faunal displacement**		**Status**	**-**
Receiving environment	**Usutu Site**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**SITE**	
	Intensity (low; medium; high)		**MEDIUM**	
	Duration (short; short-med; medium; long; permanent)		**PERMANENT**	
	Probability (Improbable; possible; likely; highly likely; definite)		**LIKELY**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**LOW MEDIUM**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**LOW MEDIUM**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (2 + 3+ 5+ 3) x 2 = 26 Low to Medium**		
	With mitigation (WM)	**WOM x ME = WM 26 x 0.4 = 10.4 Low**		
Significance With Mitigation (WM)	**LOW**			

Source of the impact

Destruction of faunal habitat and the displacement of species from their traditional home ranges during the construction phases of the proposed mining activity.

Description of the impact

Faunal species could be displaced during the construction phase. This could result in higher than normal social, grazing and browsing pressures on areas that would otherwise not have these impacts. This could result in degraded vegetation cover in areas that the life stock has moved to and a depauperation in the associated habitat i.e. from trampling, erosion, grazing or browsing and other forces.

Significance

The significance of the impact is expected to be of a medium significance without mitigation, this due to the displacement of faunal species from their habitats on site to allow for the building of the proposed development. With mitigation the significance of the impact will be reduced to that of a low significance.

Mitigation

- Minimising the loss of flora and fauna in areas that are not directly affected by the new development;
- Reduce the levels of disturbance on the area during construction;
- All construction areas should be suitably top soiled and vegetated as soon as is possible after construction; and
- Disturbed surfaces to be rehabilitated must be ripped, and the area must be backfilled with topsoil or overburden.

13.3.4 Reduction of Natural Migratory Routes

Table 28: Reduction of natural migratory routes and faunal dispersal routes

Activity	**Construction and operational activities -Vegetation clearance and habitat destruction**			
Nature of the impact	**Fragmented Landscape**		**Status**	**-**
Receiving environment	**Usutu Site**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**REGIONAL**	
	Intensity (low; medium; high)		**MEDIUM**	
	Duration (short; short-med; medium; long; permanent)		**LONG**	
	Probability (Improbable; possible; likely; highly likely; definite)		**LIKELY**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**LOW MEDIUM**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**LOW MEDIUM**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (3 + 3+ 4+ 3) x 2 = 26 Low to Medium**		
	With mitigation (WM)	**WOM x ME = WM 26 x 0.4 = 10.4 Low**		
Significance With Mitigation (WM)	**LOW**			

Source of impact:

- The clearance of vegetation on the proposed site during construction of mining infrastructure such as the plant area, change houses, offices and workshops.
- Clearing of vegetation for the construction of roads from the box cut and opencast operations and the processing area;
- Clearing of vegetation for the establishment of the opencast operations;
- The clearing of vegetation for the construction camp, temporary access onto the site, spoil areas, materials storage and topsoil stockpiles.

Description of the impact:

The grassland and hydrophilic vegetation on site provides habitat for faunal species and links the area with other areas of open space. They are therefore able to provide important migration corridors and dispersal patterns for faunal species by linking various sections of open land that would otherwise be fragmented from one another. Should construction occur, the possibility that the connectivity between areas of open space and therefore the migration corridor, would be lost, is high.

The wetlands on site furthermore provide unique habitat for faunal species and links the aquatic and terrestrial areas with other areas of open space. They are therefore able to provide important migration corridors for faunal species by linking various sections of open land that would otherwise be fragmented from one another. Should construction and mining occur, the possibility that the connectivity between these wetlands, and therefore the migration corridor, would be lost is high.

Mitigation:

- The Ecological assessment conducted in terms of the Usutu site suggests the demarcation of ecological corridors to link sensitive habitats. This should be implemented where possible and where agricultural activities have not impacted on the natural environment.

13.3.5 Increase in exotic vegetation

Table 29: Impact on increase in exotic vegetation

Activity	**Construction and operational activities -Vegetation clearance and habitat destruction**		
Nature of the impact	**Increase in exotic vegetation**	**Status**	**-**
Receiving environment	**Usutu Site**		
Magnitude	**Extent (footprint; site; regional; national; international)**		**REGIONAL**
	Intensity (low; medium; high)		**MEDIUM**
	Duration (short; short-med; medium; long; permanent)		**LONG**
	Probability (Improbable; possible; likely; highly likely; definite)		**LIKELY**
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**LOW MEDIUM**
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**LOW MEDIUM**
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (3 + 3+ 4+ 3) x 2 = 26 Low to Medium**	

	With mitigation (WM)	**WOM x ME = WM 26 x 0.4 = 10.4 Low**
Significance With Mitigation (WM)	**LOW**	

Source of impact:

Landscaping associated with the development during the operational phase could cause an increase in the exotic vegetation on the site.

Description of the Impact:

Operational Phase

Exotic vegetation may be introduced to the environment via rehabilitation activities. If no mitigation is present some of these plants may further spread into the surrounding area increasing the opportunity for exotic plants to invade the surrounding vegetation.

Significance:

Processes such as urbanisation, acceleration of agricultural production and industrialisation have a drastic impact on terrestrial ecosystems through degradation, alteration of processes and the introduction (both intentional and unintentional) of many exotic species. In order to prevent the further destruction of the ecosystem, it is important to plan and co-ordinate human activities and development so as to include studies of the natural environment involving soil, water, floral, faunal and cultural or historical aspects.

The impact is considered to have a low significance based on the impact identification matrix. The key impact is the rehabilitation associated with the mining and rehabilitation phase could cause an increase in the exotic vegetation on the site.

Mitigation measures have been set out in the Environmental Management Plan (See Annexure 5: Environmental Management Programme (EMPr)). The impacts will become more pronounced if the suggested mitigation measures are not implemented.

Mitigation:

- Minimising the loss of indigenous flora and fauna in areas that are not directly affected by the opencast mining of coal;
- Reduce the levels of disturbance on the area during mining;
- All mining areas should be suitably top soiled and vegetated as soon as is possible after mining; and
- Disturbed surfaces to be rehabilitated must be ripped, and the area must be backfilled with topsoil or overburden.
- Footprint size should be kept at a minimum so as to maintain as much natural vegetation cover as possible;
- Only vegetation indigenous to the area should be considered for rehabilitation purposes; and
- Wastewater limit values applicable to discharge of wastewater into watercourses as stipulated by the Department of Water Affairs and Forestry should be strictly adhered to.

13.3.6 Disturbance of fauna and flora

Table 30: Impact on the disturbance of flora and fauna

Activity	Construction and operational activities -Vegetation clearance and habitat destruction			
Nature of the impact	Disturbance of flora and fauna		Status	-
Receiving environment	Usutu Site			
Magnitude	Extent (footprint; site; regional; national; international)		REGIONAL	
	Intensity (low; medium; high)		MEDIUM	
	Duration (short; short-med; medium; long; permanent)		LONG	
	Probability (Improbable; possible; likely; highly likely; definite)		LIKELY	
Weighting factor (WF)	WF (low; low-medium; medium; medium-high; high)		LOW MEDIUM	
Mitigation Efficiency (ME)	ME (high; medium-high; medium; low-medium; low)		LOW MEDIUM	
Significance	Without mitigation (WOM)	(Extent + Intensity + Duration + Probability) x Weighting Factor (3 + 3+ 4+ 3) x 2 = 26 Low to Medium		
	With mitigation (WM)	WOM x ME = WM 26 x 0.4 = 10.4 Low		
Significance With Mitigation (WM)	LOW			

Source of impact

Human encroachment and movement could disturb the occurrence of flora and fauna on the site.

Description of impact

Fauna and flora within the area may be disturbed by the mining activities on the site and on the property as a whole e.g. firewood collection, flower picking interfering with wildlife etc. This, if not controlled properly can lead to an impoverished ecosystem and reduction in biodiversity.

Significance:

The impact is considered to have a medium significance based on the impact identification matrix. The key impact is that human encroachment during the operational phase could disturb the occurrence of flora and fauna on the site.

Mitigation measures have been set out in the Environmental Management Plan (See Annexure 5: Environmental Management Programme (EMPr)). The impacts will become more pronounced if the suggested mitigation measures are not implemented.

Mitigation:

- Minimising the loss of indigenous flora and fauna in areas that are not directly affected by the new development;
- Reduce the levels of disturbance on the area during construction;

- All construction areas should be suitably top soiled and vegetated as soon as is possible after mining;
- Disturbed surfaces to be rehabilitated must be ripped, and the area must be backfilled with topsoil or overburden.
- Footprint size should be kept at a minimum so as to maintain as much natural vegetation cover as possible;
- Only vegetation indigenous to the area should be considered for rehabilitation purposes; and
- Wastewater limit values applicable to discharge of wastewater into watercourses as stipulated by the Department of Water Affairs and Forestry should be strictly adhered to.

13.4 Noise

13.4.1 Increased Noise and vibration

Table 31: Assessment of the possible impacts on Noise and Vibration during the construction and operational phase

Activity	**Noise generation on site during the construction and operational phase**			
Nature of the impact	**Blasting and construction activities which generate noise that exceeds the current ambient noise levels experienced over the site and surrounding areas**		**Status**	**-**
Receiving environment	**Machine operators and workers, surrounding communities**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**REGIONAL**	
	Intensity (low; medium; high)		**LOW**	
	Duration (short; short-med; medium; long; permanent)		**LONG-TERM**	
	Probability (Improbable; possible; likely; highly likely; definite)		**HIGHLY LIKELY**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**LOW MEDIUM**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**MEDIUM HIGH**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (3 + 1+ 4+ 4) x 2 = 24 Low to Medium**		
	With mitigation (WM)	**WOM x ME = WM 24 x 0.4 = 9.6 Low**		
Significance With Mitigation (WM)	**LOW**			

Source of the impact:

Possible sources of disturbing noise of the Vunene Colliery (Pty) Ltd are listed in table 30. Of these sources, those with the greatest potential to be disturbing are:

- Increase noise levels from vehicular traffic and other equipment associated with the construction of the proposed mine; and
- Vibrations and noise associated with blasting.

Table 32: Possible sources of noise at the Vunene Colliery (Pty) Ltd Usutu mine and the potential affected parties

Process	Noise source	Mitigation
Mine workings	Drilling, blasting, loading and hauling	Hearing protection provided
Waste dumps	Dumping and falling of rocks	Residual sound levels are less than 60dBA at a distance of 100m from the noise source
Transport	Cars, busses and other heavy vehicles	Silencers
Villages, hostels and settlements	General domestic activity	

Description of the impact

Noise levels within the mining lease area are expected to range from 40 dBA to 50 dBA in the agricultural and residential areas, to be between 60 dBA and 70 dBA in areas where the predominant activity is mining related. Sensitive environments e.g. schools and residences; situated near the mining activities may be disturbed by these noise levels. Noise levels outside the mining lease area are expected to be lower than within it.

Considering the general trend whereby sound power levels decrease by 6 dBA with every doubling of distance from the source, it is expected there will be a significant decrease with an increase in distance beyond 50m from the noise source.

Machine operators and workers who work in the noise zones and / or with the noise sources above 85 dBA, and who do not wear approved hearing protection, will suffer permanent hearing loss.

Significance:

- The activity will have moderate significance on the surrounding environment. A blasting schedule will be implemented so that blasting occurs once a day at 4pm.

Mitigation:

- Ensure that all machinery and vehicles are well maintained and road worthy;
- Noise at equipment and machinery point source should be damped through acoustic treatment and applying silencing equipment;
- Environmental noise monitoring should be carried out at regular intervals to detect deviations from predicted noise levels and enable corrective measures to be taken where warranted;
- Regularly conduct noise audits on site;
- Erect warning signs where noise levels exceeds 85 dBA noise levels;
- Atmospheric conditions should be considered before charging and blasting;
- Blasting vibrations should be controlled by means of optimising blast hole geometry and altering the time of blasting;
- Implement a dust and noxious gases minimisation strategy that will reduce the impact of atmospheric pollution. This will include the use of noxious gas fixation techniques, using and adhering to blasting schedules, and strategies that minimise dust generation;

- Affected communities must be notified when blasting is scheduled to take place;
- Workers must be issued with the necessary protective equipment, including ear plugs, when working in conditions that may progressively have detrimental effects on their health. Ensure that all personnel have access to hearing protection equipment at site where the 85 dBA noise level is frequently recorded. Issuing of hearing protection will conform to the Vunene Colliery (Pty) Ltd strategy';
- All employees, who operate machines / tools which are identified as noise sources, should be subjected to audiometric examinations;
- All hand held machinery will be muffled;
- All fans to be silenced;
- If complaints about disturbing noise are received from the local community, Vunene Colliery (Pty) Ltd will:
    - Respond immediately to the complaints;
    - Identify the noise source;
    - Implement appropriate mitigatory measures in consultation with the affected party;
    - The responsible environmental officer will investigate all complaints and /or non-compliances and the necessary actions will be taken.

13.5 Visual impact

13.5.1 Change in Visual character of the area

Table 33: Assessment of the possible impacts on visual aspects

Activity	Construction of mining related infrastructure and visibility of mining structures			
Nature of the impact	Disturbance of existing aesthetic environment as a result of visibility of the overburden stockpiles and other mine infrastructure		Status	-
Receiving environment	Visual receptors such as the surrounding communities			
Magnitude	Extent (footprint; site; regional; national; international)		REGIONAL	
	Intensity (low; medium; high)		MEDIUM	
	Duration (short; short-med; medium; long; permanent)		LONG	
	Probability (Improbable; possible; likely; highly likely; definite)		HIGHLY LIKELY	
Weighting factor (WF)	WF (low; low-medium; medium; medium-high; high)		MEDIUM	
Mitigation Efficiency (ME)	ME (high; medium-high; medium; low-medium; low)		LOW	
Significance	Without mitigation (WOM)	(Extent + Intensity + Duration + Probability) x Weighting Factor (3 + 4+ 3+ 4) x 3 = 42 Medium		
	With mitigation (WM)	WOM x ME = WM 42 x 1 =42 Medium		
Significance With Mitigation (WM)	MEDIUM			

Source of the impact:

The risk sources during the construction phase can be considered to be as follows:

- The image of the construction activity could lead to a perceived view of progress and benefit to the community;
- Excessive cleaning and stripping of topsoil for site offices, servitudes and access roads;
- The relative random and disorganised lay down of building materials, vehicles and offices;
- Cut and fill slopes of roads will become highly visible if not re-vegetated and shaped to blend in with existing topography;
- Dust from construction vehicles;
- Open and rehabilitated landscape scarring;
- Location and layout of construction workers camp if located in proximity of works area; and
- The construction of the access roads, surface infrastructure and opencast mining.

All infrastructure relating to mining operations are familiar landmarks within the region. Parts of mine infrastructure notably the overburden stockpile, rock dumps, and other infrastructure may be noticeable from the N2 Piet Retief high way and surrounds.

Residential communities in the surrounding area will also be impacted by the visual intrusion. The risk sources during the operational phase can be considered as follow:

- Dust from heavy vehicles;
- Open and rehabilitated landscape scarring;
- Stockpile areas; and
- The operations associated with the access roads, surface infrastructure and opencast mining.

On closure of the mine, the only structures that will remain will be the vegetated open fields and remaining buildings which could be utilised.

Description of the impact:

Table 32 below rates each criteria from high, medium to low according to the specific characteristics of those criteria Table 33 lists for each project component the visual criteria rating and the visual impact of the component on these areas.

Table 34: Visual Assessment Criteria (VAC) ratings

	CRITERIA	**HIGH**	**MEDIUM**	**LOW**
1	Visibility	Very visible from many places beyond 1000 meter zone.	Visible from within the 1000 meter zone but partially obscured by intervening objects.	Only partially visible within the 1000 meter zone and beyond due to screening by intervening objects.
2	Genius Loci	A particular definite place with an almost tangible dominant ambience or theme.	A place, which projects a loosely definite theme or ambience.	A place having little or no ambience with which it can be associated.
3	Visual Quality	A very attractive setting with great variation and interest but no clutter.	A setting, which has some aesthetic and visual merit.	A setting, which has little aesthetic value.
4	Visible social structure	Housing and / or other structures as a dominant visual element.	Housing and / or other structures as a partial visual element.	Housing and / or other structures as a minor visual element.
5	Surrounding Landscape Compatibility	Ideally suits or matches the proposed development.	Can accommodate the proposed development without appearing totally out of place.	Cannot accommodate the proposed development without it appearing totally out of place visually.
6	Character	The site or surrounding area exhibits a definite character.	The site or surrounding area exhibits some character.	The site or surrounding area exhibits little or no character.
7	Scale	A landscape which has horizontal and vertical elements in high contrast to the human scale.	A landscape with some horizontal and vertical elements in some contrast to the human scale.	Where vertical variation is limited and most elements are related to the human and horizontal scale.
8	Visual Absorption Capacity	The ability of the landscape to easily accept visually a particular development because of its diverse landform, vegetation and	The ability of the landscape to less easily accepts visually a particular	The ability of the landscape not to visually accept a proposed

		texture.	development because of a less diverse landform texture and vegetation.	development because of a uniform texture, flat slope and limited vegetation cover.
9	View Distance	If uninterrupted view distances to the site are > than 5 km.	If uninterrupted view distance are < 5 km but > 1 km.	If uninterrupted view distances are >500m and < 1000m.
10	Critical Views	Views of the projects are to be seen by many people passing on main roads and from prominent areas i.e. communities and settlements.	Some views of the project from surrounding main roads and communities.	Limited views to the project from main roads and communities.

Table 35: Site evaluation

CHARACTERISTICS	VISUAL CRITERIA RATING	VISUAL IMPACT
Visibility	Medium to High	Moderate
Genius Locci	Medium to Low	Moderate
Visual Quality	Medium to Low	Low
Social	Medium to High	Low
Surrounding landscape compatibility	Medium to Low	Low
Character	Medium to Low	Moderate
Scale	High	Low
VAC	Low	High
View Distance	High	Low
Critical Views	High	Low

The result show that Vunene Colliery (Pty) Ltd has 1 high, 3 moderate and 6 low visual impact ratings.

The Vunene Colliery (Pty) Ltd mine will exert a negative influence on the visual environment. This is largely due to:

- High visibility of construction activity within a zone of uniform visual pattern;
- The low visual absorption capacity of the setting which is attributable to:
    - Relatively flat topography;
    - The low vegetation height (less than one meter);
    - The lack of visual diversity; and
    - A general lack of rising landforms as a backdrop.
- The size of the operations will expose it to many viewers; and
- The need to cut across or expose the existing landforms to accommodate the surface infrastructure.

Significance:

The significance of the impact is assessed to be low to medium.

Mitigation:

- Effective planning of the location of the mine infrastructure and lighting to minimise visual impact and light pollution;
- Screen the plant from the surrounding roads and properties using, for example trees;

- The illumination of Vunene Colliery (Pty) Ltd operations should be focused yet bear in mind safety and security issues. The design should make provision for accent lighting which should be downward to prevent light pills skywards;
- Selective and sensitive location and design of the lighting requirements for the Vunene Colliery (Pty) Ltd operations is required. For instance reduce the height from which floodlights are fixed and identify zones of high and low lighting requirements with the focus of the lights being inward rather than outward;
- The building textures and colours should not contrast vividly with the backdrop of colour and textures provided by the landscape. The natural setting and colours of buff, olive greens, dark brows should be respected and where possible, these should be incorporated into the materials used in the exteriors of the buildings and landscape;
- Colours of new infrastructure should be matt, not glossy so as to reduce reflection and glare from the surfaces. This is important when considering the night scene and reflected lights;
- The land forming and planting design of Vunene Colliery (Pty) Ltd should respect the surrounding indigenous vegetation. The interface between new planting and the existing should be gradually blended. Plant material around the main structures can be exotic, colourful and lush, however on the fringes of these areas the planting material should tend more towards local indigenous species of trees and grassland;
- The building forms should be broken by roof overhangs and steps in the façade. This will create shadow lines which, in turn, assist in the mottling breaking up of the visible plant form;
- The requirements for stabilisation of new landforms must be considered so that effective rehabilitation and re-vegetation can be timeously and effectively implemented. This will be determined by slope, access, material, climate etc.

13.6 Terrestrial impacts

13.6.1 Soil Erosion and increased surface runoff

Table 36: The impact of vegetation clearance and topsoil stripping on soil erosion and surface water runoff

Activity	**Soil erosion during the construction and operation phases**			
Nature of the impact	**Vegetation clearing, topsoil stripping, site establishment, movement of people and vehicles on site**		**Status**	**-**
Receiving environment	**Soil structures and adjacent water resources**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**SITE**	
	Intensity (low; medium; high)		**HIGH**	
	Duration (short; short-med; medium; long; permanent)		**SHORT - MEDIUM**	
	Probability (Improbable; possible; likely; highly likely; definite)		**POSSIBLE**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**LOW TO MEDIUM**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**MEDIUM HIGH**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (2 + 3+ 2+ 2) x 2 = 18 Low**		
	With mitigation (WM)	**WOM x ME = WM 18 x 0.4 =7.2 Low**		

Significance With Mitigation (WM)	LOW

Source of the impact:

The clearance of vegetation and stripping of topsoil to make way for the establishment of mine related infrastructure and structures associated with the various proposed development components.

Description of the impact:

During construction it will be necessary to clear portions of vegetation, where the development will be undertaken. The construction sites will need to be levelled, which will alter the natural soil structure. The major impact of vegetation clearance is the exposure of soil to the agents of erosion, such as wind and water.

Large volumes of spoil material will be generated during the construction phase whilst some of the material will be re-used for fill elsewhere on site, the spoil material generated will also be vulnerable to the agents of erosion, such as wind and water.

Erosion can be expected if construction occurs within the rainy season and therefore may result in the loss of topsoil from topsoil stockpiles. The clearance of vegetation will reduce the capacity of the land surface to limit the flow of surface water, thus decreasing infiltration, and increasing both the quantity and velocity of surface water runoff and causing erosion.

Significance of the impact:

Topsoil normally has a high nutrient content and is an indigenous seed bank. It is considered to be a national resource of value to current and future generations. It may be lost through the establishment of infrastructure on the soil and through the development excavations. A loss of topsoil will result in a decrease in the productivity of land.

Conservation of topsoil requires attention. Long-term bulk storage of topsoil will degrade the soil fertility, texture and structure. The following factors that cause degradation include:

- Erosion;
- Compaction;
- Loss of nutrients by leaching and anaerobiosis; and
- Decline in essential biological activity.

Mining related activities will disturb land and damage the vegetation that shelters and binds soils. The exposed soils will be more susceptible to erosion by wind and water. Erosion can affect all living organisms through the destruction of habitats, loss of valuable topsoil, which reduces the productivity of the soils, contamination of water with suspended solids and contamination of air with dust. Erosion can also reduce the aesthetic quality of the environment. Among the activities at Usutu that could cause erosion is the construction of infrastructure (such as new buildings, roads, conveyor belts, pipelines and various facilities for the handling of waste and polluted components).

Off-road movement of vehicles can cause extensive erosion – one trip across the veldt is enough to damage vegetation and initiate the erosion process. Unsurfaced access roads are highly susceptible to erosion. Footpaths are also prone to erosion particularly where there is concentrated pedestrian traffic.

Erosion may be accelerated where water is channelled by linear infrastructure (such as roads and railway lines, power lines and pipelines) and surface water management infrastructure (such as canals and bunds). Erosion may also be accelerated at points where there are concentrated discharges of water to the environment (such as at culverts, outflows of run off etc). Mine residue deposits at Usutu include the overburden stockpile. Materials eroded from these deposits could pollute water and air. The contaminants in the water and air could be transferred to soil.

The extent of the impact is on site during the construction phase. The impact is given a medium intensity rating as vegetation growth and other natural processes would continue in areas around the erosion. The duration would be medium term, since erosion would be discontinued once vegetation has established. The weighing factor attributed to this impact is low-medium and significance of the impact with mitigation is thus low.

Mitigation:

- The implementation of anti erosion measures such as construction of berms to reduce the velocity of surface water run-off is essential;
- By maintaining the maximum amount of vegetated area on site, the extent of erosion and ecosystems loss can be contained;
- Topsoil and subsoil must be kept totally separated during excavation and must be stored in separate stockpiles;
- It is also imperative that the topsoil layer be retained and used in facilitating the reinstatement of indigenous vegetation;
- Trench areas must be raised to accommodate the bulking factor and subsidence;
- When soil is replaced excavation and installations should be carried out when the soil is at its driest, where possible;
- All access roads must be demarcated, and existing roads must be used as far as possible for the hauling of materials; and
- Disturbed surfaces to be rehabilitated must be ripped, and the area must be backfilled with topsoil over overburden and approximately re-vegetated.

13.6.2 The potential for soil pollution

Table 37: Soil pollution

Activity	**Improper disposal of paints, cement bags and other building wastes during the construction phase, as well as inappropriate storage and handling of hazardous substances (including fuels and lubricants**			
Nature of the impact	**Contamination of soil through direct contact between hazardous and toxic materials and bare soil surfaces as well as through seepage of leachates from the mine residue deposits**		**Status**	**-**
Receiving environment	**Bare soil surfaces**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**SITE**	
	Intensity (low; medium; high)		**HIGH**	
	Duration (short; short-med; medium; long; permanent)		**SHORT - MEDIUM**	
	Probability (Improbable; possible; likely; highly likely; definite)		**LIKELY**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**LOW**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**HIGH**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (2 + 5+ 2+ 3) x 1 = 12 Low**		
	With mitigation (WM)	**WOM x ME = WM 12 x 0.2 =2.4 Low**		
Significance With Mitigation (WM)	**LOW**			

Source of impact:

The accidental spillage of hazardous materials such as fuels, oils and hydraulic fluids, paints and bitumen based products, as well as cement, are an unfortunate reality on large scale developments. Incorrect management and handling of the aforementioned substances can also result in unnecessary spillages thereof. Fuel and oil leaks from poorly maintained plant and vehicles can also contribute to soil pollution.

Soils on the Usutu premises and surrounding land could also be contaminated in four main ways:

- Failures of mine residue deposits or pollution control measures;
- Contamination of water;
- Contamination of air; and
- Seepage from mine residue deposits.

Of the above modes of soil contamination the contamination of water is of most concern. The issue of leachates from mine residue deposits is generally addressed in the section on water resources, which cover seepage intro surface into surface and groundwater from the deposits.

Description of the impact:

Contamination of soils as a result of accidental spillages will alter the chemical properties of the affected soils and negatively influence the future growth of vegetation on these soils. Surface water run-off over contaminated

areas can also transfer pollutants into ground and water resources, thus contributing to the potential contamination thereof.

Significance of impact:

The extent of the impact is on the site during the construction phase. The impact is given a high intensity rating due to the potential thereof to contribute towards ground and surface water pollution of nearby water resources. The duration would be over the short to medium term, since the potential for soil pollution will persist throughout the construction period. The weighting factor attributed to this impact is low and significance of the impact with mitigation is thus also low.

Mitigation:

- The concrete bathing site (if required) will be appropriately rehabilitated;
- A 'Hazardous materials spillage contingency plan' should be in place;
- All hazardous materials stored on site should also be stored in an appropriately bunded and well ventilated area;
- All contaminated soils should be immediately removed and placed within a hazardous skip located on site, for end disposal at an appropriately licensed hazardous waste disposal site by a reputable waste disposal contractor;
- All construction vehicles and plant machinery operating on site should be regularly serviced in order to prevent the potential for oil and fuel leaks to occur;
- Drip trays should be placed under vehicles that stand within the contractors yard for extended periods of time; and
- Vehicles should not be serviced out of terrain, but only in designated workshops established for the purposes that are equipped with oil water separators and sumps for the collection of contaminated materials.

13.6.3 Soil pollution as a result of incorrect stockpiling

Table 38: Soil pollution as a result of incorrect stockpiling

Activity	**Soil stripping during the construction phase**			
Nature of the impact	**Contamination of soil through incorrect stripping activities as well as the incorrect stockpiling methodologies**		**Status**	**-**
Receiving environment	**Surrounding environment**			
Magnitude	**Extent (footprint; site; regional; national; international)**		**LOCAL**	
	Intensity (low; medium; high)		**HIGH**	
	Duration (short; short-med; medium; long; permanent)		**SHORT TERM**	
	Probability (Improbable; possible; likely; highly likely; definite)		**LIKELY**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**MEDIUM**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**HIGH**	
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (4+2+1+3) x 3,6 = 36 Medium**		

	With mitigation (WM)	**WOM x ME = WM 36 x 0.2 = 7.2 Medium**
Significance With Mitigation (WM)	**MEDIUM**	

Source of impact:

The incorrect stripping and stockpiling of soil material during the initial phases of mining can cause the material to decline in quality. This is mostly due to the soil material not being stockpiled in the identified layers.

Description of the impact:

Soil stockpiles are not clearly defined and separated and this results in the different identified soil layers being stockpiled on one combined stockpile. Movement of individuals and vehicles over the stockpiled soil material results in unnecessary pollution and decrease of the soil quality.

Significance of impact:

Soil is a fundamental and ultimately finite resource that fulfils a number of functions and services for society which are central to sustainability. Some of the most significant impacts on this resource occur as a result of activities associated with construction activity, yet it appears that there is a general lack of awareness and understanding of this need within the mining industry.

The extent of the impact is on the site during the construction phase. The impact is given a high intensity rating due to the potential thereof to contribute towards ground and surface water pollution of nearby water resources. The duration would be over the short to medium term, since the potential for soil pollution will persist throughout the construction period. The weighting factor attributed to this impact is low and significance of the impact with mitigation is thus also low.

Mitigation:

Construction

- The Avalon and Glencoe soils are suitable for agricultural purposes; effort should be made to strip the topsoil separate from the underlying plinthic material;
- The soils in the wetland should be kept undisturbed;
- The average soil depth ranges from 30-90 cm overall shallower then 70cm. If soil stripping is necessary, it is recommended to strip only 40-60cm of the soil. These estimates take into consideration a possible 10% topsoil loss through compaction and allow the rehabilitated areas to be returned to the pre-mining land capability, i.e. arable cropping land;
- During the construction phase it is recommended that the topsoil be stripped and stockpiled in advance of construction activities that might contaminate the soil;
- The stripped soils should be stockpiled upslope of areas of disturbance to prevent contamination of stockpiled soils by dirty runoff or seepage;
- All stockpiles should also be protected by a bund wall to prevent erosion of stockpiled material and deflect water runoff.

Operational

- Stockpiles can be used as a barrier to screen operational activities. If stockpiles are used as screens, the same preventative measures described above should be implemented to prevent loss or contamination of soil;
- The stockpiles should not exceed a maximum height of 6m and it is recommended that the side slopes and surface areas be vegetated in order to prevent water and wind erosion and to keep the soils biologically active; and
- If used to screen operations, the surface of the stockpile should not be used as roadway as this will result in excessive soil compaction.

Decommissioning

The following issues need to be taken into consideration before, during mining operations, with closure and rehabilitation:

- Loss of topsoil and usable soil
    - Strip all usable soil and stockpile;
    - Vegetate long-term soil stockpiles.
- Contamination of topsoil and stockpiled soil
    - Prevent contamination of topsoil and stockpiled soil;
    - Site all soil stockpiles upslope from any mining / development activities; and
    - Position stockpiles upslope of mining areas, or as screens to restrict visibility of the mining operation provided that in doing so, the stockpile is not exposed to the risk of seepage or dirty water contamination.
- Erosion of stockpiled soil
    - Ensure that all stockpiles have a storm water diversion berm for protection against erosion and contamination by dirty water.

13.7 Heritage impacts

13.7.1 Potential Impacts on Heritage Resources

Table 39: The impacts of the development on heritage resources

Activity	**Construction of the mine and associated infrastructure**		
Nature of the impact	**Disturbance of historical and cultural resources**	**Status**	**-**
Receiving environment	**Elements of cultural or historic significance as well as the surrounding communities**		
Magnitude	**Extent (footprint; site; regional; national; international)**	**SITE**	
	Intensity (low; medium; high)	**HIGH**	
	Duration (short; short-med; medium; long; permanent)	**PERMANENT**	
	Probability (Improbable; possible; likely; highly likely; definite)	**POSSIBLE**	
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**	**LOW**	
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**	**HIGH**	

Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (2 + 5+ 2+ 3) x 1 = 12 Low**
	With mitigation (WM)	**WOM x ME = WM 12 x 0.2 =2.4 Low**
Significance With Mitigation (WM)	**LOW**	

Source of the impact:

A number of cultural sites were found within the development footprint of the site (See Annexure 3: Specialist Reports). These include historical, archaeological and grave sites. Historic sites unfortunately have been extensively robbed for building material and the area has also been subject to extensive ploughing and the forces of urbanisation in recent years. It is therefore difficult to relate the remnants of these buildings with any description. Should development continue to take place on sites having a high and medium cultural significance, there could be a permanent loss of the cultural sites.

Significance of the impact:

The extent of the potential impact is contained within the boundaries of the site. The impact is given as a Low intensity rating and could possibly occur, but is unlikely.

Mitigation:

The mitigation and management measures as set out in the specifications for a HIA should be applied prior to development taking place, namely:

- No blasting with explosives or heavy drilling within 20 meters of any heritage feature;
- No part of any heritage structure may be removed or altered during the construction period without a permit from the South African Heritage Resources Agency (SAHRA); and
- If hidden archaeological and historical finds are exposed during construction work, they should immediately be reported to the authorities, so that an investigation and evaluation of the finds can be made.

Under no circumstances shall archaeological or palaeontological artefacts be removed, destroyed or interfered with by anyone on the site. Vunene Colliery (Pty) Ltd shall advise their workers of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the National Heritage Resources Act (Act 25 of 1999), Section 51(1).

13.8 Socio economic impacts

13.8.1 Impacts on socio-economic environment

Table 40: Impact on employment

Activity	**Job creation**		
Nature of the impact	**Labour required for development (during construction and operational phases)**	**Status**	**-**
Receiving environment	**Residents of the region Developers**		
Magnitude	**Extent (footprint; site; regional; national; international)**	**REGIONAL**	

	Intensity (low; medium; high)		HIGH POSITIVE
	Duration (short; short-med; medium; long; permanent)		MEDIUM TO LONG TERM
	Probability (Improbable; possible; likely; highly likely; definite)		DEFINITE
Weighting factor (WF)	WF (low; low-medium; medium; medium-high; high)		HIGH
Mitigation Efficiency (ME)	ME (high; medium-high; medium; low-medium; low)		HIGH
Significance	Without mitigation (WOM)	(Extent + Intensity + Duration + Probability) x Weighting Factor (5 + 5+ 5+ 5) x 5 = 100 High Positive	
	With mitigation (WM)	WOM x ME = WM 100 x 0.2 =20 High Positive	
Significance With Mitigation (WM)	HIGH POSITIVE		

Source of the impact

Creation of job opportunities during construction and operation for residents of the region.

Description of the impact

The construction phase of the development will provide numerous job opportunities to the skilled professionals, less skilled trades (such as bricklaying, painting, carpentry etc) as well as the unskilled and semi-skilled workers residing in the region.

During the operational phase of the development job opportunities will take on a more permanent nature in the form of heavy vehicle drivers, operators, maintenance staff etc.

Significance

The impact can be very negative if labour is sourced from elsewhere and the local residents are excluded from economic benefit to be gained from the construction and operation of the proposed opencast coal mine. Certainly, some skilled labour will have to be imported from other areas but unskilled labour is available, and if work is given to these people it will have a great benefit and have a very positive significant impact on the region as a whole.

Mitigation

- If and where possible, the local community should be consulted when sourcing semi-skilled labour.

13.9 Traffic

Table 41: Impact on traffic

Activity	Increase in traffic on the surrounding network		
Nature of the impact	Increase in traffic on the surrounding network as a result of the proposed development	Status	-
Receiving environment	Residents of the region Motorists using the road network		
Magnitude	Extent (footprint; site; regional; national; international)	REGIONAL	
	Intensity (low; medium; high)	HIGH	
	Duration (short; short-med; medium; long; permanent)	MEDIUM TO LONG TERM	

	Probability (Improbable; possible; likely; highly likely; definite)		**DEFINITE**
Weighting factor (WF)	**WF (low; low-medium; medium; medium-high; high)**		**HIGH**
Mitigation Efficiency (ME)	**ME (high; medium-high; medium; low-medium; low)**		**HIGH**
Significance	**Without mitigation (WOM)**	**(Extent + Intensity + Duration + Probability) x Weighting Factor (5 + 5+ 5+ 5) x 5 = 100 High**	
	With mitigation (WM)	**WOM x ME = WM 100 x 0.2 =20 High**	
Significance With Mitigation (WM)	**HIGH**		

Source of the impact

Development related traffic can access the external road network at various points and thereafter several route choices are available (towards Camden Power Station or alternatively towards Ermelo, ot even Piet Retief). The bulk of the coal from this colliery is sent to the Camden Power Station and the balance to other users via the N2 through Ermelo. The roads that can be used are briefly discussed below:

N2

The N2 between Ermelo and Piet Retief is currently being upgraded with road works on the entire section between the Camden Power Station / Usutu West Colliery and Ermelo. It can be assumed that this road will be in good condition as depicted in the photos taken along this section of the N2.

The existing access to Usutu West Colliery is currently being upgraded as part of the N2 road upgrade. A temporary access is currently in use opposite the access to Camden Power Station.

Description of the impact

Trip generation

No accommodation is provided on the mine and staff reside mainly in Ermelo. Around the shift change time, the 3 busses drop off the new shift staff and pick up the staff from the previous shift and return to Ermelo.

The operation is in two shifts with the following shift change times:

- 05:00 – 17:00; and
- 17:00 – 05:00

The mine provide 3 X 16 seater busses for transport to and from the mine. It is assumed that the balance of the staff use own transport with an average of 2 people per vehicle.

In terms of the Manual for Traffic Impact Studies, intersections where more than 75 peak hour trips are added to the critical movements must be analysed to determine the impact of the additional traffic on the operating conditions of the intersection. In this instance, this is not expected at any of the major intersections. There are two (2) access scenarios which are being investigated:
The design scenarios will be applied to both access options, one access as well as two access points.

Significance

The impact is considered to have a high significant impact as a result of the operational phase of the proposed development with regard to the increase in traffic at the intersections with the N2. Mitigation measures reduce the impact to a medium - low significance. Mitigation measures have been set out in the Environmental Management Programme. The impacts will become more pronounced if the suggested mitigation measures are not implemented.

Mitigation

Proposal A

- Access to the Power Station and the Mine is relocated to the new position and a second access is implemented for Block D. An auxillary lane is provided on the N2 to accommodate the 150 x 30 ton truck loads to the Power Station per day. From a traffic flow point of view the trucks will use the N2 from Block D to the power station and back. When crossing the road, mining trucks will use the new access and will experience increasing delays to cross the N2. Truck driver frustration and conflict with traffic on the N2 will become an issue.

Proposal B

- The truck hauling takes place on the mine side, off the N2, and no additional access is implemented for Block D. Coal is transported to the power station through a single access point on the N2. Operating hours are amended to outside peak traffic hours and transport is supplemented by re-activating the existing conveyor system between the mine and Camden Power Station. The ideal situation will be reached at a point where only the conveyor system is used, with no coal trucks crossing the N2. This will limit the impact on the N2 to only the intersection used by the mine and the power station. For this proposal no additional cost is required for a second access on the N2 or additional lanes on the N2. Haul roads will be required within the mine area. From a traffic flow point of view the trucks will only cross the N2 (not travel along it) but will experience increasing delays in crossing the N2. The conveyor system should however completely replace the truck transport. Truck driver frustration and conflict with traffic on the N2 will be eliminated to a great extent.

Proposal C

- The truck hauling takes place on the mine side of the N2, and no additional access is implemented for Block D. The access to the mine and the Camden Power Station remain at-grade with a bridge placed where the haul road would best suit the mining operation. The truck trips would be completely eliminated from using the at-grade intersection on the N2.
- The truck hauling takes place on the mine side of the N2, and no additional access is implemented for Block D. The access to the mine and the Camden Power Station become a split-level intersection with on- and off ramps to the N2. The at-grade intersection is completely eliminated.

14. CUMULATIVE IMPACTS (Reg 31(2)(l))

Cumulative impacts as illustrated below, occur because of the combined effect of incremental changes caused by other activities together with the particular project. In other words, several developments with insignificant impacts individually may, when viewed together, have a significant cumulative adverse impact on the environment.

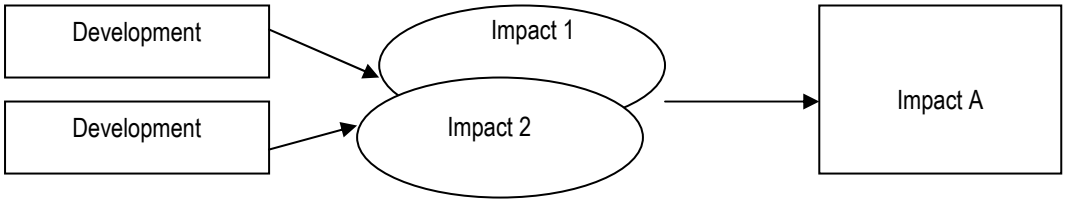

Figure 15: The identification of cumulative impacts

The following cumulative impacts have been identified in terms of the proposed development:

- Cumulative impacts on traffic as a result of more heavy vehicles making use of the roads in the immediate area;
- Cumulative impact: decrease in air quality in the immediate surroundings of the mine
- Cumulative loss of wetland functionality as a result of an increase in pollutants;
- Cumulative impact on wetland function and ecology;
- Cumulative impact of hydrological modifications and stormwater;
- Cumulative impact of faunal habitat and displacement;
- Cumulative impact on natural migratory routes and faunal dispersal patterns and
- Cumulative impacts on the decreased quality of the water sources in the area as a result of contaminants being released into water sources.

14.1 Cumulative impact: increased traffic volumes within the mine and surrounding communities

Source of impact:

Traffic will increase in and around the proposed development. The increase of especially heavy vehicles movements surrounding the Vunene Colliery (Pty) Ltd project, such on National and Provincial roads which are in the vicinity of the mining complex and link up to the project area. In addition to this traffic within the mine area itself will also be a contributing fact towards cumulative impacts from an increase in traffic.

Description of the impact:

The proposed development entails the set up of mining activities as well as the construction of mine related infrastructure. Due to the nature of the activity it is likely that there will be a cumulative increase in vehicular traffic within the mine and just outside the boundary of the mine. The cumulative impacts emanating from the increase in traffic may become apparent during the operational phase of the Usutu opencast and underground coal mine. Temporary access roads could also contribute significantly to dust impacts, spills and erosion and loss of soil resources.

Significance of impact:

The transport of materials, people and goods may present the only significant impact. The movement of vehicles on the local roads within the surrounding communities may result in damage to roads from movement of heavy vehicles. Despite the potential cumulative impacts from the traffic increase it is not anticipated that the impact will have a ranking higher than medium for as long as the internal road are not in close proximity to the adjacent communities. As long as the roads are internalised, it is not anticipated that the cumulative impact of traffic will be significant.

Mitigation:

- Only main roads should be used;
- Where feasible vehicles should not operate on public roads during peak hours;
- Vehicles should adhere to the speed limit of the road;
- Heavy vehicles should always travel with their head lights switched on;
- Heavy vehicles should not stop on the road to pick up hitchhikers – No stopping on the road approaching the mine will be allowed;
- Limit the extent and degree of change to the biophysical and socio-economic environment; and
- Communicate with and acknowledge concerns of the I&APs and mitigate where possible.

14.2 Cumulative impact: decrease in air quality in the immediate surroundings of the mine

Source of impact:

- Materials handling operations with mining are predicted to result in significant fugitive dust emissions including the transfer of material by means of tipping, loading and off-loading trucks;
- Wind erosion from exposed areas – significant emissions arise due to the mechanical disturbance of granular material from open areas and storage piles;
- Primary washing and drying operations represent significant dust generating sources if uncontrolled;
- Particulate emissions will result from the entrainment of loose material from the paved road surface due to the vehicle traffic.

Description of impact:

Dispersion simulations should be executed for the proposed operational phase. Previous experience with coal mines indicated that PM_{10} and TSP should be assessed. The predicted concentrations for these pollutants are discussed below. In order to account for cumulative impacts, measured PM_{10} concentrations from the mines surrounding the Ermelo community should be used. The annual average concentration of 52µg/m^3 is used to reflect the background concentrations at the Usutu opencast and underground coal mine.

PM_{10}

The predicted mitigated daily average ground level concentrations for the proposed operations at the Vunene Colliery (Pty) Ltd facility do not exceed the daily current South African standard of 180µg/m^3 or the proposed South African standard of 75µg/m^3 at the mine boundary or the sensitive receptor sites.

The predicted annual average ground level concentrations for the proposed Vunene Colliery (Pty) Ltd operations do not exceed the current annual South African standards of 60µg/m^3 and the proposed South African standard of 40µg/m^3 outside the mine boundary. Since the background PM_{10} concentration of 52µg/m^3 already exceeds the proposed South African standards, cumulative predictions will also exceed this limit. It is however noted that the Venene Colliery (Pty) Ltd activities are a small contribution to the cumulative concentrations.

Significance of the impact:
The cumulative impact of PM_{10} concentrations has a significance of Medium.

Mitigation:

- It is recommended that an Air Pollution Control System (APCS) be developed for the Vunene Colliery (Pty) Ltd activities to reduce and control all main contributing sources. This APCS includes detailed management plans, mitigation measures and monitoring and operational procedures developed for each significant source of emission to ensure emissions reduction will occur. The APCS must be implemented and revised by mine personnel on an ongoing basis. This APCS can be incorporated into the Environmental Management System (EMS) of the mine.
- The absence of visible dust plume at all tipping points and outside the primary crusher would be the best indicator of effective control equipment in place. In addition the dustfall in the immediate vicinity of various sources should be less than 1200mg/m^2/day. From all activities associated with the Vunene Colliery (Pty) Ltd mine; dustfall levels should not exceed 600mg/m^2/day.
- Additional mitigation measures are included in the EMPr.

14.3 Cumulative loss of wetland functionality as a result of an increase in pollutants

Source of the impact:
The absence of a buffer zone in the majority of the study area could result in a direct input of pollutants, including fertiliser derived nutrients such as nitrates and phosphates into the wetland and riparian areas. These pollutants and others are transported by storm water runoff, which picks up sediment load along its path, which further decreases the water quality. The Witpuntspruit and Humanspruit are bedrock river with shallow soils on the banks of its riparian zone. These soils with their mainly tree dominated vegetation therefore have a low potential for filtering and absorbing, as well as adsorbing, transported pollutants before they reach the main water body.

Description of the impact
Due to the fast moving water the river pollutants are unlikely to build up locally, but will be transported downstream to slower moving areas (e.g. dams) where they will increase in concentration and decrease the water quality.

Significance
The significance of the impact is expected to be of a high significance without mitigation, this due to the transport of pollutants to slower moving areas where there could be an increase in concentration of pollutants and a decrease in water quality. With mitigation the significance of the impact will be of a medium significance even though the impact will not be reversible and is of a permanent nature.

Mitigation measures

- The areas cleared of vegetation and impacted on by excavation must be managed to prevent dust pollution and sedimentation of storm water channels. Excavated soil material must be correctly located and preferably covered to prevent erosion of the soil and siltation of storm water channels;
- If servicing and washing of the vehicles are to occur on site, there must be specific areas constructed for this activity. These areas need to have a concrete foundation, bunded as well as have oil traps to contain any spillages likely to occur.
- A walled concrete platform, dedicated store with adequate flooring or a bermed area should be used to accommodate chemicals such as fuel, oil, paint, herbicide and insecticides, as appropriate, in well ventilated areas.
- All construction materials prone to spillage must be stored in appropriate structures with impermeable flooring, such as plastic lines for temporary storage areas.
- Portable septic toilets must be provided and maintained for construction crews. Maintenance must include the removal without sewage spills.
- In the case of pollution of any surface or groundwater, the Regional Representative of the DWA must be informed immediately.

14.4 Cumulative impact on wetland function and ecology

Source of the impact:

Construction and operation activities related to the development, especially the creation of hardened surfaces in close proximity to wetland areas can have devastating and irreversible effects on these ecosystems. Excavation, infilling, draining, hardened structures, vehicle and people movement, as well as stock piling are all construction and operational related impacts, which can destroy wetlands by causing disturbance to their hydrological regime, which is the main driver of wetland functioning. Reduced infiltration, increased energy flows, erosion, desiccation and habitat destruction are the result of such impacts, which in most cases result in irreversible wetland damage.

Description of the impact

The loss of wetland habitat and the linear linkages formed by wetland habitat to other wetland areas inside the study area's direct catchment could become fragmented by the development. This will reduce the ability of the study area (wetland catchment) to maintain viable population numbers of various wetland dependant species due to a loss in connectivity. Wetland dependant species inside the site, wetland connectivity still provides a functional role for more common wetland dependant species and should also be taken into consideration. The same applies to the riparian habitat. Wetland and riparian connectivity is also important from a physio-chemical water quality and quantity management role, as wetlands in many cases provide the natural corridors for water drainage inside the study area. The importance of connectivity extends beyond the study area to include the upstream catchment as well the downstream catchment, which implies a loss to downstream water users should wetland functioning be compromised inside the study area.

Significance

The significance of the impact is expected to be of a high significance without mitigation, this due to construction activities causing a disturbance in the hydrological regime. With mitigation the significance of the impact will be of

a medium significance even though the impact will not be reversible and is of a permanent nature. Temporary wetland zones that are still impacted are former agricultural lands that have no biodiversity value.

Mitigation

- Development should not be considered within wetland boundaries and their associated buffer zones;
- Interventions and mechanisms should be included in the proposed development to reduce the impact of stormwater on the wetland;
- An ecologically sensitive stormwater management plan will be required to attenuate flood peak events and prevent excessive erosion; and
- The natural open spaces in the proposed layout should be connected to adjacent natural open spaces.

14.5 Cumulative impact of hydrological modifications and stormwater

Source of the impact:

Hardened surfaces will impact negatively on the wetlands, as the construction of impermeable layers on the surface will prevent infiltration and ultimately result in reduced seepage yields.

Description of the impact

Increased stormwater runoff with an associated increased erosion potential are also directly related to the expansion of hardened surface inside a catchment. Interventions and mechanisms can be included in the development to facilitate a higher percentage of infiltration (e.g. porous pavements).

Significance

The significance of the impact is expected to be of a medium significance without mitigation, this due to removal of vegetation and the construction of hard surfaces. With mitigation the significance of the impact will be of a low significance even though the impact will not be reversible and is of a permanent nature.

Mitigation

- Development should not be considered within wetland boundaries and their associated buffer zones;
- Interventions and mechanisms should be included in the proposed development to reduce the impact of stormwater on the wetland;
- An ecologically sensitive stormwater management plan will be required to attenuate flood peak events and prevent excessive erosion; and
- The natural open spaces in the proposed layout should be connected to adjacent natural open spaces.

14.6 Cumulative destruction of sensitive habitat

Source of the impact:

Development of sensitive habitat types and the impact of development on sensitive habitat types, such as road infrastructure etc. This will result in the fragmentation of species and habitats associated with important landscape elements such as wetlands and ridges that function on a landscape scale as corridors.

Description of impact:

The most sensitive habitats of ecological significance on the site are the riverine habitats and the rocky outcrops and associated steep slopes. If impacted they will deteriorate downstream use and water quality and impact on the hydrology of the site. Impacts will also affect natural faunal migration and movement down these linear systems which act as corridors in the landscape. From an ecological point of view it is also very important that this report is taken into consideration when planning and layouts are determined. These sensitive areas have been demarcated as part of the specialist studies. There is no development on rocky outcrops, footprints are minimal, and therefore impact without mitigation is medium.

Significance

The significance of the impact is expected to be of a high significance without mitigation, this due to the destruction of sensitive habitats that support a high ecological functioning site to allow for the mining of the proposed development. With mitigation the significance of the impact will be reduced to that of a medium significance even though the impact will not be reversible and is of a permanent nature.

Mitigation

- Footprint size should be kept at a minimum so as to maintain as much natural vegetation cover as possible;
- Only vegetation indigenous to the area should be considered for landscaping purposes; and
- Wastewater limit values applicable to discharge of wastewater into watercourses as stipulated by the Department of Water Affairs should be strictly adhered to.

14.7 Cumulative impact of faunal habitat and displacement

Source of the impact

Destruction of faunal habitat and the displacement of species from their traditional home ranges during the operational phases of the proposed opencast and underground coal mine.

Description of the impact

Faunal species could be displaced during the operational phase. This could result in higher than normal social, grazing and browsing pressures on areas that would otherwise not have these impacts. This could result in degraded vegetation cover in areas that the life stock has moved to and a depauperation in the associated habitat i.e. from trampling, erosion, grazing or browsing and other forces.

Significance

The significance of the impact is expected to be of a medium significance without mitigation, this due to the displacement of faunal species from their habitats on site to allow for the mining of the proposed development. With mitigation the significance of the impact will be reduced to that of a low significance.

Mitigation

- Minimising the loss of flora and fauna in areas that are not directly affected by the new development;
- Reduce the levels of disturbance on the area during mining;
- All mining areas should be suitably top soiled and vegetated as soon as is possible after mining; and

- Disturbed surfaces to be rehabilitated must be ripped, and the area must be backfilled with topsoil or overburden.

14.8 Cumulative impact on natural migratory routes and faunal dispersal patterns

Source of the impact

The introduction of barriers such as walls, buildings, roads and other infrastructure during the mining phase of the proposed development would have an impact on the natural migratory routes and faunal dispersal patterns.

Description of the impact

Walls, buildings, roads and other infrastructure associated with the development may obstruct and constrict faunal dispersal and floral dispersal by limiting and funnelling natural dispersal patterns.

Significance

The significance of the impact is expected to be of a medium significance without mitigation, this due to the constriction of natural migratory routes and faunal dispersal patterns. With mitigation the significance of the impact will be reduced to that of a low significance.

Mitigation

- Sensitive areas e.g. wetland buffer should be demarcated to prevent access during the mining phase;
- Reduce the levels of disturbance on areas indicated by the ECO as migratory routes along the Witpuntspruit and Humanspruit;
- All mining areas should be suitably top soiled and vegetated as soon as is possible after mining; and
- Disturbed surfaces to be rehabilitated must be ripped, and the area must be backfilled with topsoil or overburden;
- Use indigenous plants wherever possible in the landscaping of the property;
- Try to maintain the natural vegetation in its original context as far as possible as this will enable species that are sensitive to transplanting to be maintained as well as their associated communities;

15. AUTHORISATION OPINION WITH POSSIBLE CONDITIONS (Reg 31(2)(n))

The Scoping phase of the EIA process was aimed at establishing the scope of the proposed development as well as its key issues and potential impacts on the surrounding environment. The evaluation of the project motivation, the status quo of the social and natural environment, as well as the inputs received from Interested and Affected Parties during the Scoping Process, highlighted the following needs and concerns:

- The need to undertake mining activities bearing in mind the potential impacts the activity may have on adjacent landowners;
- The need for assessing water source alternatives to avoid puttung strain on already strained water resources in the area; and
- Concerns related to the impacts of the proposed development on the air quality and traffic congestion on the internal roads as well as the surrounding communities.

From this, the need for particular specialists' studies was determined. Specialists' studies assisted with the development of an understanding of the system processes and the potential impacts of the proposed development on both the social and biophysical environments. The following specialists' studies were undertaken as part of the Scoping phase:

- Geohydrological Assessment;
- Surface water Impact Assessment;
- Wetland Delineation and Functional Assessment;
- River Health Assessment (SASS5);
- Traffic Impact Assessment;
- Visual Impact Assessment;
- Heritage Impact Assessment;
- Paleontological Assessment;
- Ecological Assessment;

Key issues identified for the assessment during the EIA phase of the Vunene Colliery (Pty) Ltd project include:

<u>Water Resources:</u>

- Increase in watercourse sedimentation, erosion and general pollution of surface water resources;
- The quantity of groundwater resources;
- Depletion of the underground aquifer; and
- Pollution of groundwater resources due to seepage from opencast coal mining activities.

<u>Air Quality:</u>

- Dust levels and related health impacts from the generation of dust.

Destruction of Sensitive Flora and Fauna:

- The ecological status quo of the Usutu area;
- Wetlands on site and in the surrounding area;
- The dispersal of existing flora and fauna on site by means of existing water channels; and
- Spill-over impacts, which may occur on adjacent ecological systems.

Soils and Land-use Capability:

- Loss of soil resources for agricultural land uses;
- Soil degradation as a result of mining activities; and
- The utilisation of soil resources for inappropriate land uses such as backfilling cut areas.

Noise vibration and shock:

- Increase in the ambient noise level as a result of blasting activities,
- The disruption of current ambient noise levels; and
- The disruption of sensitive receptors by means of increased noise and vibration.

Socio-economic:

- The determination of the extent to which the current social status quo will be altered and if so, the manner in which such changes will occur.

Visual Impact:

- The visual character of the area as a result of the establishment of mining infrastructure such as a coal ore dump.

Traffic:

- The change in the traffic patterns as a result of traffic entering and exiting the Usutu opencast and underground coal mine on the surrounding road infrastructure and existing traffic.

Job Creation:

- Job creation in an area where the main source of income is generated through primary activities e.g. farming;
- Creation of job opportunities during construction and operation for residents of the region;
- The provision of improved infrastructure and social upliftment, by creating short term employment over a period and skills transfer to unskilled and semi-skilled unemployed individuals.

The cumulative impacts have been identified in terms of the proposed development:

- The cumulative impacts of traffic;
- The cumulative impacts of air quality;
- The cumulative loss of wetland functionality as a result of an increase in pollutants;

- The cumulative impact on wetland function and ecology;
- The cumulative destruction of sensitive habitat;
- The cumulative impact of faunal habitat and displacement; and
- The cumulative impact on natural migratory routes and faunal dispersal patterns.

These key impacts, together with the potential cumulative impacts were assessed during the impact assessment phase of the project in order to predict the nature and characteristics of the impacts and establish appropriate mitigation measures to reduce the identified impacts as far as possible. The summary of the significance of identified impacts before and after mitigation is given in the table below:

Table 42: Summary of the impact significance

Environmental aspect	Significance WOM	Significance WM
Impacts on groundwater levels	Low to Medium	Low to Medium
Impacts on groundwater levels due to the dewatering of the open pit	Medium	Medium
Contamination of surface and groundwater resources due to the migration of contaminated water from the mining operations	Medium	Medium
Pollution of surface water due to construction and operation activities	Low	Low
Destruction of Wetland Habitat	Medium to High	Medium
Altered Hydrological Regime	Medium to High	Medium
Atmospheric pollution	Low to Medium	Low
Impacts on Rare and Endangered Fauna and Flora	Low to Medium	Low
Destruction of Natural Habitat	Low to Medium	Low
Reduction of Natural Migratory Routes	Low to Medium	Low
Noise and Vibration	Low to Medium	Low
Visual impacts	Medium	Medium
Soil Erosion and Surface runoff	Low	Low
Soil Pollution	Low	Low
Heritage resources	Low to Medium	Low
Socio-economic environment – job creation	High Positive	High Positive

A number of possible proposals or alternatives for accomplishing the same objectives have been identified and investigated. During the EIA Phase of the project, the various alternatives identified during the Scoping phase were assessed in terms of both environmental acceptability as well as economic feasibility.

Alternative mining methods were investigated:

- Area mining;
- Contour mining;
- Underground mining; and
- Roll over mining.

15.1 Recommendations

With regards to the status quo of the site's local environment and information made available to the consultants, the proposed development will not result in any fatal flaws in terms of the environment that should prevent the development from proceeding. Provided that the correct mitigation measures are implemented in accordance with the EMPr, impacts that would potentially have a significant high negative effect on the environment will be minimised to medium impacts.

All recommendations of the specialists' studies should be adhered to and incorporated into a detailed Environmental Management Plan (EMP). It is specifically recommended that:

- The groundwater system and ground and surface water quality, is monitored and models and assessments updated as more information becomes available;
- Rehabilitation and monitoring plan should be developed to ensure the success of wetland re-establishment. Furthermore, every effort should be made to prevent the impact on the remaining wetland on the study site;
- Blasting vibrations should be controlled by means of optimising blasthole geometry and altering the time of blasting;
- Implementation of a dust and noxious gases minimisation strategy that will reduce the impact of atmospheric pollution be undertaken. This strategy will include the use of noxious gas fixation techniques, using and adhering to blasting schedules, and strategies that minimize dust generation;
- The building textures and colours should blend in with the backdrop of colour and textures provided by the landscape. The natural setting and colours of buffs, olive greens, dark browns should be respected and where possible, these should be incorporated into the materials used in the exteriors of the building and landscape;
- Colours of new infrastructure should be matt and not glossy, so as to reduce reflection and glare from the surfaces. This is important when considering the night scene and reflected light;
- Disturbed surfaces must be ripped, and the area must be backfilled with topsoil or overburden and appropriately re-vegetated when rehabilitation commences;
- The topsoil layer must be retained and used in facilitating the reinstatement of indigenous vegetation;
- By maintaining the maximum amount of vegetated area on site, the extent of erosion and ecosystem loss can be contained;
- An ecologically-sensitive stormwater management plan should be implemented during the construction phase;
- Dust fallout monitoring should be carried out close to the sensitive receptors around the mine area and in the proposed site for the operational activities. It is recommended that dust deposition monitoring be confined to sites within, and in close proximity (<2 km) to the proposed mine operations. Monitoring should be undertaken using the American Society for Testing and Materials standard test method; for the collection and analysis of dustfall (ASTM D-1739) or any other method which can demonstrated to give equivalent results (SANS, 2004). Dust fallout at the sensitive receptor sites should be below 600 mg/m²/day at all times;
- No blasting with explosives or heavy drilling within 20 meters of any heritage feature may occur;
- It is recommended that an existing community based organisation and non-government organisation in the surrounding area be used to serve as a communication channel between the community and Vunene Colliery (Pty) Ltd; and

- Labour guidelines should be drafted in terms of employing local residents as it is expected that there will be an influx of newcomers in search of employment.

The mitigation measures suggested by the specialists in their reports include:

Ecological Assessment

The Usutu Colliery is located in the Msukaligwa Local Municipality (MP302) 5-10 kilometers south East of Ermelo in the Mpumalanga Province. From a biodiversity point of view, the area has no formal land base protected areas, thus it has been prone to extensive natural habitat loss due to land-use activities within the area.

The study has found and concluded that the proposed mining activity will cause a significant environmental impact to the remaining natural environment. The study area contains numerous wetlands types. A few of those wetland types, mainly the floodplains still maintain their functionality and offer a series of species ecological important ecosystem services. These include their use as breeding sites and as general species habitat.

The proposed activity will include the removal of vegetation thus causing habitat loss for species such as African grass owl. The obstruction of water flow would result in wetland drainage or dryness which will prevent species functioning, mainly for birds that use this environment for breeding and migratory purposes. Further disturbance to the area will lead to more alien species invasion and remaining natural area loss.

It is therefore recommended that the proposed mining, should it be authorized, includes rehabilitation, especially of wetlands in their Environmental Management Plans. Furthermore, there should be an allowance for species movement by leaving strips of natural vegetation that would serve as corridors for species movement. The client should adhere to the buffering zones recommended by the specialists. Lastly, further monitoring of the ecological function pre and during mining should be considered in order to maintain and manage the biodiversity of the area prior to rehabilitation.

Due to the intensity of land-use activity in the area, it should be understood that the cumulative environmental impacts on the area are the results of the combination of the agricultural, infrastructure and mining activities in the vicinity. Therefore, it is important to consider the severity of each activity and where they interlink in order to implement a correct ecological management of the area.

Ambient Air Quality Report

The South and East are the only monitoring points that exceeded the lower limit of 600 mg/m^2/day. None of the monitoring point exceeded the 2400 mg/m^2/day limit and none of the monitoring points exceeded the 1200 mg/m^2/day limit more than 3 times in a calendar year. The North monitoring point is the only monitoring point that exceeded the 1200 mg/m^2/day limit in two sequential months. It can be concluded that the mine is compliant with the South African National Standards 1929:2004 most of the time. The Ambient Air Quality at Usutu Mine is of a very high standard and although the mining activities, such as blasting and transportation of coal is having a negative effect on the receiving environment. This impact is mitigated by means of dust suppression and other management measures to such a level that the impact is negligible small.

It is recommended that the following area be managed to ensure that dust fallout across the site do not increase to such levels that the dust exceeds the 2400 mg/m^2/day.

Pollution Control Dam Design Report

The conclusions that were reached during the design process can be summarised as follows:

- Choose an appropriate lining to be used when constructing the pollution control dam;
- Construct a 4 450m^3 pollution control dam with emergency overflow at the position to be determined on site;
- Construct trenches / berms in close proximity to the mining activities to minimise the amount of clean water (storm water run-off) that will infiltrate into the mining area; and
- Construct trenches / berms (channel type 12) with 2 000mm base width and minimum 660mm depth at minimum 1:50 gradient

Geohydrological Report

The results of the investigation were:

- Groundwater levels were measured in twelve boreholes during a hydrosensus conducted in November 2011 for the proposed Usutu opencast on the Farm Janhendriksfontein portion 263 IT and Transitu 257 IT. The depth of the static groundwater level was found to vary between 1m and 10m below ground level;
- A seasonal aquifer perched on the bedrock probably develops in the upper weathered soil layer, especially after high rainfall events. Flow in the perched aquifer is expected to follow the surface contours closely and emerge as fountains or seepage at lower elevations;
- From the chemical analysis of thee water samples an overall assumption can be made that the groundwater sampled in the proposed mining area is of poor quality and not acceptable for domestic use. It can be deducted from the water quality of the sampled boreholes that the groundwater has been negatively affected by historic mining related contaminants;
- The acid base analysis (ABA) of exploration drill cores from the six opencast areas showed material that is intermediate to potentially acid forming material;
- Geophysics indicated that structures such as dykes are present across the opencast mining area.

Surface water Report

Resource Sensitivity and Integrity

sThe Present Ecological State (PES) of the Witpuntspruit is classified as moderately modified (class C). This status is caused by upstream anthropogenic and agricultural activities as well as mining operations in close proximity to the stream.

In addition the area is characterised by 14 hectares of seasonal wetlands and permanent wet zones. All wetlands in the area are described as palustrine wetland types with areas adhering to non-channelled and valet bottom descriptions. Most of the wetlands in the study area obtained a low PES category status. In terms of the wetland study it was found that the biodiversity of the wetlands range from sensitive to less sensitive in the study area. The wetlands are considered to be of ecological importance and sensitivity but due to their current low significance status rehabilitation measures need to be instated.

Surface water impacts:
Surface water resources within the vicinity of the project area are already impacted due to mining activities. The historic water quality of the Witpuntspruit exceeds the Resource Quality Objectives for the catchment. Currently there is no evidence of further degradation of the water quality as measured upstream and downstream of Usustu Coal operations. Water quality could be classed as unacceptable in terms of variables such as pH, TDS, SO_4, Mn, Al and Fe. Mining at Usutu Colliery may cause further degradation of the water resource if appropriate water management practises are not in place. Mining will impact on the aquatic ecology as well as wetlands within the project area. These impacts are rated as moderate to high and with the implementation of mitigation measures, impacts will have a rating of low to moderate.

Water Use and Management
The approach in water management for the mine is founded in the requirements set for a water resource management framework on a catchment level. This entails that the mine will strive to follow a pro-active, coherent and consistent management strategy in accordance with the objectives to be achieved as provided in the Internal Strategic Perspective of the Upper Vaal.
It is further envisaged that the mine will impact on the wetland area as significant coal reserves are located in these areas. The water management approach of the mine will be to replace the affected wetlands with artificially constructed wetlands as part of the rehabilitation program.
The current footprint of the mine will be considered in the layout of new infrastructure to ensure that clean areas are maximised, dirty areas minimised, and that adequate containment facilities are in place to prevent spillages and discharge to the environment. The settling pond will be phased out and replaced with an appropriately designed pollution control dam. The proposed mining footprint will be rehabilitated by means of an artificial wetland to assist with further improvement of water quality.

Recommendations:
The feasibility of the mine is dependent on the mining of coal reserves on the Farm Janhendriksfontein 263It. The sterilisation of coal reserves in close proximity to the wetland areas will create a situation that not sufficient funding through mining will be generated to implement the entire pollution prevention infrastructure. The mining of coal adjacent to the wetland areas could be approved as the wetland specialist study has stated that the relatively small scale of the mining activity and the low conservation status of the wetlands will result in no major negative impact.
The commitment by the mine to reinstate affected wetlands and to rehabilitate disturbed areas will result in a situation where the water management practices adopted by the water management area. It is recommended that the water uses as applied for by the mine be approved on condition that all water management measures as specified are implemented.

Wetland Delineation and functionality report

The wetlands were assessed as having a combined impaired Class D rating. It was determined that the wetlands are considered to be ecological important and sensitive. The biodiversity of these wetlands are usually very sensitive to flow and habitat modifications and plays a role in moderating the quantity of water in major rivers. However, in some instances, these functions could no longer be attributed to some of the wetlands.
The Wethealth assessment revealed that in terms of natural and human services the wetlands are moderately to seriously modified. The loss of natural habitats and basic ecosystem functions are extensive and were caused

due to extensive anthropological activities in the catchment. In the event that this wetland is subject to further degradation due to road construction and mining, Usutu Colliery will have to apply for a Section 21 (i) and (c) Water Use License authorisation. The water use authorisation will entail a proper rehabilitation plan as part of the closure plan.

River Health Assessment

Biomonitoring was conducted at two points in the Witpuntspruit upstream from the confluence with the Vaal River on the Farm Janhendriksfontein 263IT and upstream from the Camden Power station. The reference site was selected in the upper parts of the Wipunt Spruit upstream from the confluence with the Humanspruit. However, the reference site was also situated downstream from several coal mining operations in the catchment. Biomonitoring was conducted along with surface water monitoring to determine the current state of the surface water resource and its associated aquatic community.
The biomonitoring points selected in the Wipunt Spruit and Humanspruit respectively were at the two bridges where these watercourses transect the N2 road with a third point (UCREF) selected in the Witpuntspruit to act as a reference site. UC01 was located in the Witpuntspruit upstream of Camden power station and just downstream from the Usutu west coal operations at the bridge on the N2 opposite the turn off to Camden Village.
UC02 was a further 300 meters upstream from the rehabilitated mining areas of Usutu West coal operations at the bridge on the N2 crossing the Humanspruit just before the Camden power station turnoff. The tributary falls within the C11B quaternary drainage area. According to the Ecological Water Requirements Assessment conducted by Department of Water Affairs and Forestry (2001), the Present Ecological Status (PES) of C11B quaternary drainage area is D, largely modified. This category was used to determine the current reference scores for the stream.

The measured biota-specific water quality viables indicated that the stream could support aquatic life. The invertabrate Habitat Assessment Sytem (IHAS) showed that UC01 and UC02 were within the range expected from largely impaired stream that could not support a diverse macro-invertabrate fauna. It is also important to remember that this biomonitoring was conducted directly downstream of mining operations. This might have influenced the availibility of habitats. The SASS5 scvores at both monitoring points were much lower than the reference score. Of the 13 taxa that were found during the study, only two families found at UC01 were sensitive to pollution while no sensitive secies were found at UC02. The reference site hosted five sensitive speciees out of a tptal of 21 taxa identified. Compared to the reference scores, UC01 was severely impaired, while UC02 was largely impaired. Impacts on both monitoring points include upstream impacts from the agricultural land use activities, sediment from the coal mining activities and power generation, litter from the N2 and erosion.

Visual Impact Assessment

The construction and operation of the Usutu mine related activities and its associated infrastructure will have a visual impact on the natural scenic resources and the topography. However, with the correct mitigation measures the impact can be decreased to a point where the visual impact can be seen as insignificant.

The moderating factors of the visual impact of the facility in the close range are the following:

- Short exposure time of road users
- The time the structure will be visual due to roll-over mining

- Number of human inhabitants located in the area
- Natural topography and vegetation
- Mitigation measures that will be implemented
- Medium to high absorption capacity of the landscape

In light of the above mentioned factors that reduce the impact of the facility, the visual impact is assessed as LOW VISUAL IMPACT after mitigation measures have been implemented.

Traffic Impact Assessment:

This traffic impact assessment was done as part of the environmental impact assessment for the Vunene Colliery (Pty) Ltd located on Leeuwenburg 137IT, Roodewal 270IT, Holbank 265IT, Vlakfontein 266IT, Mooiplaats 290IT, Witpunt 267IT, Transutu 257IT and Jan Hendriksfontein 263IT in the Msukaligwa Local Municipality, Mpumalanga Province.

The mining area covers a large area and opencast as well as underground mining operations are envisaged. The opencast mine has an expected life of 30 years with the production off approximately 3 000 000 tons/ annum. The underground portion of the mine has the same expectancy. This project is an extension of the existing mining operations at Usutu West Colliery. The colliery has an existing access to the N2 just west of the access to the Camden Power Station.

A traffic statement was conducted by Via Magna for the relocation of the Camden Power Station access in June 2012. The reason for the relocation of the access on the N2 was to mine the coal underlying the existing access road to Camden Power Station. The intention is to relocate the access approximately 1km (towards Witpuntspruit).

The proposed relocation was approved by SANRAL subject to a number of conditions. One of the conditions is that the Usutu West Colliery access (current access to the mine) must be relocated at the same time that the Camden Power Station access is relocated.

The extension of the mine requires a separate access for mining activities in Block D on the N2. This was discussed with SANRAL and an access could be supported, again subject to conditions that will be imposed if the access is approved.

The mine is not a land use for which trip generation figures are available in the “SA Trip Generation Rates”. The trip generation will be based on employment figures and operational information provided to the sub consultant for the project. Shift changes times and the method of moving product between the mine and Camden Power Station plays a major role in the trip generation. In this instance the mine is and existing operation with trucks delivering coal to Camden Power Station. This will continue with between 120 and 150 x30 ton truckloads per day for 24 hour operations.

Land capability Assessment

According to the parent material maps the study area has Arenite and sedimentary sandstone parent material. According to the 1:250 000 land types map the specific ecotope for the area under investigation have mesotrophic and eutrophic soils on a plinthic catena with some duplex and gleyic soils on the valley bottom.

The topography of the area is a typical gentle rolling landscape with slopes of 2-3%, with drainage areas and wetlands in the valley bottom.

The soil investigation on the proposed area was done with a soil auger on a grid system. Profile pits were also opened on representative soil management units. Applying these criteria where possible to the soils that were mapped based on the limitations of the soils' chemical and physical characteristics and the site constraints. A combination of these variables was then used to obtain the land capability and agricultural potential of the soils.

The major soils forms that occur on the proposed development are as follow:
On the crests and mid-slopes the typical catena is Glencoe soils followed by Avalon soils on the lower mid- and foot-slopes and then Westleigh, Longlands, Katspruit and Rensburg soils associated with wetlands.

Glencoe (Gc)
The Glencoe soils have an Orthic A Horizon over a Yellow Brown Apedal B Horizon over Hard Plinthite. The average depth of the Glencoe soils range from 30-60cm on the crests to 60-90cm on the mid-slopes. Sub-dominant to Glencoe soils are Clovelly soils with hard rock in the sub soil.

Avalon (Av)
The Avalon soils have an Orthic A Horizon over a Yellow Brown Apedal B Horizon over Soft Plinthite. The average depth of the Avalon soils Glencoe soils range from 60-90cm on the mid- and foots-lopes. Sub-dominant to Avalon soils are Longlands soils on the foot-slopes.

Westleigh (We)
The Westleigh soil has an Orthic A Horizon over a soft Plinthic B horizon with some signs of wetness in the sub-soil. The depth ranges from 0—60cm depending on the wetness of the soil. Sub dominant to the Westleigh soils are Longlands, Katspruit and Rensburg soils forms all associated with wetland conditions.

The following table is a summary of the management units and their land capability potential.

Table 43: Land capability classes of different management units

Soil Management Unit	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
Soil Types	Avalon, Glencoe	Avalon, Glencoe,	Glencoe, Dresden	Westleigh, Longlands, Rensburg Katspruit	Disturbed Ares
Average soil depth	60-90cm	30-60cm	0-30	0-60cm	
Limiting Factors	Wetness, Depth	Depth, wetness	Depth, rock	Wetness,	
Agricultural potential	Medium to high	Low to medium	Marginal	Marginal	
Land capability	1	2	4	5-6	6
Recommended Land use	Arable, crop production	Arable crop production	Grazing	Wetlands	Wilderness/ Grazing
% of Area	126.1 (27.7%)	209.4 (46%)	28 (6.2%)	91.9 (20.2%)	6.6 (1.5%)

Special measures must be implemented in the soil stripping and rehabilitation process to restore the soils to an arable and grazing potential. The soils associated with wetlands are marginal for crop production but are very important from a wetland perspective. These soils should not be disturbed.

16. ANNEXURES

Annexure 1: Authority correspondence

Annexure 2: Public Participation

Annexure 3: Specialist Reports

Annexure 4: Technical Support Information

Annexure 5: Environmental Management Programme (EMPr)