



DRAFT SCOPING REPORT FOR THE NORTHERN COAL WELTEVREDEN OPEN CAST COAL MINE

NORTHERN COAL (PTY) LTD

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the dedet

Department:
Economic Development, Environment and Tourism
MPUMALANGA PROVINCIAL GOVERNMENT

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ENVIRONMENTAL

This document has been prepared by **Digby Wells Environmental**.

Report Title: Draft Scoping Report For the Northern Coal Weltevreden Open Cast Coal Mine

Project Number: NOR1982

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EXECUTIVE SUMMARY

Northern Coal (Pty) Ltd (hereafter Northern Coal) submitted a Mining Right Application (MRA) to mine coal on Portions 15 and 16 of the farm Weltevreden 381 JT within the Belfast area of the Mpumalanga Province (See Plan 1, Appendix A). The MRA was approved and a Mining Right has been granted by the Department of Mineral Resources (DMR) on 04 December 2013 (File Ref No.MP302/5/1/1/2/358 MR). Based on the results of feasibility studies, which took into account the demand for coal within the internal and international market, it would be economically viable for Northern Coal to undertake mining operations on the above mentioned portions.

Digby Wells Environmental (hereafter Digby Wells) has been appointed by Northern Coal as independent Environmental Assessment Practitioner (EAP) to undertake the environmental investigations, necessary public consultation and to compile the environmental reports required by the Department of Economic Development, Environment and Tourism (DEDET) in support of the environmental authorisation for certain listed activities associated with the mining project.

Northern Coal will be applying for environmental authorisations in terms of Section 24 of the National Environmental Management Act, Act No. 107 of 1998 (NEMA). Authorisations are required for listed activities in terms of the Environmental Impact Assessment Regulations and Listing Notices 1 and 2 (GN R. 543, GN R. 544 and GN R. 545). A list of all activities applied for are described in Section 2.2 of this report.

Project Description:

The Northern Coal Weltevreden Project proposed to develop an open pit coal mine for the mining of No. 2 Seam of the Witbank coal field. With the proposed mine development minimal infrastructure is planned.

Planned mine infrastructure will comprise of a crusher and screening plant, a 46 m³ above ground storage facility for hydrocarbons (which will be placed within a bunded area). A planned haul road will be constructed from the R33 road to the mining area and will have a width of 8 m and will be approximately 2 km long. Furthermore, it is also planned to widen the R33 will to construct a road crossing from the haul road into the R33. A diesel workshop will be constructed for maintenance of mine machinery. An explosives magazine will be placed on site. Water diversion berms will be built for dirty water/clean water separation. Temporary portable change house facilities, portable water storage tanks (for potable use) and offices will also be placed onsite.

Public Consultation Process:

The Public Participation Process (PPP) has been designed to comply with the regulatory requirements set out in the Environmental Impact Assessment (EIA) and provides a platform for transparent interaction with stakeholders. Included in the PPP are various phases and activities which are aligned with the NEMA requirements. In essence, these include the following for the Announcement Phase of the project:

- Identification of stakeholders that are interested and/or affected by the proposed project;
- Compilation of a stakeholder database which represent various sectors of society;
- Providing information about the proposed project to stakeholders, which included:
 - Background Information Document;
 - Announcement letter with Registration and Comment Sheet;
 - Placement of advertisement in newspapers; and
 - Placement of site notices.

For the Scoping Phase the Draft Scoping Report (DSR) is available to the public for comment and an Open House meeting is to be held with stakeholders where the DSR content will be discussed. Comments received during the Scoping Phase from stakeholders will be captured in a Comment and Response Report (CRR), which will be updated throughout the environmental regulatory process. The DSR will be updated once the public commenting period is complete and the Final Scoping Report put out for public comment. .

Purpose of this Report

The purpose of this Draft Scoping Report is to present the results of the scoping phase for the proposed project and subsequently, to recommend a Plan of Study for the EIA phase.

The scope of work for the compilation of this Report is as follows:

- Desktop studies to define the Terms of Reference (ToR) for the required baseline and specialist studies; and
- Development of the ToR for specialist baseline studies to be conducted.

Conclusion:

The overarching objectives of the EIA process will be to:

- Prepare integrated sensitivity maps for the study area based on the findings of environmental, socio-economic and cultural assessments as input into the project design process;
- Identify and assess the significance of potential impacts associated with the project activities; and
- Recommend mitigation and enhancement measures to ensure that the development is undertaken in such a way as to promote the positive impacts and to minimise the negative impacts.

Most specialist studies were already conducted during the MRA process and will be used for the proposed EIA study. Additional studies that are proposed to be conducted for the EIA process are:

- Flora and Fauna studies (within the areas of the proposed locations for the infrastructure);



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- Surface water study;
 - Geophysical studies (within the proposed locations of the planned PCDs).

LIST OF ACRONYMS

°C	Degrees Celsius
BID	Background Information Document
DEA	The Directorate responsible for environmental affairs within the Department of Water and Environmental Affairs
DEDET	Mpumalanga Department of Economic Development and Tourism
Digby Wells	Digby Wells Environmental
DMR	Department of Mineral Resources
DSR	Draft Scoping Report
DWA	The Directorate responsible for water affairs within the Department of Water and Environmental Affairs
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan



FSR	Final Scoping Report
GG	Government Gazette
GN R.	Government Notice in a Regulation Gazette
I&AP	Interested and Affected Party
km	Kilometre
kV	Kilo Voltage
LoM	Life of Mine
m	Metres
m/s	Metres per second
MAP	Mean Annual Precipitation
mbgl	Metres below ground level
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MRA	Mining Right Application
N4	National Highway Number 4



NEM:BA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
No.	Number
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PPP	Public Participation Process
R33	Regional Route 33
ROM	Run of Mine
WULA	Water Use Licence Application



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1 INTRODUCTION

Northern Coal (Pty) Ltd (Northern Coal) holds a Prospecting Right for coal on Portions 15 and 16 of the farm Weltevreden 381 JT within the Belfast area of the Mpumalanga Province. Based on the prospecting programme, feasibility studies, and accompanied by the current price and demand for coal within the internal market, Northern Coal has found it economically viable to undertake mining operations on the above mentioned portions. Northern Coal has accordingly submitted a Mining Right Application (MRA) in order to undertake mining activities on Portions 15 and 16 of the farm Weltevreden 381 JT. The Mining Right was granted on 04 December 2013 by DMR (File Ref No.MP302/5/1/1/2/358 MR)

Digby Wells Environmental (hereafter Digby Wells) has been appointed by Northern Coal as independent environmental assessment practitioners to undertake the environmental investigations and document compilation for various environmental activities anticipated to occur due to the planned open pit mine on the above mentioned farms.

In accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) a Scoping Report is required in terms of listed activities stipulated in Government Listing Notices 1 to 3 (GN R. 544, GN R. 545 and GN R. 556. This environmental Scoping Report will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism (DEDET) in order to obtain authorization for the undertaking of proposed listed activities to occur on the above mining site.

Therefore, this Scoping Report is being compiled in support of the NEMA processes. This Scoping Report:

- Describes the methodology applied to conduct the scoping;
- Provides details of the Environmental Assessment Practitioner (EAP) and their expertise to carry out the scoping procedures;
- Identifies key legislation and guidelines that have been considered in the preparation of the Scoping Report;
- Details the current state of the environment;
- Identifies and describes the anticipated environmental and social impacts, including cumulative impacts in respect of the listed activities;
- Provides details on alternative means to carry out the operation and the impact of not proceeding with the proposed project;
- Describes the most appropriate procedure to plan and develop the project;
- Describes the process of engagement followed to date and the further consultation planned for the proposed project; and
- Describes the investigations that will be incorporated in the Environmental Impact Assessment Report (EIAR).

2 LEGISLATIVE REQUIREMENTS

The following legislation and guidelines are applicable to this project and will be considered during the EIA process:

2.1 Constitution of the Republic of South Africa, Act No. 108 of 1996

Section 24 of the Constitutional Act states that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that -

- i. Prevents pollution and ecological degradation;
- ii. Promotes conservation; and
- iii. Secures ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

In support of the above rights, the environmental management objectives of proposed project are to protect ecologically sensitive areas and support sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the project areas.

2.2 National Environmental Management Act, Act No. 107 of 1998

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) provides for cooperative environmental governance by establishing principles for decision making on matters affecting the environment, institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state.

NEMA also provides for matters related to sustainable development, which means the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure that development serves present and future generations. To achieve the above objectives, the Act makes provision for the use of the EIA process as a tool for environmentally sound decision-making. The EIA process is regulated in terms of the Government Notice Regulations published in GN R. 543, GN R. 545 and GN R. 546 issued on 18 June 2010 ("EIA Regulations"), in accordance with the provisions of Sections 24(2) and of 24D of NEMA.

As the project activities associated with the project require the construction and operation of new infrastructure, a Scoping and EIA study is required to comply with NEMA for the authorisation of listed activities contained in GN R. 544 of 18 June 2010 (Listing Notice 1), GN R. 545 of 18 June 2010 (Listing Notice 2) and GN R. 546 of 18 June 2010 (Listing Notice 3) published in terms of Sections 24(2) and 24D of NEMA.

Table 2-1 below provides a summary of the listed activities for which Northern Coal requires an Environmental Authorisations.

Table 2-1: The listed activities Northern Coal intends to apply for in terms of EIA Listing Notices

Government Notice Regulation (GN R.)	Listed activity number	The proposed activity
Notice No. 544, 18/06/2010	11(iii) and (xi)	Construction of two river crossings
Notice No. 544, 18/06/2010	22(i)	Widening of an existing road for the construction of a crossing to the mining Site
Notice No. 544, 18/06/2010	22(ii) (iii)	Construction of access road wider than 8 m
Notice No. 544, 18/06/2010	23 (ii)	The combined area covered by mine infrastructure will be in excess of one hectare.
Notice No. 545, 18/06/2010	5	The construction of two pollution control dams (PCD's), and a ROM Stock pile which required an Integrated Water Use Licence in terms of Section 21 of theNWA.
Notice No. 546, 18/06/2010	4(a)(ii)(ee)	For the construction of a road wider than 4 m in a biodiversity sensitive area
Notice No. 546, 18/06/2010	10(ii) (ee)	The construction of above ground diesel storage to a total capacity of 46 m ³

2.3 National Water Act, Act No. 36 of 1998

In accordance with Section 21 and 40 of the NWA a water use licence application has been submitted to the DWA. The Water Use Licence Application covers the following water uses::

- Section 21 b – Storage of water for both raw and potable water use;
- Section 21 c – Impeding or diverting the flow of water in a water course for crossing of streams via causeways as there is a stream crossing the mining area;
- Section 21 g – Disposing waste or water containing waste in a manner which may detrimentally impact on a water resource for the pollution control dams, overburden dumps, coal stockpiles and discard dumps;
- Section 21 i – Altering the bed, banks, course or characteristics of a watercourse; and
- Section 21 j – Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity for the safety of the people for

the dewatering of the mining pits to facilitate mining and to provide a safe mining environment.

2.4 Government Notice GN R. 704

Regulation 4 of this government notice states that no residue deposit, reservoir or dam may be located within the 1:100 year flood line, or less than a horizontal distance of 100 m from the nearest watercourse. Furthermore, no person or persons may dispose of any substance that may cause water pollution.

Regulation 5 states that no person(s) may use substances for the construction of a dam or impoundment if that substance will cause water pollution. Regulation 6 is concerned with the capacity requirements of clean and dirty water systems, while Regulation 7 details the requirements necessary for the protection of water resources.

Where any of GN 704 regulations are contravened, the user should apply for an exemption of regulations 4 and 5 from the Minister.

2.5 The National Environmental Management: Biodiversity Act, Act No. 10 of 2004

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) controls Indigenous Biological Resources. NEM:BA provides for the consolidation of biodiversity legislation through establishing national norms and standards for the management of biodiversity across all sectors and by different management authorities.

2.6 Minerals and Petroleum Resources Development Act, Act No. 28 of 2002

Northern Coal (Pty) Ltd is in possession of a Mining Right for the mining of coal on Portions 15 and 16 the Farm Weltevreden 381 JT.

2.7 Additional Legislation

The EIA study is not only subject to the terms and regulations of the MPRDA, NEMA, NEM:WA and the NWA, but must also comply with other applicable South African statutory requirements and guideline documents relevant to the proposed Project. Table 2-2 includes a non-exhaustive list of legislation and guidelines that will be considered during the EIA.

Table 2-2: Additional National Legislation, Associated Regulations and Guidelines Applicable to the Proposed Project Area

Water
<ul style="list-style-type: none">■ Water Services Act, 1997 (Act No. 108 of 1997)■ DWAF: Best Practice Guideline G1: Storm Water Management (Aug, 2006);

<ul style="list-style-type: none"> ■ DWAF: Best Practice Guideline G2: Water and Salt Balances; August 2006; ■ DWAF: Best Practice Guideline A4: Pollution Control Dams (PCDs) (Aug, 2007); ■ DWAF: Best Practice Guideline GH: Water Reuse and Reclamation, June 2006; ■ SA Water Quality Guidelines – Aquatic Ecosystems, 1996, and ■ SA Water Quality Guidelines – Domestic Water Use, 1996.
<p>Heritage Resources</p>
<ul style="list-style-type: none"> ■ National Heritage Resources Act, 1999 (Act No. 25 of 1999).
<p>Fauna and Flora</p>
<ul style="list-style-type: none"> ■ National Environment Management: Biodiversity Act, (Act No. 10 of 2004) (NEM:BA); ■ National Forest Act, 1998, (Act No. 84 of 1998); ■ Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983); and ■
<p>Atmospheric Emissions</p>
<ul style="list-style-type: none"> ■ National Environmental Management: Air Quality Act, 2004 (Act No. 36 of 2004) including Government Notice 220 of 26 March 2010; ■ DEAT Air Quality Guidelines; and ■ SANS 1929:2005 Edition 1.1 – Ambient Air Quality Limits for Common Pollutants.
<p>Hazardous Materials</p>
<ul style="list-style-type: none"> ■ Hazardous Substances Act, 1973 (Act No. 15 of 1973); ■ Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).
<p>Noise</p>
<ul style="list-style-type: none"> ■ National Environmental Management: Air Quality Act, 2004 (Act No 39 of 2004); and ■ SANS 10103:2008 The Measurement and Rating of Environmental Noise with Respect to Land Use, Health, and Annoyance and to Speech Communication.
<p>Roads & Rail</p>
<ul style="list-style-type: none"> ■ National Road Traffic Act, 1996 (Act No 93 of 1996); ■ National Road Traffic Act Regulations, GN R. 225 of 2002; ■ SANS 10228;

- SANS 10231;
- SANS 10232-1;
- SANS 10229:2005; and
- SANS10233;

3 SCOPING METHODOLOGY

As mentioned above, Digby Wells was appointed to investigate the environmental aspects associated with the proposed NEMA listed activities that will be applied for. The EIA will include aspects such as the physical, biological and social environment and will be a general evaluation of the status of the pre-construction environment.

The scoping methodology applied included:

- The collation of data;
- Review of the proposed project activities;
- Identification of alternatives, positive and negative risks and potential impacts;
- Identification of information shortfalls to guide further specialist studies and
- The engagement of interested and affected parties and authorities.

The information in the Scoping Report has been compiled from various sources, including the client, site visits, interviews and meetings, literature reviews and documentation.

The mine works programme, which describes the proposed mining process, infrastructure, tonnages, workforce and financial requirement to undertake the proposed mining project, was reviewed prior to submission and alternatives evaluated. An MRA, associated Scoping Reports and EMP were submitted and approved by the DMR on 04 December 2013 as a part of the granting of the Mining Right (File Ref No.MP302/5/1/1/2/358 MR); these documents were reviewed in the compilation of this Scoping Report.

The positive and negative potential impacts that the proposed listed activities will have on the environment are also identified in this Scoping Report.

An assessment of the information required to evaluate the identified impacts objectively has been compiled and a description of further investigations that will be required in the impact assessment studies is given. This includes all issues identified that require further investigation to gather information necessary to fully assess the impacts and compile an appropriate management plan.

The Public Participation Process (PPP) is of great significance. It is important that stakeholders affected by the project are given an opportunity to identify issues relevant to them as well as ensuring that local knowledge and values are understood and utilised. The views of Interested and Affected Parties (IAPs) will be taken into account when deciding between alternative actions, in exploring the importance of issues, and when framing mitigating measures, compensation provisions and management plans.

This Scoping Report will provide the framework for the EIAR, where the identified issues will be described in detail, impacts assessed and mitigation methods discussed. The EMP that will form part of the EIAR will deal with the implementation and monitoring of these mitigation measures.

4 ENVIRONMENTAL ASSESSMENT PRACTITIONER

4.1 Digby Wells Environmental

Digby Wells was appointed by Northern Coal as the Independent Environmental Assessment Practitioner (EAP) responsible for undertaking the EIA process and associated investigations for the envisaged listed NEMA activities set out in section 2.2 of this Scoping Report. Digby Wells is a South African company with international expertise in delivering comprehensive environmental and social solutions for clients in diverse sectors including the energy, minerals, and mining industries.

Particulars of the EAPs are provided in Table 4-1 below:

Table 4-1: Particulars of the EAP compiling the Scoping Report and managing the EIA Study

EAP Name:	Digby Wells Environmental
Contact Person:	Lucy Koeslag
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Postal Address:	Private Bag X10046, Randburg, Gauteng, 2125

5 PROJECT DESCRIPTION

5.1 The Applicant

The Applicant's details are provided in Table 5-1 below:

Table 5-1: Particulars of the Applicant

Applicant Name:	Northern Coal (Pty) Ltd
Contact Person:	Mr G. W. Middup
Telephone No:	+27 11 882 7204
Fax No:	+27 11 882 9044
Email address:	Greg@portaclone.co.za
Physical Address:	158, 10 th Road, Ktw, 2132

Postal Address:	P. O. Box 52651, Saxonwold, 2132
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5.2 Regional Locality

The Northern Coal Weltevreden Project is located within the Witbank coal field, 10km south of Belfast in the Mpumalanga Province. The location of the project area can be seen on (Plan 1, Appendix A). The project area falls within the Emakhazeni (Highlands) Local Municipality and the Nkangala District Municipality. The mining site of Portions 15 & 16 of the farm Weltevreden 381 JT is accessible from the R33 Regional route towards Belfast which links to the N4 National Highway. Site co-ordinates are 25°43'0"S: 30°03'0"E.

5.3 Land Tenure

The mining activities of the Northern Coal Weltevreden Project will be undertaken on Portions 15 and 16 of the Farm Weltevreden 381 JT, with a total size of 513.8ha. . Table 5-2 below gives the land owner information of these two Portions and table 5-3 gives the information of the adjacent land owners to the operation.

Table 5-2: Landowner details of the project area

Farm Name	Portion	Landowner
Weltevreden 381 JT	15	Mr Willie Pretorius
Weltevreden 381 JT	16	Mr Willie Pretorius

Landowners adjacent to the proposed project site are listed in Table 5-3 below.

Table 5-3: Adjacent landowners to the Weltevreden Project

Farm Name	Portion	Landowner
Weltevreden 381 JT	2	Therésilda Lotter
Weltevreden 381 JT	9	Sameul Johannes Lundall
Weltevreden 381 JT	RE	Sameul Johannes Lundall
Zoekop 426 JT	10	Highlands Organics
Weltevreden 381 JT	4	André Viljoen
Blyvooruitzicht 383 JT	16	Willem Pieter Pretorius
Blyvooruitzicht 383 JT	17	Jozef Benjamin Kotzé

5.4 Project Description

5.4.1 Coal Deposit

The Northern Coal Weltevreden Project involves the open pit mining of the No. 2 Seam of the Witbank coal field. The seam thickness varies from 1.2 m in the north section of the mining area to 4.15 m in the south west portion of the mining area. The coal deposit is a 'C' grade coal which is ideal for sale to Eskom. Table 5-4 shows that the coal reserve to be mined meets the Eskom specification requirements.

Table 5-4: Eskom specification versus coal reserve on Weltevreden

	Eskom Specification	Weltevreden ROM (Raw)
Calorific Value (MJ/kg)	> 20	22.18 average
Ash content (%)	< 30	24.74 average
Volatile content (%)	>21	22.00 average
Sulphur content (%)	<1.5	0.94 average

5.4.2 ROM and LoM

The total ROM coal to be extracted is estimated at 7.512 Mt during the LoM of approximately 7 years.

5.4.3 Mining Method

The mining method that will be undertaken in order to remove the coal seam will be truck and shovel roll over method at a strip ratio of 5:1. Roll over mining or strip mining is undertaken by creating an initial cut or strip which is mined out. As mining progresses into the second strip, the overburden from the second strip is backfilled into the initial cut, and so on into subsequent excavations. The overburden from the initial cut is used to backfill the final cut. Approximately 187.51 ha will be disturbed which equates to approximately 38% of the total project area. The open pit mining will be undertaken in three phases or sections which will result in the coal resource to be mined through three consecutive pits. In Plan 2 (Appendix A) it is indicated how the proposed opencast area has been divided into three pits and the direction of mining has also been included. Mining will be undertaken in this manner in order to stay outside of the 100 year flood lines of the intermittent stream that runs through the project area and outside of a 100 m buffer zone from the stream or delineated wetland area (the area which is greater will be adhered to) in accordance with Regulation 704. It is also necessary due to the high stripping ratio of the northern section of the coal reserve.

5.4.4 Beneficiation

The coal does not require beneficiation. Table 5-4 above, shows that while the coal meets the requirements of Eskom's specification, it would not be economic to beneficiate it apart from crushing. The coal deposit is therefore viable for sale directly to Eskom. Extracted coal will be crushed and placed on a ROM stockpile which will not exceed 5 000 tonnes. ROM coal will then be transported off site to its final destination which shall be a nearby Eskom facility. Correspondence regarding negotiation in securing supply with Eskom will be included in the EIA, since the destination of the coal has not finally been determined.

The location of the opencast area as well as the associated infrastructure can be seen on the conceptual mine plan (Plan 2, Appendix A).

5.5 Mine Infrastructure and Servitudes

Minimal mine infrastructure will be developed for the Weltevreden Project. A small scale fixed crusher plant will be established on site. This crushing and screening plant will comprise of a primary tip, a primary crusher, a scalping screen, a secondary crusher and five conveyors. Electricity will be obtained from the current power supply crossing the farm with permission from Eskom. This power line will not require relocation for the mining operations. Other infrastructure includes a portable temporary office and toilets as well as portable water storage tanks for domestic use.

A 46 m³ above ground storage facility for hydrocarbons will be placed within a bunded area on site. A haul road will be constructed from the R33 to the mining area and will have a width of 8m and will be approximately 2 km long. The R33 will be widened to construct a road crossing from the haul road into the R33. Temporary change houses will be placed on site. A diesel workshop will be constructed for maintenance of mine machinery. An explosives magazine will be placed on site. Water diversion berms will be built for dirty water/clean water separation. Areas will be cleared and concreted for waste management purposes (none of the waste activities are anticipated to require a waste a management licence in terms of Section 21(b) of NEM:WA).

5.6 Waste Management

5.6.1 Mine Waste

No mine waste is expected to be generated on site. Extracted coal will be crushed and added to the ROM stockpile which will not exceed 5 000 tonnes. Coal will be continually transported off site by road.

5.6.2 Hazardous Waste

Hydrocarbon waste generated due to onsite maintenance will be stored in separate drums and disposed of by a reputable contractor. All waste other than hydrocarbon waste and other hazardous waste, shall be collected in waste skips and disposed of at a licensed municipal waste facility.

5.6.3 Sewage Effluent

A sufficient number of chemical toilets will be provided on site to service all staff. The facilities will be maintained by a reputable contractor and sewage will be removed from site and treated at a suitable sewage treatment works.

5.7 Water Use and Resource

The current use of water is determined by the land usage. The surrounding land use is agricultural in nature and is sparsely populated by farm owners, tenants and farm labourers. Agricultural activities consist of crop farming, where soil conditions are favourable, and stock farming. The water resources available are small streams and pans and the groundwater yield from the weathered and fractured Karoo aquifers.

The water requirements for the proposed operation are minimal and will mainly be required for domestic use and dust suppression. The required domestic water will most likely be obtained from boreholes on site since the area is allowed groundwater abstraction (under general authorizations, 1999) of 60 m³/ha per annum (DWAf, 1999). Should the volume of abstraction exceed the 60 m³/ha per annum, the additional requirement will be included in a Water Use Licence Application (WULA). No abstraction of water is envisaged from the mining activities.

In-pit dirty water will be used for dust suppression on haul roads and other denuded areas. Dust suppression has the potential to require a considerable amount of water. Northern Coal will investigate dust prevention methods that will reduce watering requirements.

5.8 Storm Water

Storm water will be managed as per GN R.704, regulations on use of water for mining and related activities aimed at the protection of water resources (GG 20119 of 4 June 1999). Clean storm water will be directed away from the mining operations using berms and dirty water will be captured within the dirty area and directed towards a pollution control dam for settling and evaporation. The pollution control dams will be sized such that it will be able to contain the run-off from a 1:50 year storm event. Mining will occur outside the 100 year floodline. No streams will be diverted as part of this project.

5.9 Transport

The final destination of coal could be any of several coal power stations in the surrounding area. The following power stations are within economic road-haul distance of the Weltevreden project area:

- Arnot Power Station – 45 km
- Camden Power Station – 122 km
- Hendrina Power Station – 93 km
- Majuba Power Station – 180 km

- Tutuka Power Station – 202 km
- Komatipoort Power Station – 112 km

The transport route that will be taken by the coal trucks is dependent on which of the above power stations Northern Coal secures a supplier contract with. It is clear that the road network within the entire Mpumalanga coal mining district is currently degrading due to the continual increase in heavy load haul trucks using the network to transport the coal from the supply to the consumer. The transportation of the coal via haul truck holds many disadvantages and will add to the already stressed road network. It is estimated that approximately 127 trucks will be leaving the site daily. Negotiations with Eskom will take place to determine the destination of the coal from Weltevreden. Northern Coal is investigating the option of the transport of coal via rail through the use of private rail sidings in Belfast, as certain Eskom utilities are able to receive coal by rail and this will result in shorter required road haulage.

A bus service will be provided for the transportation of the workers to site from the local towns. No accommodation will be provided on site for labourers, neither will they be allowed to reside within the local communities, unless sourced from them.

6 ALTERNATIVES

A number of alternatives will be investigated during the EIA phase. Alternatives involve investigating alternative means of undertaking the project.

6.1 Coal Resource Alternative

The coal resource to be mined, as part of the proposed Weltevreden project, is located within the Witbank coal field. The Witbank coal field is part of the Central Basin coal reserves which falls predominantly within the Mpumalanga province. This area is the central supply area for the Eskom power stations in the vicinity. Mining of low grade coal, that meets Eskom's specification, is required in order for Eskom to meet increasing power demands across the country. In terms of resource alternatives, the Waterberg coal field is becoming an important future resource for coal requirements in order to meet demand. Currently this resource is constrained in being considered as an alternative resource site. The Waterberg coal field lies far from the industrial centres of the country and lacks significant infrastructure for its development. However, as Eskom expands operations in the Waterberg, this area will need to be considered more closely as a future resource alternative. As Eskom commissions the construction of new power stations in the region, it would act as a catalyst for further development as there would be an ensured market for the low grade coal situated close to the coal reserve.

6.2 Mining Alternatives

The nature of the coal seams determines the preferred mining method. The location of the feasible coal determines the location of the mining operation. These two factors limit mining

alternatives that are available. The only possible alternative available will be the “no mining” option.

The depth to coal does not allow underground mining to take place. The No. 2 seam is the only seam on the property of economic value. The tonnage of the resource and the life of mine indicates the optimal mining rate and this in turn determines the mining method. Drag line operations or large scale mining will not be feasible.

6.3 Land Use Alternatives

When considering the allocation of land for development and in deciding applications for planning permission affecting agricultural land, the agricultural implications must be considered together with the environmental, cultural and socio-economic aspects. In particular, prime quality land should normally be protected against permanent development or irreversible damage.

Consideration of land use alternatives is one of the cornerstones of community planning. Land use decisions must be evaluated in terms of sustainability, broadly defined as balancing environmental, economic and social equity concerns. The primary land use categories that encompass basic functions are residential, commercial, industrial, recreational, institutional, and agricultural uses. Land use is determined by a number of factors namely; climate, resources, population growth, economic activity and topography. When considering a new development for an area, it is required that other land use alternatives are considered to ensure that the development is justified and viable. In the project area, present land use includes agriculture, residential, business, recreational, grazing and cattle farming. Alternative land use of the area that could also be viable is low cost housing.

Agriculture is the only current land use alternative and involves the production of maize. The remaining extent of the property is at present, not utilised. The land may also be used for additional agricultural purposes such as grazing. Alternatively the land may be returned to its natural state which may hold possible eco-tourism benefits, which is, however, an unlikely option.

Stock farming and cropping are the most suitable land uses on the site apart from coal mining. There are, however, a number of impacts that stock farming may have on the environment. The first such impact is that of vegetation disturbance and damage. Animals damage plants by eating, cutting, bruising and breaking them. Excessive stock farming may cause severe soil erosion. Another impact is that of soil disturbance. Animals alter the structure of soils by chipping or loosening the soil surface, or they may compact the soil depending on its moisture. Though the loosening of the soil can be advantageous, excessive soil loosening can cause soil loss through wind and water erosion. When soils are moist, they can easily be compacted through hoof action resulting in a loss of soil structure, which causes a reduction in infiltration, aeration and water holding capacity. General conditions for plant growth will become less favourable. These impacts are likely to be insignificant if correct management is applied.

The use of this land for stock farming compared to mining is less economical as mining produces greater value, far quicker than stock farming per unit area of land. Stock farming is extensive with large amounts of land needed to sustain the livestock. This not only means that more land will be subject to the impacts associated with this type of farming but also that it will be using more land than the mining operations with less economical gain per hectare used. Stock farming, however, provides income and food for the local population.

Crop farming results in whole areas of vegetation and the fauna dependant on them being destroyed for the areas under cultivation. The impacts may spread from the site if pesticides and herbicides are used which may wash off from the area. It is likely that a few years after crop farming has ceased vegetation diversity will recover and return to its former state over time if excessive erosion has not occurred. In the project area, although the soils lend themselves in areas to crop farming, lack of rain results in predominantly subsistence farming only, and limited commercial potential. Topographical disturbance may occur if contour drains are constructed.

The cumulative impact on the environment from agricultural activities can be highly significant. The use of fertilisers and pesticides can impact on local water sources and cause pollution. Dust and noise during ploughing and planting can be a nuisance factor, particularly with other agricultural or mining activities in the area. If more areas are used for agriculture, there will be a loss of natural habitats and biodiversity. Cumulative impacts are therefore negative overall and the impacts depend on the scale of farming.

Agriculture, in the form of crop production and grazing, can impact negatively, to some degree, on the environment. Agriculture does, however, provide a food source for communities. Mining will have an impact on the environment but the benefits of mining include social upliftment, provision of jobs, earning/generation of foreign currency and local economic development.

6.4 Mining Development and Infrastructure Alternatives

The mine planning has taken into consideration alternative opencast development and process of mining the coal. The alternative to one extensive pit is to mine the reserve in three pits which will allow for the preservation of the stream that cuts through the opencast area. An infrastructure alternative is to have temporary required facilities on site which reduces the impact on the receiving environment from infrastructure development.

6.5 No Mining Option

The current land use is agricultural, where land is planted to crops or pastures for grazing. The no-mining option will result in the continuation of such land use. Although economically viable, the continuation of agriculture will not provide the level of short-term economic growth to the area that mining would offer, such as increased employment of local residents, greater economic input into the area allowing better development of the towns and surrounding areas, and greater socio-economic stability in the area. After mine closure and rehabilitation of mined areas, the land capability may return to its current state allowing the continuance of

agricultural practices. The mine will also promote sustainable local economic development, to give communities the skills required to remain economically viable and successful after mine closure.

Not mining the coal reserves available on Weltevreden will prevent the use of a valuable coal reserve for the generation of electricity at a time where a much-publicised inability to generate enough electricity to sustain economic growth exists.

Northern Coal will furthermore forfeit its Mining Right, for which it has invested extensive time and resources, and as the resource can be economically mined additional applicants will in all likelihood apply in any event for a prospecting or mining right on the property.

7 STATUS OF CURRENT ENVIRONMENT

The status of the pre-mining environment was compiled from desktop studies and site visits by specialists. Each relevant environmental aspect is described independently.

7.1 Climate

The area is characterised by moderate summers, cold winters and summer rainfall. The average rainfall in the target area is 768 mm per annum. The rainfall distribution and total rainfall is typical of the Highveld region. The region is characterised by thunderstorms in the summer. Temperatures are also typical of what could be expected in the Highveld region, although lower temperatures could be expected on the high lying regions (ELM EMF, 2006).

Climate data was obtained from the Belfast weather station (05170412) from 2005 to 2007 and interpreted in order to give a description of the climate experienced in the area.

7.1.1 Mean Annual Rainfall

The Mean Annual Precipitation (MAP) for the Belfast area is approximately an average of 700mm with the highest concentration of rainfall been experienced between November and February (Figure 7-1).The winter months contribute very little to the annual rainfall amount.

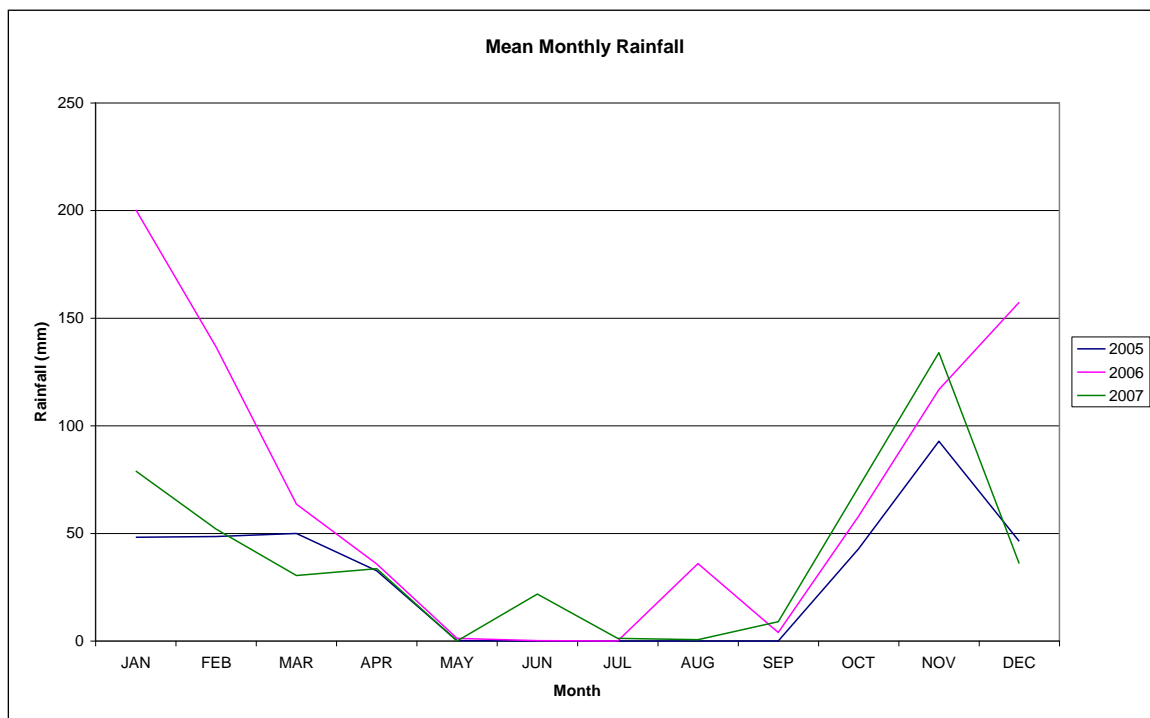


Figure 7-1: Mean annual rainfall for Belfast.

7.1.2 Mean Monthly Temperature

The area of Belfast experiences an average daily maximum temperature of 21°C. Temperature variations are experienced with seasonal changes with the average summer maximum temperature of 25°C which drops to 15°C during the winter months. The minimum temperatures in the area can drop to below 0°C during the winter months. Figure 7-2 illustrates the mean monthly maximum and minimum temperatures recorded at the Belfast weather station.

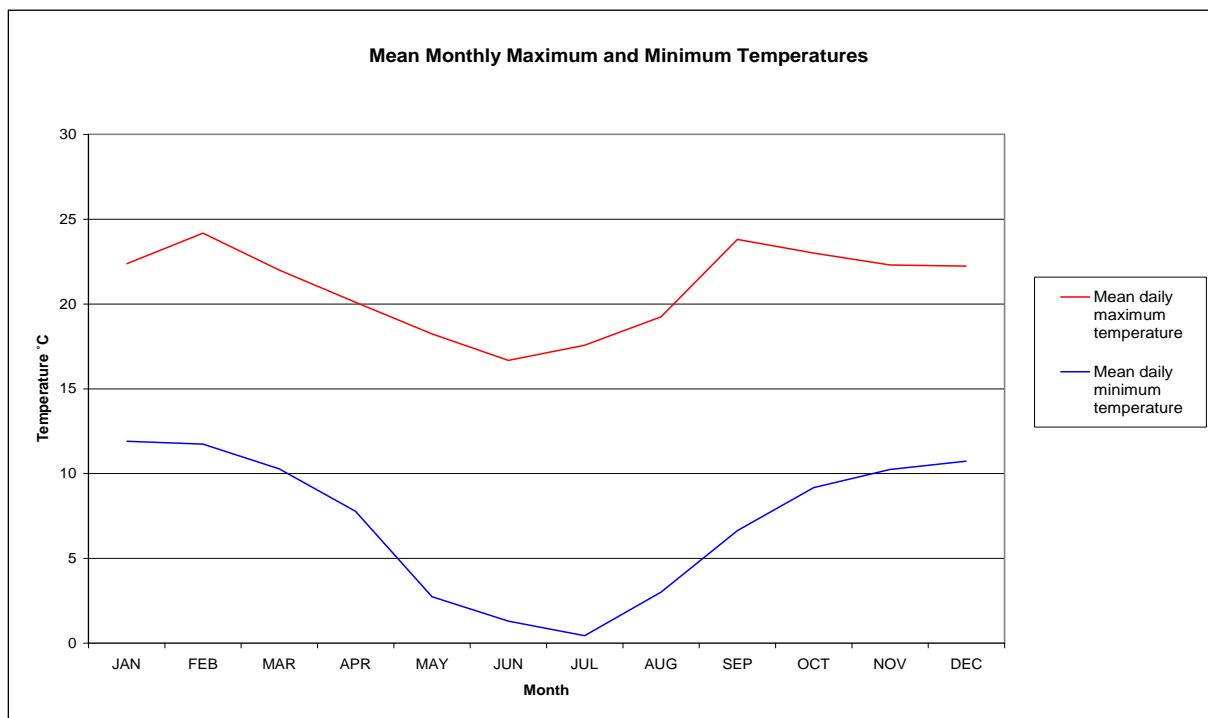


Figure 7-2: Mean monthly maximum temperature for Belfast weather station.

7.1.3 Mean Annual Wind Direction

Figure 7-3 represents the average annual wind direction and speed from 2005-2007 for the Belfast climate station. From the graph below it is clear that the predominant wind direction in the area is north-easterly. Only a small percentage of the average wind speeds experienced in the area exceed 5.6 m/s. According to monthly averages July is the windiest month.

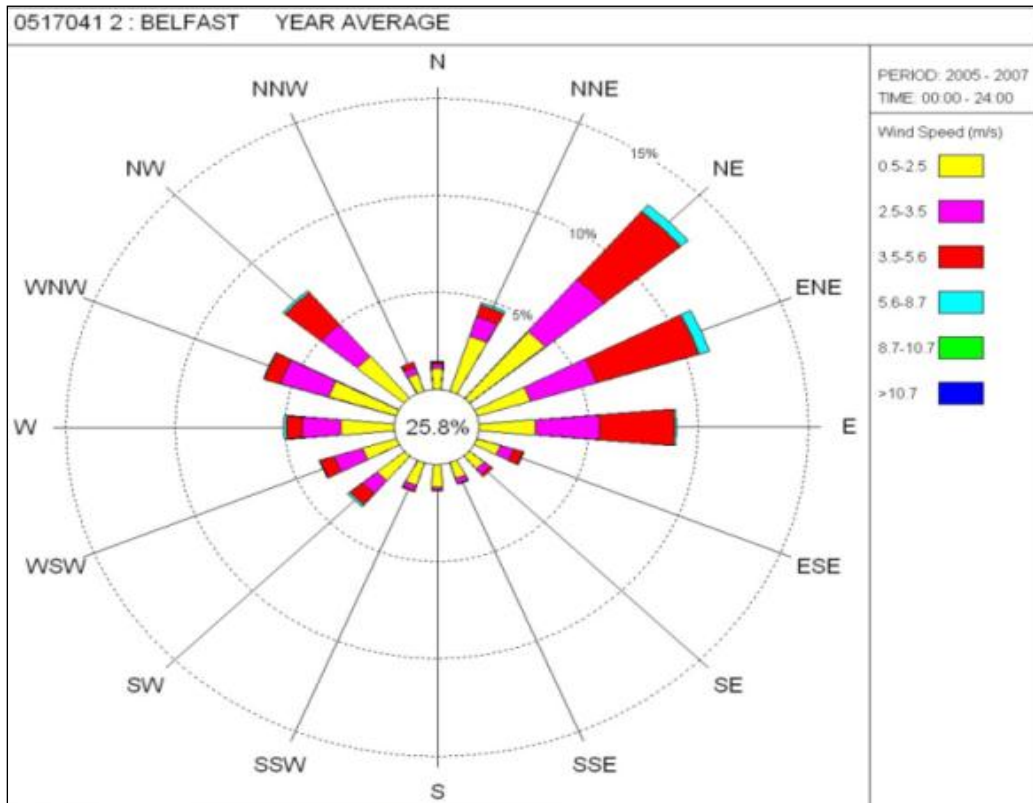


Figure 7-3: Average annual wind direction and speed for Belfast.

7.2 Topography

Topography is defined as the study of the earth’s surface features and predominantly involves the relief of the surface (area), vegetation cover and human activities. The topography has a strong relationship with the underlying geology and climate, thus there is a strong link between topography and the science of geomorphology. One of the objectives of topography is to describe spatial relationships in terms of relative position, both horizontally and vertically. This section will focus more on the relief of the topography and the associated impacts that the proposed development will have on the topography.

The site is located on the southern side of a major ridge; this is evident on (Plan 3, Appendix A). This ridge forms part of the primary catchment area boundary (watershed) of the Komati River. The site is located approximately 2.5 km from this watershed and thus is near the periphery of the catchment area at a high elevation (and at the source of the streams). This fact is important for surface water issues, as any polluted surface water on the site has the potential to pollute an important river system. On the site itself, the altitude varies between 1880 m above mean sea level (m.a.m.s.l.) at the highest point and 1795 m.a.m.s.l. at the lowest point, thus there is a range of 85 m between the highest and lowest points. This is further translated into an average gradient on the site of 4%.

7.3 Geology

As can be seen on the Geology Map (Plan 4, Appendix A), the site is located on the Vryheid formation (Pv) which is part of the Ecca group, which in turn is part of the Karoo Supergroup. The Karoo Supergroup covers a large tract of South Africa as it formed by the process of sedimentation within a deltaic, fluvial environment in the extensive Karoo Basin during the late Carboniferous to Middle Jurassic periods. The Vryheid formation typically comprises of fine to coarse-grained sandstones, shales and coal seams. It is the No 2 coal seam which is to be mined in this case. The strata of this formation are generally upward coarsening in grain, this is reflective of rhythmic or seasonal variations in fluvial input within the deltaic environment (Johnson et al, 2006). The coal seams generally developed as peat swamps on broad alluvial plains which were then covered and compacted in an oxygen free environment to form coal. The Vryheid formation overlays the Dwyka formation which rests on the Transvaal Supergroup.

As depicted on the map, there is Vaalian Diabase (V-di) present at the south-western corner of the site, an outcrop of this diabase was found in the valley bottom nearing this area, confirming its presence. There are no other faults, dykes or lineaments indicated on the site which are common in the Karoo Supergroup.

The No 2 seam is ranges from 0 m at outcrop to approximately 30 m below the surface and has a thickness of between 1.2 m and 3.62 m. The seam thickness decreases to the south of the site where it splits into two seams of 0.3 cm each separated by a mudstone and eventually outcrops as a carbonaceous mudstone. The seam dips generally in a south-westerly to southerly direction.

7.4 Soil and Land Capability

The soil types in study area are characteristic of a typical Highveld Soil Catena, including pedologically young and shallow lithosols of the Hutton (Hu), Shortlands (Sd), Swartland (Sw) and Glenrosa (Gs) Formations. The soils generally have a weak structure with medium to high organic content. Their red and yellow colours can be ascribed to the relatively high iron and magnesium content of the parent rocks.

The land capability of the Emakhazeni Local Municipality region in which the project area falls has been determined by the National Department of Agriculture and is based on soil classification. Table 7-1 shows the distribution of land capability classes that were used by the National Department of Agriculture. The region of the Emakhazeni Local Municipality has been classified as Class III or Class VI, which gives an indication that the area has generally moderate conditions for cultivation and soil management and conservation is required (ELM EMF, 2006).

Table 7-1: Land capability classes for Emakhazeni Local Municipality (EML EMF, 2006)

Land Capability Class	Percentage coverage in ELM	Description
Class I	0	No limitations
Class II	12.5%	Some limitations that reduce the choice of plants or require moderate conservation practices, less latitude in the choice of crops or management practices.
Class III	20.3%	Severe limitations that reduce the choice of plants or require special conservation practices, or both, may be used for cultivated crops, but has more restrictions.
Class IV	11.5%	Very severe limitations that restrict the choice of plants, requires very careful management, or both. It may be used for cultivated crops.
Class V	8.0%	Little or no erosion hazard but has other limitations impractical to remove that limit its use largely to pasture, range, and woodland.
Class VI	22.3%	Severe limitations that make it generally unsuited to cultivation and limit its use largely to pasture and range, woodland or wildlife.
Class VII	7.6%	Very severe limitations that make it unsuited to cultivation and that restrict its use largely to grazing, woodland or wildlife.
Class VIII	17.8%	Limitations that preclude its use for commercial plant production and restrict its use to recreation, wildlife, water supply or aesthetic purposes.

Land capability is the potential usefulness of land for agriculture which takes into consideration various environmental factors such as soil and climatic factors. Through determining the land capability of an area the agriculture potential can be determined. Plan 5 (Appendix A) gives an indication on the agricultural potential of the project area and the surrounding region. In accordance with Plan 5 (Appendix A) the project area has a high agricultural potential.

During the EIA phase site specific studies will be carried out to determine the site specific soil classification and land capability for the project area.

7.5 Land Use

Current land use in the Nkangala District is dominated by agriculture (in terms of the area occupied by this activity). In the southern part of the District, crop farming and some cattle farming are the major enterprises, while in the northern part of the District it is cattle and game farming. Subsistence farming (mixed farming and livestock) is the major enterprise in the north-western part, with associated rural residential land use; while in the eastern part, agriculture is complemented by eco-tourism and forestry (Nkangala District Municipality, 2006).

Maize for grain is the most important enterprise in Waterval-Boven and Belfast districts of ELM as it contributes 27% towards gross farming income in these two districts. The second most important enterprise is beef cattle, contributing 25% towards gross farming income. Dry land production represents 86% of total area under crops in ELM. The agricultural sector has been experiencing a sharp decline: average annual growth rates of -5.3, -11.5 and -21.5% are recorded for the Belfast, Lydenburg and Waterval-Boven magisterial districts, respectively. The agricultural economy across the area has been hard hit in recent years by changes in government policies, recession, and land restitution claims. By mid-2000, there were 900 land claims in the Lydenburg area, 270 in Belfast and 29 in the surroundings of Waterval-Boven (EML EMF, 2006).

Site specific land use is maize farming, with various other agricultural farming activities occurring in the surrounding area from cattle farming to organic cherry orchards. Agricultural land use therefore needs to be considered as an alternative land use to mining activities.

7.6 Surface Water

The project area falls within the X11 sub-catchment of the Komati River primary drainage region (quaternary catchment X11D). The farm Weltevreden is located on a watershed area which drains in a southerly direction. The intermittent stream that falls in the project area, as well as the intermittent streams in the surrounding area, drains into a main tributary of the Komati River which drains into the Nootgedacht Dam.

According to the National Water Resource Strategy (NWRS), the greater Inkomati Water Management Area (WMA) had a negative balance (deficit) of 258 Million m³/a for the year 2000 scenario (and 197 for the year 2025 scenario) based on the reconciliation of water requirements versus water availability in the area. Thus the WMA is regarded as stressed, and is excluded from the general authorizations for surface water abstractions and discharges to water resources while the abstractions of groundwater is limited to 60 m³/ha per annum (DWAF, 1999).

Surface water quality of the sites that can be potentially impacted from the proposed project and surrounding water resources (rivers, streams, pans) will be assessed. The data obtained will be benchmarked against the South African National Standards (SANS) 241 for drinking water (2005), South African Water Guidelines (DWAF, 1996) for the relevant users (domestic and agricultural – irrigation and stock watering). Where the Water Quality

Objectives (WQOs) have been set, these will have priority over the SANS and DWAF guidelines.

7.7 Groundwater

7.7.1 Conceptual Geohydrology

The hydrogeological significant units are generally identified as the upper weathered Ecca aquifer, the fractured aquifer within the competent Ecca sediments and the aquifer below the Ecca sediments.

The Ecca sediments are weathered to depths between 5 – 12 m below surface throughout the area. The upper aquifer is associated with this weathered zone and water is often found a few meters below the surface. Rainfall that infiltrates into the weathered rock reaches impermeable layers of sediment below the weathered zone, where it accumulates and groundwater flow is in a lateral direction following the surface slope. Water reappears as springs or seeps where the surface topography cuts into the groundwater level. The aquifer in the weathered zone is generally low yielding (0.02 – 0.5 l/s), because of its insignificant thickness.

Pores within the Ecca sediments, comprising the lower aquifer, are too well cemented to allow any significant groundwater flow. All groundwater flow occurs along secondary structures, such as fractures and joints in the sediments. Structures are better developed in the Sandstones, but it should be emphasized that not all fractures are water bearing. Of all the unweathered sediments in the Ecca, the coal seams often have the highest hydraulic conductivity.

Water quality in the weathered aquifer is very good and can be attributed to dynamic groundwater flow through the weathered sediments. Leachable salts in this zone have been washed from the system and it is only the slow decomposition of clay particles that contribute to the salt content in the water. (Grobbelaar *et.al.*2004)

7.7.2 Groundwater Recharge

This aquifer is recharged by rainfall and the percentage recharge is estimated to be between 1% and 3% of the annual rainfall or an average value of 14.8mm/a (2%) based on a MAP of 740mm.

7.7.3 Groundwater Levels

The data retrieved from the DWAF database shows that water levels in the Belfast district varies between 2 mbgl to 20 mbgl, measured over a period of 15 years. There is limited information regarding depths of the water strikes in the boreholes in the proposed mining area and therefore it is not possible to ascribe the measured water levels to a particular aquifer.

7.7.4 Borehole Yields

Groundwater yield is classed as low because 83% of boreholes on record produce less than 2 l/s in the Vryheid Formation (Barnard, 2000).

7.7.5 Groundwater Use

The boreholes in the proposed mining area are used for domestic purposes and livestock watering. The volume of water use from boreholes, recorded during the PPP registration process, varies from 4 m³/d – 1000m³/d per property. Neighbouring farmers have reported decreasing yields of boreholes; therefore the preservation of current yields is of importance,

7.7.6 Groundwater Quality

Data available to from the DWAF database indicate that the quality of groundwater is good with an average EC value of 24.8 mS/m, an average pH of 7.4. The concentration of all the cations, chloride, sulphate and heavy metals are well within the recommended acceptable limits (SANS 241:2005) for domestic and agricultural use. This is based on data available until 1995 in a 15km radius around Belfast. However discussions with IAPs in the area have indicated that old mining operations are impacting on current groundwater quality. This will be further investigated in the EIA phase.

When plotted on a Piper plot the data indicates a calcium/magnesium bicarbonate signature that is characterised by freshly recharge water, refer Figure 7-4 below.

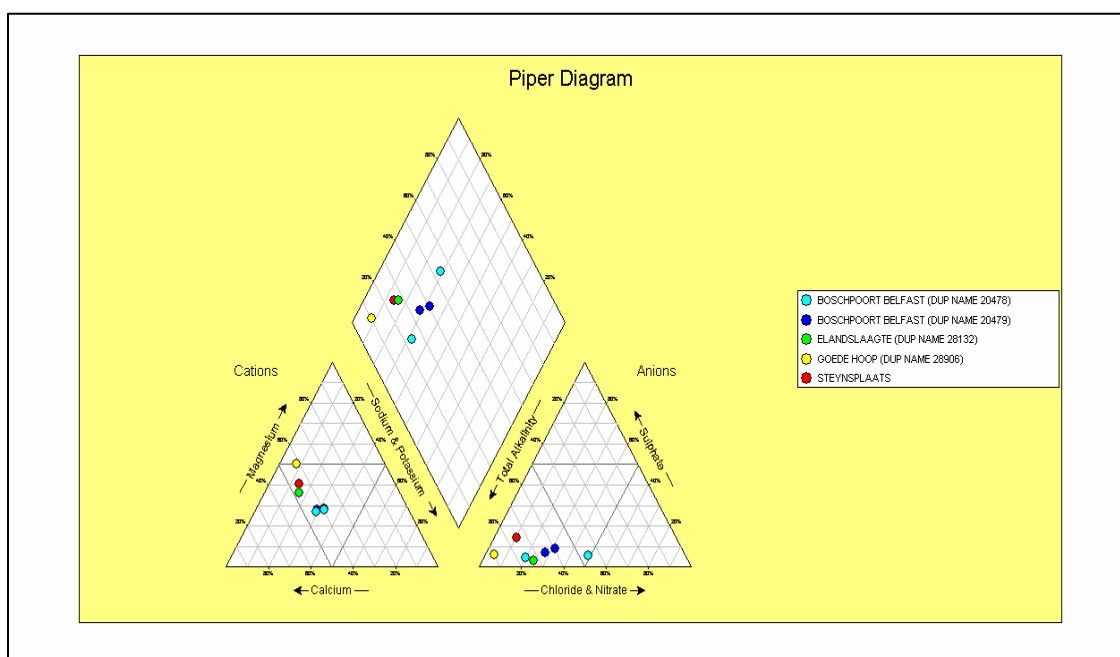


Figure 7-4: Piper diagram depicting calcium/magnesium bicarbonate signature.

7.8 Air Quality

It is expected that the levels of dust in the area are low during summer but increase during drier periods in the year. The dust present is predominantly from farming activities, such as ploughing and harvesting. It is also possible that wind carries dust from adjacent mining activities to the area. Driving on dirt roads also contributes to dust levels in the area.

7.9 Noise

Current noise levels in the area are generally expected to be low. Noise pollution in the area is caused by traffic on the R33 and N4. These roads are predominantly used by haul trucks and cars.

7.10 Vegetation

The area falls within the Moist Sandy Highveld Grassland vegetation type within the Grassland biome (Low & Rebelo, 1996), also known as the North-eastern Sandy Highveld, (Veld type 57 of Acocks; 1988). The vegetation corresponds to the *Cymbopogon-Themeda* Veld and corresponds to the Near-Bankenveld variation of the North-eastern Sandy Highveld. Dominant species and less dominant species typical of the Near-Bankenveld variation are indicated in Table 7-2 (Acocks 1988). Mucina *et al.* 2006 described the area as Eastern Highveld Grassland

Table 7-2: Plant species typical of the North-eastern Sandy Highveld vegetation type within which the Weltevreden project is located

DOMINANT SPECIES		
Alloteropsis semialata	Andropogon schirensis	Brachiaria serrata
Ctenium concinum	Digitaria tricholaenoid	Diheteropogon amplexans
Elionurus muticus	Eragrostis plana	Eragrostis racemosa
Eragrostis sclerantha	Harpochloa falx	Helichrysum oreophilum
Heteropogon contortus	Loudetia simplex	Microchloa caffra
Monocymbium ceresiiforme	Panicum natalense	Themeda triandra
Trachypogon spicatus	Tristachya leucothrix	Stoebe vulgaris*
SPECIES OF LESS GENERAL OCCURRENCE		
Aristida aequiglumis	Aristida junciformis	Dicoma anomalla
Diheteropogon filifolius	Eragrostis patensissima	Panicum ecklonii

Schizahyrium sanguineum	Sporobolus pectinatus	Rendlia altera
Tristachya rehmannii		

* *Alien plant*

The veld is dense with a grey, dead look of the Bankenveld in winter. The land is generally very arable and used for grazing and crop farming.

This vegetation type has a very poor conservation status (Low and Rebelo 6) (Plan 6, Appendix A). Moist Sandy Highveld Grassland is now largely ploughed and natural vegetation is restricted to patchy remnants that are often heavily grazed. The Nooitgedacht Dam Nature Reserve is the only official conservation area, but the Ermelo Game Park (situated South east of the site) represents a good example of this vegetation type (Low & Rebelo, 1996).

7.11 Fauna

7.11.1 Mammals, Birds, Reptiles and Frogs

Actual sightings, spoor, calls, dung and nesting sites were used to establish the presence of animals. No correlation between the presence of animals (except for the terrestrial macro invertebrates and frogs) and the vegetation units was drawn as these animals would tend to move through all the sample plots at some stage.

7.11.2 Terrestrial Invertebrates

An insect sweep net with a 400 mm diameter will be used to catch terrestrial insects. One hundred and fifty sweeps will be made in each sample plot so as to cover the area required to get a good representation of the insects inhabiting each plot. The captured insects will be placed in formalin to preserve them for identification purposes. Table 7-3 indicates some mammals that may occur within the boundaries of the proposed project area.

Table 7-3 : Mammals likely to occur in the area

Order	Scientific Name	Common Name	Status
Artiodactyla	<i>Antidorcas marsupialis</i>	Springbok	Least concern
Artiodactyla	<i>Damaliscus pygargus phillipsi</i>	Blesbok	Least concern
Artiodactyla	<i>Raphicerus campestris</i>	Steenbok	Least concern
Artiodactyla	<i>Redunca arundinum</i>	Reedbuck	Least concern
Artiodactyla	<i>Sylvicapra grimmia</i>	Grey /Common Duiker	Least concern

Order	Scientific Name	Common Name	Status
Carnivora	<i>Aonyx capensis</i>	Common Clawless Otter	Least concern
Carnivora	<i>Atilax paludinosus</i>	Water Mongoose	Least concern
Carnivora	<i>Canis adustus</i>	Side-striped Jackal	Near Threatened
Carnivora	<i>Canis mesomelas</i>	Black-backed Jackal	Least concern
Carnivora	<i>Caracal caracul</i>	Caracal	Least concern
Carnivora	<i>Cynictis penicillata</i>	Yellow Mongoose	Least concern
Carnivora	<i>Felis nigripes</i>	Black-footed Cat	Least concern
Carnivora	<i>Felis silvestris</i>	African Wild Cat	Least concern
Carnivora	<i>Galerella sanguinea</i>	Slender Mongoose	Least concern
Carnivora	<i>Genetta genetta</i>	Small-spotted Genet	Least concern
Carnivora	<i>Genetta tigrina</i>	Large-spotted Genet	Least concern
Carnivora	<i>Ictonyx striatus</i>	Striped Polecat	Least concern
Carnivora	<i>Leptailurus serval</i>	Serval	Near Threatened
Carnivora	<i>Suricata suricatta</i>	Suricate	Least concern
Carnivora	<i>Vulpes chama</i>	Cape Fox	Least concern
Insectivora	<i>Atelerix frontalis</i>	South African Hedgehog	Near Threatened
Lagomorpha	<i>Lepus capensis</i>	Cape/desert Hare	Least concern
Lagomorpha	<i>Lepus saxatilis</i>	Scrub/Savannah Hare*	Least concern
Rodentia	<i>Cryptomys hottentotus</i>	Common Molerat	Least concern
Rodentia	<i>Hystrix africeaustralis</i>	Porcupine	Least concern
Rodentia	<i>Otomys angoniensis</i>	Angoni Vlei Rat	Least concern
Rodentia	<i>Otomys irroratus</i>	Vlei Rat	Least concern
Rodentia	<i>Pedetes capensis</i>	Springhare	Least concern
Rodentia	<i>Rhabdomys pumilio</i>	Striped Mouse	Least concern

Order	Scientific Name	Common Name	Status
Rodentia	<i>Tatera brantsi</i>	Highveld Gerbil	Least concern
Tubulidentata	<i>Orycteropus afer</i>	Aardvark	Least concern

7.11.3 Birds that could occur in the area

A list of all the birds that may possibly be found in the area is provided in Appendix C. Roberts (2003) lists 388 species for grid reference 2530CC. This list is compiled using historical data and recorded sightings for the entire grid. Any Red Data Species found will be recorded and the GPS point taken for reference purposes

7.12 Sensitive areas

In ecological, social and economic terms, wetlands are among the most valuable and productive ecosystems on earth, providing important opportunities for sustainable development. Despite these values, however, wetlands in South Africa are rapidly being lost or degraded as a result of human activities. According to Lindley (1998) wetlands are under threat by industrial activities and expanding cities due to the rapid urbanisation and industrialisation that is common in developing countries like South Africa. It is estimated that more than 50% of South Africa's wetlands have been destroyed, making the protection of the remaining wetlands so much more important. According to BuaNews (2006) Mpumalanga has lost about half of its wetlands to mining, forestry, agriculture and urban development, hence the need to protect this resource.

The National Water Act defines wetlands as, "*land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.*"

Wetlands are protected by legislation as they are recognised as a valuable resource. In terms of the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention, 1975) to which South Africa is a party, the Contracting Parties must formulate and implement planning so as to promote as far as possible the wise use of wetlands in their territory (Article 3.1). Additionally, in terms of the Convention on Biological Diversity, to which South Africa is also a party, it is considered a duty to conserve wetlands and to rehabilitate them. The Constitution of South Africa also creates a duty on the State to conserve and rehabilitate wetlands (Section 24). Wetlands are protected by the National Water Act.

In compliance with the numerous legislations, wetland delineation will be carried out to identify and classify various wetland units and assess the ecological integrity and functions provided for by the different wetland units. The wetland areas considered for this study include the pan and adjacent hillslope seepage area connected to the pan, these wetland

units are situated on the periphery of the proposed opencast area. Additional wetland units considered further downstream of the proposed opencast area and within the study area include non-channelled valley bottom wetlands as well as hillslope seepage areas.

7.13 Socio-economic characteristics

7.13.1 Visual aspect

Mining developments generally have significant negative visual impacts due to the scale of the operations as well as the degradation of the environment. The visual aesthetic of the area is characterised by a hilly topography, covered by agricultural activity and grasslands. The proposed mining activity will have an impact on the visual aesthetic of the immediate surrounds.

7.13.2 Traffic and safety

The Weltevreden project area is located off the R33 towards Belfast which joins the N4. The coal extracted from the Weltevreden operation will be transported directly to Eskom power stations. The current options of supply include:

- Arnot power station – 45 km from site;
- Camden power station – 122 km from site;
- Hendrina power station – 93 km from site;
- Majuba power station – 180 km from site;
- Tutuka power station – 202 km from site, or;
- Komatipoort power station – 112 km from site.

The proposed method of transportation of the coal via haul truck holds many disadvantages and will add to the already stressed road network. If this option is chosen it is estimated that approximately 127 trucks will be leaving the site daily. Road transportation will increase safety risks on the road network and additional intersections may be required to reduce such safety risks. Northern Coal is currently investigating the use of private rail sidings in the Belfast area as an alternative option of transport which will reduce the need for long distance road haulage.

7.13.3 Socio-economic environment of the municipal areas

The population of Emkhazeni Local Municipality amounts to 43 007 persons in accordance to Statistics South Africa which has been updated to currently being more than 59 000 persons as estimated by a Social Service Department study. This makes up 4.2% of the total of Nkangala District Municipality and 1.3% of the population of Mpumalanga (ELMIDP, 2007).

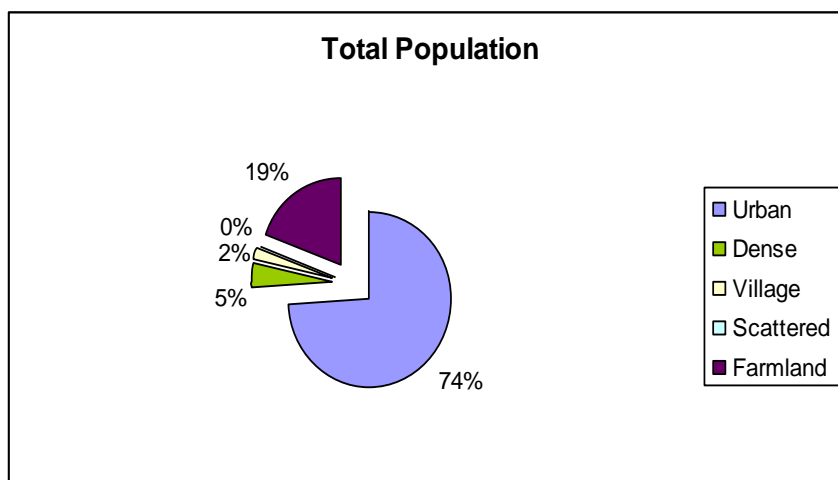


Figure 7-5: Population distribution of Emakhazeni Local Municipality (ELM IDP, 2007)

Approximately 39% of the population of Emakhazeni Local Municipality is economically active, while the overall unemployment amounts to 30%. The per capita income of employed people (age 15-65) was approximately R1700 per month. Approximately 54.5% of the employed population earned less than R800 per month, which is considered as living below the poverty line. 21.4% earned between R801 and R1600 per month, with 24.1% of the population earning more than R1 600 per month. The relatively low income levels are indicative of poverty and a high reliance on social assistance, specifically housing subsidies (ELM IDP, 2007).

Employment according to the major types of industry in the area was as follows:

- 26% work in agriculture and forestry;
- 5% work in mines and quarries;
- 13% work in private households;
- 14% work in wholesale and retail; and
- 11% work in community; social and personal services.

From this breakdown it is clear that most people in the area were employed in the primary and secondary sectors, with very few people employed in the tertiary sector (ELM IDP, 2007).

7.13.4 Access to Basic Services

The primary energy, secondary energy, water, communication and waste removal services are briefly outlined to provide an indication of the current access to services by residents of the Emakhazeni municipality.

The majority of households in Emakhazeni used coal for cooking purposes (37%), while 34% of households used electricity and 23% used wood. This corresponds with the type of fuel

used for heating purposes. Approximately 37% of households used coal for heating purposes, 34% of households used electricity and 23% of households used wood (ELM IDP, 2007).

In terms of fuel used for lighting purposes, approximately 72% of households used electricity. The provision of electricity for lighting purposes increased with 1 921 units from 1996-2001 indicating that good progress was made with the provision of electricity to all households in the area (ELM IDP, 2007).

The majority of households (78%) had piped water inside their house or yard. The provision of water inside the house or on the stand increased with 1 133 units between 1996 and 2001. In terms of sanitation, the majority (69%) of households use flush toilets. The provision of flush/chemical toilets in houses increased with 1 811 units between 1996 and 2001 (ELM IDP, 2007).

Approximately 61% of the households reported that the local authority removed refuse at least once a week. Access to basic services in the Emakhazeni area is therefore good and improvement is evident (ELM IDP, 2007).

Approximately 87% of all households had access to a telephone or cell phone within the location of their house which shows improvement in telecommunication access (ELM IDP, 2007).

7.13.5 Sites of Archaeological and Cultural Significance

Archaeological, cultural and heritage resources refers to the resources in South Africa having archaeological (prehistoric), palaeontological, historical, artistic, and religious values, as well as unique natural environmental features that embody cultural values, such as sacred groves and forests, amongst others.

Archaeologically, the greater Belfast area further to the west of the study area is well known for its Later Iron Age stonewalling. Historically, the greater area of Belfast is also renowned for the Anglo Boer War (1899-1902) with numerous skirmishes, railway sabotage and battle sites occurring in the Mpumalanga Highveld area. The Anglo-Boer War or South African War was waged between Great Britain and the two Boer Republics, the ZAR and the Oranje Vrystaat, from 1899 to 1902.

Although the greater Belfast area is rich in history and heritage, there is no indication of sites of cultural heritage significance proposed project area; however this will be confirmed by the completion of the archaeological impact assessment. The general area is currently being utilised for grazing and planting and it is evident that large sections of the area are currently covered by maize. Due to the subsurface nature of archaeological sites, additional sites may be exposed during the course of development.

8 PUBLIC PARTICIPATION PROCESS

The Public Participation Process (PPP) has been designed not only to comply with the regulatory requirements set out in the Environmental Impact Assessment (EIA), as required

in terms of the National Environmental Management Act, Act 107 of 1998 (NEMA), but is also designed to provide Interested and Affected Parties (I&APs) with an opportunity to evaluate all aspects of the proposed project. The aim is to maximise the project benefits while minimising its adverse effects. This section provides an overview of the PPP and describes the engagement activities undertaken to date and includes the steps which will follow in the PPP.

8.1 PUBLIC PARTICIPATION METHODOLOGY

8.1.1 Scoping Phase

The PP methodology used thus far for the EIA process is set out in detail below.

8.1.1.1 Stakeholder Identification

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

- Conducting Windeed searches in and around the project site to verify landownership and obtain contact details;
- Responses received from the publication of newspaper advertisements and placement of site notices;
- Responses on the distribution of the Background Information Document (BID); and
- Telephonic consultation with landowners and land occupiers to identify additional I&APs.

Stakeholders are grouped into the following categories:

- **Government:** National, Provincial, District and Local authorities;
- **Landowners:** Directly affected and surrounding landowners within a 100 m buffer;
- **Land occupiers:** Directly affected and surrounding land occupiers;
- **Communities:** Surrounding communities;
- **Non-Governmental Organisations (NGOs):** Environmental organisations and Community-based Organisations (CBOs);
- **Business:** Small to medium enterprises and formal business organisations; and
- **Other:** Agriculture and farmers organisations, industry etc.

A Stakeholder Database has been compiled which will be updated throughout the process. Refer to **Appendix B** for the copy of the Stakeholder Database.

8.1.1.2 Compilation of Public Participation materials

The following methods have been used to disseminate project information to stakeholders (*see Table 1 for further details*):

- **Background Information Document (BID) Appendix B:** includes the location and a description of the proposed project, the legislative processes that will be followed, specialist studies to be conducted and the consultation and registration process including contact details of the responsible person.
- **Newspaper Advertisements: Appendix B:** an advert was placed in one Local Newspaper in English. The advert included a brief project description, information about the required legislation, the decision-making authority, details of the appointed independent environmental consultant, information about availability of the Draft Scoping Report (DSR) for public comment and details about the Open House to be undertaken.
- **Site Notices:** Site notices were put up at various places as indicated in **Appendix B**. The site notices contained a brief project description, information about the required legislation, the decision-making authority, details of the appointed independent environmental consultant, information about availability of the DSR for public comment and details about the Open House to be undertaken.
- **Letter with Comment and Registration Sheet:** A letter was sent to stakeholders via post and email containing information about the proposed project, applicable legislation and decision-making authority, information on availability of the DSR and details of the public meetings. A Registration and Comment Sheet was also provided for stakeholders to use for formal registration as I&APs or to submit comments.

The various Public Participation materials used during the Scoping phase, as indicated above, have been included.

8.1.1.3 Consultation with stakeholders

- **Landowner Consultation:** One-on-One meetings will be conducted on Tuesday, 11 and Wednesday, 12 February 2014 with Directly Affected Landowners. Comments, concerns and suggestions received from stakeholders will be captured in the Comment and Response Report (CRR).
- **Open House:** An open house will be conducted on Wednesday, 5 March 2014 at the Belfast Hotel, from 15:00 to 18:00. All stakeholders on the database were invited to attend the open house. The open house will provide stakeholders with an opportunity to meet on a one-on-one basis and in small groups to:
 - Discuss the contents of the Draft Scoping Report in detail and view maps of the proposed project based on consultation to date with affected land owners.
 - Verify that issues and concerns raised during the initial consultation process were captured correctly.
 - Clarify any questions or issues or raise further issues.

Information will be presented visually, and you are welcome to arrive any time between 15:00 and 18:00 on the day of the Open House. Small-group discussions will take place in the language of choice of participants.

All comments raised by stakeholders at the respective meeting as indicated above, and throughout the PPP, will be captured into the Comment and Response Report (CRR) (see **Appendix B**). Stakeholder comments will be closely considered and addressed, where applicable, in the specialist studies undertaken during the process. Responses will be provided to the comments raised by stakeholders and included in the CRR.

8.2 Public Participation activities

In **Table 1** more detail is provided regarding the Public Participation activities, together with referencing materials included as Appendices, which were undertaken as part of the process.

Table 8-1: Public Participation Activities

Activity	Details	Reference in Report
Scoping Phase		
Identification of stakeholders	Stakeholder database which includes I&APs from various sectors of society including directly affected and adjacent landowners in and around the proposed project area.	Appendix B1 Stakeholder database.
Distribution of proposed project announcement material	BID, announcement letter with comment and registration sheet was emailed and posted to stakeholders on Wednesday, 29 and Thursday, 30 January 2014 , in English, Afrikaans and IsiNdebele. The Background Information Document was also available on www.digbywells.com , on Wednesday, 29 January 2014 . (Registration period: Wednesday, 29 January – Monday, 24 March 2014)	Appendix B2 BID, letter with registration and comment sheet
Placing of adverts	An advert was placed in the Middleburg Observer in (English) on Friday, 31 January 2014 .	Appendix B3 Adverts
Putting up of site notices	English, Afrikaans and IsiNdebele site notices (10) were put up at the proposed project site, local library at municipal offices and venues in the project area on Tuesday, 4 February 2014 : <ul style="list-style-type: none"> ▪ Belfast Public Library, 24 Scheppers street, Belfast, 1100 ▪ Siyathuthuka Public Library, Stand 755 Zakheni & Sakhile street, Siyathuthuka 1102 Didby Wells Environmental, Fern Isle, Section 5, 359 Pretoria Ave, Randburg. A site notice map has also been developed which provides location points of the site notices that were put up.	Appendix B4 Site notices and site notice map
Landowner Consultation	On-on-one meetings were held with Directly Affected Landowners on Monday, 10 and Tuesday, 11 February 2014 . Comments, concerns and suggestions received from stakeholders will be captured in the Comment and	Appendix B5 Comment and Response Report

	Response Report.	
Announcement of Scoping Report	<p>Availability of DSR was done in conjunction with formal announcement of the proposed project as it was emailed and posted to stakeholders on Wednesday, 29 and Thursday, 30 January 2014. Copies of the DSR are available at:</p> <ul style="list-style-type: none"> ▪ Belfast Public Library, 24 Scheppers street, Belfast, 1100 ▪ Siyathuthuka Public Library, Stand 755 Zakheni & Sakhile street, Siyathuthuka 1102 <p>Didby Wells Environmental, Fern Isle, Section 5, 359 Pretoria Ave, Randburg</p> <p>The Scoping Report is also available on www.digbywells.com (Public Documents) and will be at the Public Meeting/Open House.</p> <p>(Comment period: Wednesday, 12 February to Monday 24 March 2014)</p> <p>A poster was also put up at the Public Libraries mentioning the above to provide details of availability of the DSR and Open House.</p>	Appendix B2 Announcement Letter
Public Meeting/Open House with relevant stakeholders	An Open House will be held on Wednesday, 5 March 2014 at the Belfast Hotel from 14:00 – 16:00. All comments received at this meeting will be captured in the Comments and Response Report.	Appendix B5 Comment and Response Report
Obtained comments from stakeholders	Comments, concerns and suggestions received from stakeholders will be captured in the Comment and Response Report.	Appendix B5 Comment and Response Report.
Final Scoping Report	<p>The Final Scoping Report (FSR) will be finalised with lapse of the public comment period on the DSR. It will include additional comments raised by stakeholders and relevant information that may have been generated during the public comment period.</p> <p>A progress feedback letter informing stakeholders of the date of submission and availability of the FSR for public comment for 21 days.</p>	

9 PROJECT PHASE DESCRIPTION

The following section provides the description of the project based on the mine works programme submitted as part of the mining right application. Project alternatives are also discussed (Chapter 11) and will be taken into account during the EIA phase. The following activities are associated with each of the key project phases within the project lifecycle. Please note that although open cast mining activities do not require authorisation in terms of

the NEMA EIA Regulations, the activity is included in the project description to ensure a holistic approach to the scoping phase of the project

9.1 Construction phase

The construction phase will include the following activities:

9.1.1 Construction of Infrastructure

- Creation of paved and bunded area for storage of hydrocarbons to accommodate maximum spills;
- The construction of above ground diesel storage facility to a total capacity of 46m³ (Activity 10(ii)ee, GN R. 546);
- Removal and storage of topsoil and weathered material from areas where construction will occur;
- Construction of access roads (Activity 22(ii) and (iii), GN R. 544, and Activity 4(a)(ii)(ee), GN R. 546);
- Construction of mining infrastructure, Temporary abluion facilities and temporary office (Activity 11(xi), GN R. 544);
- Construction of the pollution control dams (Activity 5, GN R. 545);
- Construction of storm water diversion berms;
- Setting up portable office, change houses and abluion facilities;
- Construction of a small crushing plant;
- Construction of a diesel workshop;
- Provision of temporary storage facilities for domestic and industrial waste;
- Placement of an explosives magazine;
- Erection of 22 kV electricity supply line (Activity 10(i), GN R544);
- Potable water tanks will be erected for the storage of domestic water (10 000l);

9.1.2 Preparation of Areas for Opencast Mining

- Removal and storage of topsoil and weathered material from areas to be mined using opencast truck and shovel methods.
- Blasting of rock.

9.2 Operational Phase

The operational phase will include the following activities:

9.2.1 Operation of Infrastructure

- Continuous transport of coal along the haul road.
- Use of borehole water for potable water and recycling of pit water for dust suppression.
- Domestic and industrial waste storage and removal.
- Servicing and maintenance of portable toilets.
- Servicing and maintenance of fuel depot.
- Maintenance of pollution control dams.
- Maintenance of storm water diversion berms
- Maintenance of roads and equipment.

9.2.2 Open Pit Mining

- Removal of soil and overburden during opencast operations, the temporary stockpiling of these, and eventual refilling of the voids of mined out areas as the opencast operations proceed.
- Use of coal trucks to remove stockpiled coal and transport.
- Blasting of rock.
- Opencast mining of coal seams using the truck and shovel method.
- Run of Mine coal stock pile
- Monitoring of environmental data.
- Ongoing rehabilitation of areas already mined as opencast mining progresses.

9.3 Decommissioning Phase

The decommissioning phase will include the following activities:

9.3.1 Infrastructure

- Increased activity of trucks and heavy machinery to dismantle and removal of temporary infrastructure such as temporary offices and diesel storage facilities.
- Removal of all mining infrastructure not functional or utilised by other developments at that time.
- Rehabilitation of haul road if not required by the post closure land use.
- Rehabilitation of areas with regard to soil and vegetation.

9.3.2 Open Pit Mining

- Filling of the final void.

- Spreading of sub-soils and topsoil.
- Revegetation of disturbed areas.
- Profiling and contouring of the area to preserve natural drainage lines.
- Rehabilitation of areas disturbed by mining activities with regard to all environmental and social aspects discussed above.
- Ongoing monitoring of environmental data.
- Application for a closure certificate.

9.4 Waste Management

Waste that will be generated during the planned life of mine will include domestic waste, industrial waste and hazardous waste in the form of hydrocarbons e.g. used oil and oily rags. Processing waste will not be generated on site as the coal processing will not occur.

All domestic and industrial waste that is generated by the proposed Weltevreden operation will be collected and disposed of at the appropriate licensed waste disposal facilities close Belfast by an appointed waste contractor.

Used oil will be collected and removed from the site by an approved recycled oil dealer.

9.5 Management of Stockpiles

One ROM stockpile will be located on site. This stockpile will not exceed 5 000 tonnes and coal will be transported from the stockpile to its final destination. The location of the ROM stock pile is not fixed as it moves along with the mining process as the pit progresses.

Topsoil and overburden stockpiles will be created in close proximity to the final void positions of the opencast operation. Stockpiled topsoil will be vegetated and will be analysed to assess nutrient requirements and, if necessary, treated with fertiliser before final use in rehabilitation.

10 POTENTIAL ENVIRONMENTAL IMPACTS

Environmental and social impacts are discussed according to different stages of the proposed project, namely: the construction phase, the operational phase, decommissioning phase and post closure. This is an overall view of potential impacts from all associated mining activities. After more extensive research and field studies, these impacts will be quantified and mitigation measures suggested in the EIAR and EMP.

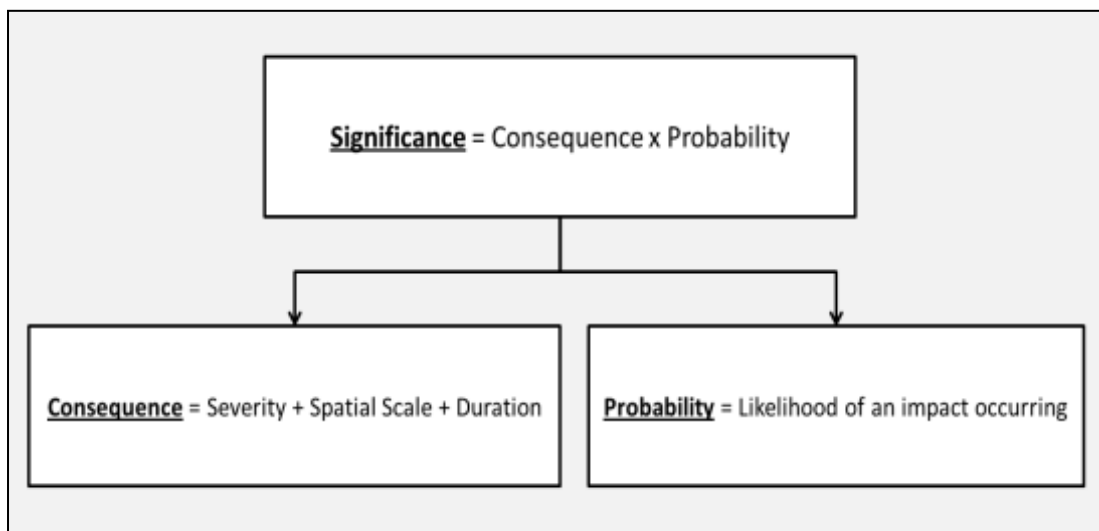
The impact assessment methodology, during the following EIA phase, for the proposed project, will consist of two phases, namely (i) impact identification; and (ii) impact significance rating.

Impacts and risks will be identified based on a description of the existing and proposed future activities to be undertaken as part of the proposed project. The impact associated with

each of these proposed activities will be assessed and a significant rating will be determined for each of them using the flowing formula and matrix below.

The mitigation measures and impact management controls for all identified impacts and risks will be incorporated into an EMP.

The significance rating process for impacts follows the established impact/risk assessment formula:



Significance										
		Consequence (severity + scale + duration)								
		1	3	5	7	9	11	15	18	21
Probability / Likelihood	1	1	3	5	7	9	11	15	18	21
	2	2	6	10	14	18	22	30	36	42
	3	3	9	15	21	27	33	45	54	63
	4	4	12	20	28	36	44	60	72	84
	5	5	15	25	35	45	55	75	90	105
	6	6	18	30	42	54	66	90	108	126
	7	7	21	35	49	63	77	105	126	147

Significance		
High	108- 147	

Medium-High	73 - 107	
Medium-Low	36 - 72	
Low	0 - 35	



Rating	Severity		Spatial scale	Duration	Probability
	Environmental	Social / Cultural Heritage			
7	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or ecosystem. Persistent severe damage.	Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.	International	Permanent to mitigation	Certain/ Definite
6	Significant impact on highly valued species, habitat or ecosystem.	Irreparable damage to highly valued items of cultural significance or breakdown of social order.	National	Permanent mitigated	Almost certain/ High probability
5	Very serious, long- term environmental impairment of ecosystem function that may take several years to rehabilitate.	Very serious widespread social impacts. Irreparable damage to highly valued items.	Province/ Region	Project life (The impact will cease after the operational life span of the project)	Likely
4	Serious medium term environmental effects. Environmental damage can be reversed in less than a year.	On-going serious social issues. Significant damage to structures / items of cultural significance	Municipal area	Long term (6-15 years)	Probable
3	Moderate, short- term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month.	Ongoing social issues. Damage to items of cultural significance.	Local	Medium term (1-5 years)	Unlikely/ Low probability
2	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants.	Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Limited	Short term (Less than 1 year)	Rare/ improbable
1	Limited damage to minimal area of low significance, (e.g. ad hoc spills within plant area). Will have no impact on the environment	Low-level repairable damage to commonplace structures	Very Limited	Immediate (Less than 1 month)	Highly Unlikely/ None

10.1 Topography

Construction phase

During the construction phase, it is anticipated that the infrastructure being constructed (i.e. creation of paved and bunded areas for storage of hydrocarbons, haul road, fuel depot, temporary office, pollution control dams, portable bathrooms and toilets, temporary storage facilities for domestic and industrial waste) will not have significant impacts on the topography due to these structures not being permanent. The predominant topographical disturbance will be as a result of the proposed mining activities such as the inception of the open cast pits, the removal of topsoil and extraction of coal.

Operational phase

During the operational phase, the functioning of the mine infrastructure, such as: continuous transport of coal along the haul road; the use of imported potable water and recycling of pit water for dust suppression; domestic and industrial waste removal; servicing and maintenance of portable bathrooms; servicing and maintenance of fuel depot; maintenance of pollution control dams; use of coal trucks to remove stockpiled coal and transport; Run of Mine coal stock pile, maintenance of roads, pipelines and equipment will not have a significant impact on the topography of the area.

The predominant impact on topography will be the continuation of the opencast mining, the factors concerned are the blasting of rock, mining of the coal seam and the continual rehabilitation of areas already mined. In some areas the mining void will be up to 30m deep, and thus, in this phase it will be important to adequately rehabilitate the areas already mined; and to restore the slopes and topographical integrity of the mined areas.

Decommissioning phase

The decommissioning phase will include the removal of the temporary infrastructure which will not have a significant impact on the topography. The predominant topographical impacts will revolve around the filling of the final void and the rehabilitation of the disturbed areas. This will be done by finalising the contouring of the disturbed areas and sufficient re-vegetation to re-establish the topographical integrity and drainage lines of the area. This phase is very important and care should be taken in order to prevent soil erosion while still ensuring effective drainage of the area.

Post closure

During the post-closure, the area needs to be monitored, especially with regards to vegetation. The vegetation on the disturbed areas may need assistance (such as more seed and fertilizer) in order to consolidate. This is critical in preventing soil erosion on the site. The amount of assistance will be a direct function of the quality of rehabilitation performed in the previous phases.

10.2 Geology

Construction phase

The construction phase will not have a significant impact on the geology until the actual blasting and removal of coal takes place. At this point the coal will be removed which will permanently alter the geology.

Operational phase

During the operational phase, the continual extraction of the coal will permanently alter the geology.

The introduction of oxygen within the strata will result in the oxidation of pyritic material present and could lead to the acidification of the workings.

Decommissioning phase and post closure

The post closure phase will have no further impacts on the geology.

10.3 Soil

Construction phase

Infrastructure: The construction of infrastructure will all have a negative impact on soils. Soil will be removed and stockpiled and possible fuel and lubricant spills from construction machinery may affect soil quality. Movement on site from machinery and clearing of vegetation can also contribute to soil erosion. The limited extent of the areas to be disturbed does, however, limit the extent of the impact.

Opencast mining: The removal and stockpiling of soil during the construction phase of the opencast mining area will have a negative impact on soil quality and quantity. Although not accurately quantified by detailed mine planning yet, the affected area is expected to comprise less than 38% of the total surface area. Fuel and lubricant spills from construction machinery may also affect soil quality.

Operational phase

The main additional impact on soil during the operational phase will be the erosion of soil, the loss of soil fertility as a result of erosion, the contamination of soil via dirty water spillages and hydrocarbons. Vehicle movement will also result in soil compaction which impacts on soil structure.

Successive mining cuts will be stripped and the soil placed to rehabilitate the previously mined cuts. The removal and replacement may lead to the mixing of soils horizons and the deterioration of soil quality if not properly managed.

Decommissioning phase and post closure

Infrastructure: The removal of infrastructure is anticipated to have a general positive impact on soil through the remediation and replacement of soil in areas where it was stripped prior to the establishment of infrastructure. Negative impacts may however be associated with the

compaction and erosion of soils due to the movement of machinery used for the removal of the infrastructure.

Opencast mining: During the decommissioning and closure phases the impacts on soil will generally be positive by the replacement of soil stripped prior to opencast mining. Some impacts that may manifest relate to the correct placement of soil in reverse sequence, i.e., the layers that were removed last have to be replaced first and to the potential for compaction of soils during replacement.

10.4 Surface Water

Construction phase

Infrastructure and Opencast mining: During the construction phase opencast areas will be stripped of topsoil, berms and trenches will be constructed and roads will be upgraded. Removal of vegetation and movement of soils will allow erosion to take place and silt could be added to the surface water environment. Due to the sensitive wetlands in the area, mitigation will be required. There is also the possibility of hydrocarbon spills affecting surface water quality.

The separation of clean and dirty water areas, in line with Regulation 704, may lead to a decrease of the surface water yield of the area

Operational phase

Infrastructure & Opencast Mining: During the operational phase, yield from the active opencast areas will effectively be removed from the various catchments. The rehabilitated mining cuts' yield will be returned to the catchment as rehabilitation proceeds during the operational phase and these areas are allowed to discharge. During mining, whenever water enters the opencast areas it will be contained and re-used and this will reduce the water availability for local streams and dams. The area is a water scarce area thus any water sourced from local dams and streams will reduce the overall yield from local water resources in the area.

All water contained within the mine workings and around coal handling sites is considered to be contaminated and thus must be contained within the dirty water system to ensure it does not reach the local water sources, where it could impact local water quality. Coal spillages from trucks will require mitigation to ensure that the coal does not negatively impact on the surrounding water quality. Northern Coal will need to maximize the area of clean water runoff and minimise as far as possible the containment of dirty water surface runoff.

Decommissioning phase

Infrastructure & Opencast Mining: Surface water quantity should be restored after decommissioning and closure due to the rehabilitation of the opencast workings. Rehabilitation must be adequate to ensure erosion is reduced and slopes of a natural gradient to reduce fast flowing run-off. Water monitoring will continue to ensure the site is not impacting on local water quality from exposure of the coal seam.

10.5 Groundwater

Construction phase

Infrastructure: Most construction work will utilise water from boreholes and therefore impacts on groundwater quantity during the construction phase will require further investigation. Potable water will most likely be obtained from groundwater. Accidental hydrocarbon spillages can impact on groundwater quality, if seepage occurs into the groundwater. The probability of this impact will be low if good management practices are in place.

Operational phase

Infrastructure: Impacts on groundwater quantity will be low as industrial water requirements should be obtained from the pollution control dam and in-pit water, and potable water will be sourced from groundwater. Groundwater quality could also be impacted on with the increased probability of accidental spillages from vehicles and machinery which could seep into the groundwater. Seepage from infrastructure and non-lined portions of the dirty water system may lead to further contamination of aquifers.

Opencast mining: The impacts on the aquifer system are expected to be of a qualitative and quantitative nature. The aquifers within the mining area will be dewatered during, and possibly after, mining, while the opencast workings will also alter the nature of the aquifers, providing a primary aquifer in the way of the rehabilitated spoils. The qualitative impact will occur due to the mixing of the various water types and the potential for Acid Mine Drainage (AMD).

Decommissioning phase

Infrastructure: During decommissioning the infrastructure needs to be removed and the area rehabilitated. Failure to do so will lead to the footprints remaining as potential sources of pollution.

Opencast mining: The filling of the final void may impact negatively on the groundwater quality and quantity. Care should be taken to slope the area after filling to ensure that ponding, and therefore an increase in recharge, does not occur. The influx of oxygen rich water may lead to the acceleration of AMD. The final monitoring points should be installed in this phase to monitor the opencast pit flooding and quality variation after closure. Alternative water supply may be required depending on the post closure land use.

10.6 Land Capability

Construction phase

Infrastructure and Opencast mining: The land capability will change during the construction phase, from arable and grazing to industrial and mining. This is due to the increased human activity, activity of vehicles and heavy machinery, stripping of soil layers for the preparation of opencast mines. The impacts will be significant but limited to areas of construction.

Operational phase

Infrastructure: Infrastructure is not expected to alter land capability further during the operational phase.

Opencast mining: Land capability is related to soil and can be adversely affected if soil quality and quantity is lost. Changes in land capability from agricultural to mining will be limited to areas actively opencast mined. With good soil removal practices and rehabilitation measures land capability should be largely restored. Therefore impacts will be limited to the mining areas and last the duration of the mine's life. There exist some positive effects with the rehabilitation of mined areas as the opencast mining progresses, where land capability should slowly be restored to at least a grazing land capability.

Decommissioning phase

Infrastructure and Opencast mining: Land capability is directly related to soils and should soil be negatively impacted on, then these impacts will also affect land capability. The land capability should be rehabilitated back to its original state. Therefore the impacts on land capability should be positive with land capability being restored to grazing and eventually arable lands. There is potential for erosion during decommissioning and rehabilitation which will impact negatively on land capability, particularly if the land is to be used for grazing or agriculture.

10.7 Land Use

Construction phase

Infrastructure and Opencast mining: Land use will change from its current agricultural use to mining. During the construction phase this will be due to the increased human activity, activity of vehicles and heavy machinery, stripping of soil layers for the development of opencast mines. Due to the small area affected, much of the area will still be available for agricultural purposes. These impacts will be low in a regional context

Operational phase

Infrastructure: Infrastructure is not expected to further alter land use during the operational phase.

Opencast mining: Land use will immediately be changed to one of mining, until the land is re-vegetated and rehabilitated, as should be the case during the roll-over of opencast mining. Once rehabilitated the land use should be one of at least grazing.

Decommissioning phase

Infrastructure and Opencast mining: The land use will change back from mining to agricultural and therefore the impacts during decommissioning and rehabilitation should be positive, restoring land use to its original state, initially grazing and then arable.

10.8 Air Quality

Construction phase

Infrastructure and Opencast mining: The construction phase will increase the current dust levels due to increased activity of vehicles and heavy machinery, the construction of a haul road, the stripping of vegetation and exposure of soil layers. Preparation of areas for opencast mining by stripping soil and blasting rock will increase dust levels. Therefore the construction phase will have negative impacts on air quality in the region.

Operational phase

Infrastructure: If exposed soil occurs in the vicinity of infrastructure, then further negative impacts on air quality are expected. Increased human activity and traffic around infrastructure could also add to dust levels in the vicinity of infrastructure. Coal transport along the haul road will also contribute to dust levels. Therefore operation of infrastructure will further negatively impact on air quality. Dust suppression by spraying the area with water, or by limiting vehicle speeds will decrease dust levels.

Opencast mining: The proposed opencast mining will negatively impact on air quality, by adding to the dust levels in the area during blasting and movement of earth. The opencast mining the onsite stock pile and the loading of raw coal onto the trucks will contribute to increased dust levels in the area.

Decommissioning phase

Infrastructure: During decommissioning and mine closure the air quality will be negatively impacted on briefly due to the increased activity of heavy machinery and trucks in the area and the removal of the infrastructure. Mobilisation of exposed soils will also contribute to dust levels in the area. As the dust settles and rehabilitation of the land is completed, the air quality should gradually improve.

Opencast mining: Rehabilitation of the opencast areas and the final void should ultimately have a positive impact on air quality in the region due to the closure of opencast mining and re-vegetation of exposed soils reducing dust creation.

Post closure

Once exposed soils are re-vegetated, dust levels should be reduced to the current levels

10.9 Noise

Construction phase

Infrastructure and Opencast mining: The impact of the proposed development on local noise levels will be negative. Increased activity of vehicles and heavy machinery, and the

blasting of rock for preparation of the opencast mining will all contribute to the increased local noise levels. The topography of the region could either amplify the noise levels, or help dampen them.

Operational phase

Infrastructure: After construction of infrastructure local noise levels will drop but will still be higher than prior to construction. Trucks on haul roads, reverse hooters, increased vehicle traffic and increased human activity in the area will all contribute to local noise levels. Should the mine function at night then negative impacts on local noise levels will be significant.

Opencast mining: The impact of the opencast mining on local noise levels will be negative, but localised to areas of activity, such as the opencast pits. The increased noise levels will be due to blasting of rock, crushing of the raw coal for transport, and increased activity of vehicles and heavy machinery.

Decommissioning phase

Infrastructure and Opencast mining: Increased activity of heavy machinery and trucks to take down and remove infrastructure respectively will increase local noise levels. Therefore the removal of infrastructure in the area will have a negative impact on local noise levels, but this will be of short-term and localised to areas of activity such as the areas undergoing rehabilitation and areas with infrastructure that will be removed. Should land use return to its current state after mine closure, then local noise levels should also return to their current levels.

Post closure

Once land use returns to current state, noise levels will return to their current level.

10.10 Vibration and Blasting

Construction phase

Minimal blasting will occur during the construction phase. Blasting will occur with the initiation and preparation of the first cut in order to establish the first void. High levels of air blasting may result in damage to structures in the surrounding area, however if the smallest charged is used the possible damage to structures will be low and will not be seen as problematic. Ground vibration levels may become problematic due to human perception but will result in minimal damage to formal structures surrounding the site.

Operational phase

During operation air blasting and ground vibrations will become more frequent. Both air blasting and ground vibration can result in damage to structures in the nearby vicinity and especially to structures on site. The potential damage to structures will be dependant on the charge masses. In the event that air blasting is not controlled it may become problematic. A vibration analysis will be conducted and the results incorporated as part of the EIA/EMP phase as well as investigations on the impacts to mud houses in the surrounding area.

Decommissioning and post closure phase

No air blasting and ground vibrations should be experienced during the decommissioning and post closure stage.

10.11 Vegetation

Construction phase

Blue gum trees and Wattle are classed as category 2 invaders according to the Conservation of Agricultural Resources Act (Act 43 of 1983). For this reason the removal of such plants will be positive and long term as no new blue gum trees or weeds will be planted on that site after decommissioning. The impact will be definite and the extent will be site specific as the effects will not occur beyond the project boundary. Mitigation will be required during the removal of the vegetation to ensure that the seeds of invasive alien plants do not spread to other areas. The removal of natural habitat, however, will be of a negative impact but these areas are localised.

Operational phase

In the opencast areas, the impact on flora will continue to be negative as more land is stripped. As each opencast cut is mined, however, the area will be rehabilitated and vegetation will be restored. Monitoring will be required to ensure invasive species do not become established and to ensure that erosion is minimised and the slopes are of a suitable angle to allow for adequate drainage.

Decommissioning phase

During the decommissioning phase all remaining vegetation will be cleared from site. Grasses may be planted in the interim to prevent soil erosion and dust pollution but the area will not be returned to a fully rehabilitated state. This will have a definite, negative, long term impact on the vegetation as it will not be replaced.

Post closure

Once the exposed soils and areas covered, grasses, especially pioneer species will colonise the areas and more species will now grow. Monitoring of the plant species that have been rehabilitated must continue.

10.12 Fauna

Construction phase

The preparation of mining activities will have a negative impact on the local fauna. Sites will be cleared of vegetation and there will be an increase in noise and activity, which will result in disturbance to fauna habitat. The local fauna will be able to move into surrounding areas which will reduce the significance of this impact.

Operational phase

Impacts on fauna will continue to be negative as vegetation will be cleared and animals that depend on this vegetation will be forced to move to other areas. This will also destroy the habitat of any small mammals and birds living on the area.

Decommissioning phase

During the decommissioning phase, any habitat that may have existed for birds or small mammals will have been removed, and this will have a permanent, negative impact on the fauna that does exist in the area.

Post closure

Mammals and birds species will re-colonise the areas once the grasses and other plant species have been re-vegetated. The restoration of local fauna will also depend on post closure land use.

10.13 Archaeology and Cultural Heritage

Construction phase

Infrastructure and Opencast mining: During the construction phase, potential impacts on archaeological and heritage sites are generally localised to areas of mining development and areas prepared for mining. Potentially affected sites of archaeological and heritage significance will be identified in the Archaeological Impact Assessment (AIA) report, which will be compiled during the pre-construction phase as part of the EIA/EMP phase. Sites of significance identified in the AIA should be avoided and/or mitigated according to the NHRA (no 25 of 1999) and in line with the recommendations and comments from the relevant heritage authority. If cemeteries, graves or burial grounds are expected to be affected by the construction phase, these sites should be mitigated according to the NHRA, NEMA, the Human Tissues Act (no 65 of 1983) and the National Department of Health, as well as any ordinances of the Provincial Department of Health. The purposes of the Human Tissues Act and associated ordinances are to follow the correct process in order to obtain approval from the Provincial Department of Health before planning to relocate any grave. This includes interaction with relatives of the deceased. Authorisation for exhumation and re-interment must be obtained from the relevant local or regional council. Graves older than 60 years, but younger than 100 years are also protected in terms of the National Heritage Resources Act (Act No. 65 of 1983) and graves older than 100 years are considered as being archaeological. Preferably, cemeteries, graves and burial grounds should be protected in situ with a 15 – 20 metre buffer and allow access to family members. Due to the subsurface nature of some archaeological sites, significant resources could be exposed during the construction phase that could instigate the need for additional archaeological surveys.

Operational phase

Infrastructure and Opencast mining: During the operational phase, impacts resulting from opencast operations and development associated with mining operations on archaeological sites would be medium to high, depending on the significance and location of sites identified in the AIA report. If sites of archaeological and heritage significance are protected and effectively managed, impacts would be low, as long as sites are adequately fenced and demarcated with buffer zones to protect sites from operational activities. Should preservation not be a viable option, these sites should be properly documented and mitigated according to the NHRA (no 25 of 1999) by relevant experts. Should additional sub-surface

archaeological and heritage discoveries be made that were not previously identified/documentated in the AIA, operations must be ceased and a qualified archaeologist be contacted for an assessment of the discovery.

Decommissioning phase

Infrastructure and Opencast mining: The removal of infrastructure and mining activities associated with decommissioning and closure of mining activities are not expected to have additional impact on sites of archaeological and heritage significance, conditional to the effective implementation of management measures outlined in the archaeological assessment report during the pre-construction, construction and operational phases. Impacts during the decommissioning and closure of the mine will only occur if sites of archaeological and heritage significance were preserved in situ, or if additional sub-surface discoveries were made. However, impacts on these sites could be high if areas are not properly identified, documented, fenced off, demarcated, managed and/or provided a buffer zone to prevent accidental damage. It is therefore important to ensure that effective management and mitigation measures are implemented in terms of the NHRA and NEMA for the proposed development.

Post closure

Activities associated with post closure are not anticipated to have any additional impact on sites of archaeological and heritage significance, conditional to the effective implementation of management measures outlined in the specialist report during the pre-construction, construction, operational and decommissioning phases.

10.14 Sensitive Areas

Construction phase

This could possibly result in the removal of various wetland units. In addition to this, there will be heavy machinery on site which increases the chances of spillages of diesel and hydrocarbons which can then be washed into the wetland areas. A key ecological service offered by the wetlands is water quality enhancement and with the loss of this function as well as with the potential contribution of pollutants and toxicants to the aquatic systems, would result in a negative impact for water quality.

The proposed placement of the pollution control dams falls within the wetland units. This will result in the removal of the vegetation and increase the potential for siltation of the wetland areas. In addition to this, there will be construction and maintenance machinery and personnel within the specific sites and the area of disturbance would need to be kept to a minimum and access roads should be maintained for future use. It is advised that construction of the pollution control dams take place during the dry season to prevent siltation of the wetlands and to prevent the transport of pollutants and toxicants downstream.

It is suggested that existing open areas of soil be vegetated so as to prevent siltation of the wetland areas. In addition to this, soil which is disturbed and from areas where the vegetation is cleared could also result in siltation of the wetlands and thus mitigation will be required to prevent erosion.

The proposed placement of the haul road and mining offices could possibly be within a wetland unit. It is advised that the footprint of this impact be kept to a minimum and where possible, construction take place as close as possible to the opencast area so as to minimise the overall footprint for the operation as well as to avoid certain wetland areas completely. It is advised that construction of these facilities take place during the dry season. This will allow for easier working conditions and in the unlikely event of an impact occurring, the dry working conditions will prevent the impact from being transported downstream. This would also prevent siltation of the wetland areas.

Operational phase

The use of trucks and machinery throughout the operational phase could result in spillages of diesel and hydrocarbons which then make their way into the wetland areas and will eventually be transported downstream. Depending on the size of the spillages and the time taken to clean the spillage, this could have a significant negative impact on the water quality. It is advised that use is made of existing roads where possible and that all vehicles stay within designated areas. This will prevent further impacts to wetland areas and avoid additional loss of wetland units.

The pollution control dams should be monitored to ensure appropriate functioning so as to ensure the enhancement of water quality. Correct management of these facilities will also prevent unnecessary impacts to the wetland units downstream as well as water users. Water quality which will be released back into the wetland units should be within the DWAFF water quality guidelines for both domestic uses, as well as for aquatic ecosystems.

Decommissioning phase

During the decommissioning and closure phase, there is increased potential for water contamination from spillages and siltation as well as additional loss of wetland areas. Impacts to the water quality would be temporary and once rehabilitated, the impact on water quality is reduced. The impacts resulting in the loss of wetland units would be long term and permanent. Thus the need to avoid further loss to these areas as rehabilitation to impacted wetlands is extremely difficult and costly.

Rehabilitated areas should be vegetated with indigenous vegetation to prevent siltation of the wetland areas. The topography of the area should closely resemble the original topography to ensure the long term function of the wetland areas. It is also important that soil be replaced in the original soil profile where possible to ensure the functioning of the wetland areas.

Post closure

A large area of wetland units could possibly be lost but no further loss to wetland areas is expected. The existing wetland units would continue to function as described.

10.15 Visual Aspects

Construction phase

During the construction phase, the infrastructure being developed will be visible within the viewshed area. The visible infrastructure may include the haul road, fuel depot, temporary office, pollution control dams, portable bathrooms and toilets, waste facilities and vehicles travelling on the site. The predominant visual intrusion will be as a result of the preparation of areas for opencast mining by removing the topsoil and blasting. The visual impacts will be more prevalent closer to the site than further away. Receptors within the viewshed area need to be identified.

Operational phase

During the operational phase, the normal operation and maintenance of the temporary site infrastructure will not have an additional visual impact further to that of the construction phase; the same infrastructure would still be visible during this phase. The opencast mining will create further visual disturbances prior to full rehabilitation of the already mined areas. Trucks hauling coal will be visible to motorists and visitors to the area, as well as to local residents.

Decommissioning phase

The decommissioning phase will involve the removal of the temporary mine infrastructure which may result in an increased activity in vehicles which may form a visual disturbance in the short term. Thereafter, once the final void is filled and the site fully rehabilitated, the visual impacts of the project will begin to diminish.

Post closure

Once the site has been fully rehabilitated, the visual impacts should reduce to a minimal state.

10.16 Transport, Traffic and Safety

Construction phase

During the construction phase machinery and equipment will be transported to site via the N4 and the R33 to the proposed mine site. This will increase traffic of heavy equipment on these roads which will be short lived. There is no intersection to access the site, this may have a safety risk to pedestrians and other motorists.

Operational phase

The extent of the possible impact that the transport of coal will have is dependent on the method of transportation as well as the distance required to travel. Road haulage will have an excessive impact on the surrounding road network and will have a safety risk associated with it. In the event that haulage to a rail siding is the method of transport the impacts and safety risks will be lower due to the shorter distance of actual road haulage.

Decommissioning phase

During decommissioning the impact of transportation on the traffic and safety will decrease. During this phase equipment will be removed off site using large vehicles, which will be a temporary impact on local road users.

Post closure

There are no foreseen impacts during this phase.

10.17 Socio-Economic Environment

Construction phase

Positive Impacts

Infrastructure: The construction of infrastructure will have a positive impact on the socio-economic environment by providing employment opportunities to local contractors and labours for the duration of the construction phase.

Opencast mining: Preparation of the mining areas for mining during the construction phase may have a positive impact on the socio-economic environment by providing employment opportunities to local contractors and labourers for the duration of the construction phase. The extent to which this potential benefit may realise is dependent on the availability of required skills with local contractors.

Negative Impacts

Infrastructure and opencast mining: the proposed mining project will have a negative impact on the socio-economic environment by removing a small area of cultivated land from active production which may have farm labour implications, and by increasing the level of noise and dust in the area. The initiation of a mining project may also attract job seekers into the area which may result in the development of informal settlements been developed.

Operational phase

Positive Impacts

Opencast mining: The proposed mining may have a positive impact on local employment as Northern Coal intends employing as many people from local communities as is possible.

Negative Impacts

Opencast mining: Opencast mining will have a negative impact on the socio-economic environment by removing cultivated land from active production and by increasing the level of noise and dust in the area.

Decommissioning phase and post closure

Positive Impacts

The major positive socio-economic impacts with regard to the decommissioning of all mining operations relates to the return of mining land to productive agricultural use and the cessation of nuisance impacts such as dust and noise on local inhabitants.

Negative Impacts

Negative impacts that may be experienced relate to the potential for the loss of employment opportunities as mining operations cease. Northern Coal's Social and Labour Plan will however provide means for minimising the impacts relating to potential job losses.

11 TERMS OF REFERENCE FOR THE EIA

During the completion of the EIAR further studies will be required in order to provide sufficient background information on the state of the environmental conditions of the site pre-mining. These studies, along with the project description, will then determine the significance of the impacts. The specialist reports will contain all information as required by GN R. 543 and in particular will provide a description of the specialist findings and potential implications of the impact of the proposed activity on the environment and propose mitigation measures to manage such impacts. The following specialist studies are required to provide sufficient background information in order to complete the EIAR:

- Wetland delineation
- Archaeology Assessment
- Biodiversity Assessment
- Air Quality Assessment
- Noise Assessment
- Surface Water Assessment
- Groundwater Assessment
- Visual Assessment
- Traffic Assessment
- Soil and Land Capability Survey
- Vibration and Air Blasting Assessment
- Public Participation

11.1 Specialist Studies Methodologies

11.1.1 Wetland Delineation

11.1.1.1 Terms of Reference

The scope of work encompasses a delineation of the wetland areas associated with sections of the farm Weltevreden 381 JT.

11.1.1.2 Methods of Investigation

A desktop study will be undertaken to gather background information regarding the site and the associated wetland areas. This information will be used to gain an understanding of the

natural or unaltered conditions of the wetlands in order to better interpret any deviations there from.

11.1.1.3 Objectives

The following tasks were identified in order to meet the project objectives:

- Conduct a desktop and field investigation of the wetlands within the study area;
- Assess, classify, delineate and map the identified wetlands;
- Determine the Present Ecological State and Ecological Importance and Sensitivity of the wetlands on site;
- Determine the ecological services of the wetland units; and
- Provide a report with maps of wetlands, detailing all the information;
- Provide a description of the effects of the activity on the wetlands which may potentially be impacted on and proposed remediation measures.

11.1.1.4 Wetland Delineation Methodologies and Principles.

The actual site assessment includes an 'on-site' evaluation of the wetland condition and associated soil and vegetation structure condition. This includes the general aquatic ecological integrity of the wetland itself.

The wetland delineation procedure takes into account (according to DWAF guidelines for wetland delineations, 2005) the following attributes to determine the limitations of the wetland:

- Terrain Unit Indicator – helps to identify those parts of the landscape where wetlands are more likely to occur;
- Soil Form Indicator – identifies the soil forms, which are associated with prolonged and frequent saturation;
- Soil Wetness Indicator – identifies the morphological “signatures” developed in the soil profile as a result of prolonged and frequent saturation; and,
- Vegetation Indicator – identifies hydrophilic vegetation associated with frequently saturated soils.

A Level 2 functional assessment of the associated wetland areas will be undertaken. This methodology provides for a scoring system to establish the services of the wetland ecosystem. The onsite wetlands will be grouped according to homogeneity and assessed utilizing the functional assessment technique, WET-EcoServices, developed by Kotze *et al*, (2007) to provide an indication of the benefits and services.

A present ecological status (PES) and ecological importance and sensitivity (EIS) analysis will be conducted in order to establish a baseline integrity for the associated wetlands. In order to ascribe the individual category scores used in the assessment, air photo analysis, an assessment of the key drivers as well as limited field sampling will be used.

11.1.2 Archaeology Assessment

11.1.2.1 Terms of Reference

The National Heritage Resources Act, Act No. 25 of 1999 (NHRA) requires that all project proponents whose activities will potentially disturb a site must conduct a comprehensive assessment and/or obtain a permit for destruction from the relevant heritage resources authority. In order to obtain approval for development, a comprehensive specialist report is required in terms of both the NHRA and NEMA.

Archaeological impact assessments identify and evaluate the significance of archaeological, palaeontological and/or heritage sites, potential impacts of developments upon such sites, and propose recommendations concerning mitigation and management of these sites. Therefore, the Archaeological Impact Assessment (AIA) will ensure that resources are effectively identified, recorded and assessed by qualified specialists prior to development, where after development may proceed within legislative guidelines and approval by SAHRA and/or the relevant heritage resources agency.

No mining, prospecting and/or related development may take place without an archaeological assessment and approval from the relevant heritage authority.

In accordance with the NHRA and NEMA regulations, a phase one Archaeological Impact Assessment (AIA) report will be completed for this study by Professional Grave Solutions (Pty) Ltd.

11.1.2.2 Objectives:

The objectives of an Archaeological Impact Assessment are:

- To prepare a report, including applicable maps, tables and figures as stipulated in the relevant South African legislation (NHRA No. 25 of 1999 and NEMA No. 107 of 1998);
- To describe and assess potential impacts related to archaeological and heritage resources in the project area that may result from project related activities;
- To include mitigation measures for the potential impacts and suitable recommendations;
- To recommend a monitoring programme (if applicable) detailing the frequency, reasoning, methodology and reporting to be implemented once construction commences;
- To identify and describe any fatal flaws to the project relating to archaeological and heritage resources in the environment; and
- To estimate capital and operating costs relating to the field of speciality (i.e. archaeology and heritage studies) for the proposed project.

11.1.2.3 Assessment Methodology

The report will be written according to structures approved in South African legislation. The report will be called an “Archaeological Impact Assessment” (AIA) and will include the following information:

- Legislation, policies, standards, and criteria;
- Assessment methodology;
- Pre-historical and historical literature reviews;
- Proposed mitigation measures;
- Constructive recommendations;
- Impacts summary; and
- Plans, maps, and figures.

The phase one AIA will include the following aspects:

- Step 1: Archival research

During this phase, it will be necessary to determine the historical and pre-historical status of the area through archival research. Research will involve a desktop study to gather data and information on portion 15 and 16 of the farm Weltevreden 381 JT, with specific focus on archaeological sites, historical sites, graves, architecture, oral history and ethnographical information.

- Step 2: Physical study

A physical assessment of portion 15 and 16 of the farm Weltevreden 381 JT will be conducted. During this field survey, key stakeholder consultation will be undertaken in an effort to uncover further information related to oral history, and the locality and significance of graves, cemeteries and other sites of significance. All sites discovered in the proposed development area will be plotted on 1:50 000 maps and their GPS co-ordinates recorded (35mm photographs on digital film will be taken at identified sites).

- Step 3: Report writing

A phase one archaeological impact assessment report will be compiled after required surveys have been completed to identify significant sites and make recommendations for their management or mitigation. This specialist report will also be submitted to South African Heritage Resource Agency (SAHRA) for their perusal.

11.1.3 Biodiversity Assessment

11.1.3.1 Terms of Reference

The National Environmental Management: Biodiversity Act, Act No. 10 of 2004 (NEMBA) sets out a framework for planning the conservation and sustainable use of biological diversity within a broader framework of planning for sustainable development. Mining and its associated activities has a significant impact on the soils, land use, land capability,

vegetation and animal life. The use of land for mining and agriculture leads to the destruction of vegetation and therefore the loss of habitat for fauna. As a result of the destruction of natural vegetation and wetlands, change in land use and the contamination of the surrounding environment, the level of biodiversity within mining areas is normally diminished. With proper planning, responsible mining with concurrent rehabilitation and through the conscious conservation and protection of resident natural species these impacts and the associated loss of biodiversity can be addressed.

DWA were commissioned by Northern Coal to conduct Biodiversity Assessment studies in order to determine the current status with regards to flora, fauna and macro-invertebrates within the areas of the Weltevreden 381 JT. This will be done by combining the information and results from the soil, wet and dry season flora and fauna surveys into a comprehensive Biodiversity Report. This report details the wet season component of the study.

11.1.3.2 Assessment Methodology

DWA was appointed according to the following terms of reference:

- To perform biodiversity assessment surveys in order to identify: main vegetation types, plant communities and sub-communities, threatened species (both fauna and flora), alien species (both fauna and flora), mammals, birds, invertebrates, spiders, butterflies, and insects.
- To identify during the surveys and confirm with desktop studies the following:
 - Plant communities and descriptions of plant communities;
 - Dominant veld type;
 - Dominant indigenous species (fauna and flora);
 - Endemic species (fauna and flora);
 - Insects and amphibians
 - Dominant exotic species (fauna, but mainly flora); and
 - Rare or endangered species (fauna and flora).
- To perform wet season biodiversity surveys within the identified plant communities, which were sampled during the dry season.
- To communicate any additional relevant issues that might be of significance to the project.
- Surveys will only be done around the site since the area falls under No Natural Habitat Remaining and Least Concern (Lötter 2007) in terms of its sensitivity, the only portion which is of highly significant has been ploughed and now only maize and alien species occur.
- To compile a report that discusses the findings and gives recommendations.

The above objectives will be achieved by firstly doing the desktop exercises, collecting books and materials that have the information about Mpumalanga; these include animals,

plants, birds that are found in the area of interest and the surrounding environments. Books, such as Birds of Southern Africa, Newman's Birds of Southern Africa, Sasol Birds of Southern Africa (3rd Ed.) will be used to determine the distribution of birds found in the Province or Area of Interest.

The desktop surveys will be followed up with physical surveys.

Vegetation classification: Desktop studies will be done to determine the species that occur or could occur in the area. Studies done previously related to this project will also be consulted. SANBI will be consulted to get the PRECIS plant lists of the species that occur in these QDS GRIDS. The project will start with the dry season and later on, the wet season as many species, especially grasses can be easily identified by inflorescence and flowers. Braun Blanquet method will be used to sample the species. Every species collected will them be identified, and the unknowns will be taken to SANBI herbarium or University of Pretoria herbarium for identification. The species will be imported into the Turboveg and Juice programs which will produce the vegetation communities. The same methodology will be used during the dry season survey.

Recommendations will then be made based on the species found and their status (eg. Endangered, vulnerable etc).

Animal: List of all potential mammals will be compiled by means of desktop study and all potential red data species must be highlighted with short habitat descriptions. Studies done previously related to this project will also be consulted. Tracks and dung of mammals encountered during the survey will be, where possible, identified and recorded (if possible); A list of rare and endangered species encountered during the survey, as well as species listed according to the results of a desktop study but which were not recorded during the survey, will be compiled; A list of protected species that occur on the potential list but not recorded during the site visits or surveys.

A complete list of bird species encountered within the boundaries of the relevant farms and especially the opencast area must be compiled. Interviews with farmers will also be conducted in order to compile a species list of species recorded by farmers from time to time. A list of the most prominent birds encountered and possible species that can be expected to be present; A list of rare and endangered species encountered during the survey; Possible migration species that are not on site during the survey must be assessed from literature surveys; A species list of all the birds that can possibly be present within the relevant grid in which the farms are situated must be compiled.

Evaluation and monitoring of invertebrate biodiversity must be included and must contain information on groups including ants, ground living beetles (Tenebrionidae and Carabidae), termites, leafhoppers, spiders, and scorpions as required by the Mpumalanga Parks Boards minimum requirements. Methodology of how the field surveys will be conducted must be included.

The presence of amphibians and reptiles will be evaluated and all frogs and reptiles encountered must be recorded by means of a field survey. A short description on the methodology that will be followed to record amphibians and reptiles must be included. Interviews with farmers will be conducted in order to compile a species list of especially frogs

and reptiles such as lizards, snakes and tortoises recorded by farmers from time to time. All frogs, snakes, lizards and tortoises encountered or noted during the surveys will be recorded; A list of rare and endangered species encountered during the survey, as well as species listed according to the results of a desktop study but which were not recorded during the survey, will be compiled;

11.1.4 Air Quality Assessment

11.1.4.1 Terms of Reference

The air quality assessment will include baseline dust fallout monitoring and baseline climatic and air quality characterisation through interpretation of available local and regional monitoring data. All impacts to air quality with specific reference to the activities associated with opencast mining operations will be assessed and the latest legislative and regulatory requirements relating to the project explained. The study will furthermore consider the cumulative impact on all surrounding receptors.

The monitoring of fall-out dust utilising the bucket collection is internationally recognised and documented as an accepted method of determining fall-out dust from various sources.

The standard procedure accepted internationally is the ASTM 1982 "Standard Method for Collection and Analysis for Dust Fall" (Settleable Particulates). As a general criterion, generated dust from a source like a factory, plant, or mine rises into the air due to thermal action, wind velocity or by other means. Depending on the particulate size and wind velocity, the dust begins to fall out as soon as the immediate thermal or other effects that lifted the dust are dissipated.

11.1.4.2 Natural Particulate Classification and Variables Affecting Fugitive Dust

While many factors affect the precipitation rate, the main factors are related to wind velocity, air humidity, particulate size and dynamic shape, and prevailing ground cover.

Once the dust is airborne the factors are simplified to wind velocity and turbulence. Dust particulate of a size greater than 80µm is unlikely to be carried any great distance unless a severe windstorm is being experienced, while dust of a 30µm diameter will only be transported about 300m by a wind velocity of 5,0m/sec in about 60 seconds.

11.1.4.3 Assessment Methodology

The air quality impact assessment study will comprise of three stages

Phase 1: The baseline dust fallout assessment:

For the purpose of measuring fugitive dust levels associated with the proposed Weltevreden project, five multi-directional dust bucket samplers are going to be put up on the following farms: portion 2, 15 and 16 of the farm Weltevreden 381 JT, portion 10 of the Farm Zoekop 426 JS and portion 17 of the farm Blyvooruitzicht 383 JT. Directional dust samplers are designed to allow for the interpretation of the origin of the dust fallout with respect to direction. This means that it is possible to interpret the baseline dust levels on site and at a

later stage ascertain whether the activities on site are having an affect on the air quality, or whether it is coming from a different source.

The position of the samplers is essential to the interpretation of the results, and needs to take into account the historical directional wind data for the area, and topographical features that may affect the wind direction. Each sampler should have the north bucket orientated to true north (compass located) to allow for accurate interpretation of the data.

Before the samplers are erected on site the area is surveyed using topographical maps and historical climate data to determine the various wind flow patterns and topographical features that may influence the migratory patterns of fallout dust on site. Once these factors have been determined the location of the dust buckets is pinpointed taking into consideration the position of various infrastructures on site which require monitoring such as the pit and haul roads.

The buckets are filled with distilled water and sampled monthly. The stations will be left out on site for a period of three months and the samples collected will be transported to a registered Laboratory for analysis.

11.1.4.4 Compilation of an Emissions Inventory

Identification and quantification of pollutants found to be emitted from the proposed Weltevreden coal mining operations near Belfast by means of on-site measurements and or computational methods.

Phase 2: Dispersion Modelling phase

This phase requires the application of powerful modelling software to determine, by mathematical techniques, the fate and transport of the mentioned airborne pollutants once they are emitted, taking into account factors such as the rate of pollutant release, meteorological conditions, and the surrounding topography.

Phase 3: Evaluation phase:

Once the extent of the pollutant dispersion has been modelled, the impact on identified receptors in the immediate region can be determined. These will be dust and health impacts. Recommendations will be made regarding mitigation and/or management measures to address the unavoidable impacts identified.

11.1.4.5 Assessment of Dust Fallout Results

In order to assess the results, the collected dust fallout is filtered through a sub-micronic pre-weighed filter using a vacuum filter bench. Once the wet filtrate has been desiccated by evaporation of any retained moisture, the filter is reweighed to ascertain the collected mass (Insoluble particulate). The soluble particulate is assessed by evaporating the catch media and weighing the resulting solids.

Table 11-1: South African Fallout Dust Classification

S.A. Classification (DEAT)	mg/m ² /day
Slight	<250
Moderate	251 – 500
Heavy	501 – 1200
Very heavy	>1200

These dust fall-out guidelines are descriptive without giving any guidance for action or remediation. On the basis of the cumulative South African experience of dust fall-out measurements, Standards South Africa have published two important new standards in terms of air quality underlying limits for dust fall-out rates. In terms of dust deposition standards, a four-band scale evaluation is used as well as target, action and alert thresholds

Table 11-2: Four-band scale evaluation criteria for dust deposition (After SANS 1929: 2005)

Band Number	Band Description Level	Dust fall rate (D) (mg.m ² .day, 30 day average)	Comment
1	Residential	D < 600	Permissible for residential and light commercial.
2	Industrial	600 < D <1,200	Permissible for heavy commercial and industrial.
3	Action	1,200 < D <2,400	Requires investigation and remediation if two sequential months lie in this band, or more than three occur in a year.
4	Alert	2,440 < D	Immediate action and remediation required following the first incidence of dust fall rate being exceeded. Incident report to be submitted to the relevant authority.

Table 11-3 Target, action and alert thresholds for dust deposition (After SANS 1929: 2005)

Level	Dust fall rate (D) (mg.m ² .day, 30 day average)	Averaging Period	Comment
Target	300	Annual	N/A
Action Residential	600	30 days	Three within any year, no two sequential months.
Action Industrial	1200	30 days	Three within any year, not sequential months.



Alert Threshold	2,400	30 days	None. First incidence of dust fall rate being exceeded requires remediation and compulsory report to the authorities.
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Units will be monitored and particulates collected monthly.

The results are then analysed and placed into various graphs and tables that best indicate the dust fallout situation on site. A report is then compiled detailing all findings and includes a full assessment of the results along with conclusions and recommendations for future monitoring on site.

11.1.4.6 Roles and Responsibilities

Margot Sanor & Associates (Pty) Ltd will be responsible for the baseline air quality assessment and dispersion model.

An independent sub-contractor will be responsible for setting up the Multidirectional samplers, sampling and conveying the samples to a reputable laboratory for analyses. Lukas Sadler of Digby Wells & Associates will be responsible for interpreting the results and report production.

11.1.5 Noise Assessment

11.1.5.1 Terms of Reference

The approach used in investigating noise impacts is based on guidelines provided by the South African National Standards (SANS). In these guidelines, sound pressure level is often used as the measurement unit for noise guidelines (SANS 10103:2004).

Section 25 of the ECA authorises the Minister to make regulations with regard to noise, vibration and shock. Noise Control Regulation GN R154 (10 January 1992) was promulgated in terms of Section 25 of the ECA and is only applicable to a specific area if the relevant local authority has adopted them.. In terms of the National Noise Regulations, a "noise nuisance" is a noise that disturbs or impairs the peace or convenience of any person. A "disturbing noise" is a noise level of 7dBAs above the ambient sound level.

The Noise Control Regulations, together with the South African National Standards SANS 10103:2004 "The measurement and rating of environmental noise with respect to health, land use, annoyance and to speech communication", for the measurement and assessment of noise will be used as a guide in determining acceptable ambient noise levels.

The Standard covers methods and gives guidelines to assess working and living environments with respect to acoustic comfort, excellence, preservation of health, land use

and with respect to possible annoyance by noise indicates the acceptable levels of noise in both residential and non-residential areas. The standard SANS 10103:2004 is essentially in line with the recommendations of the World Health Organisation for community exposure.

Numerous environmental factors determine the level of sound at a given point of reception. These factors include: distance from the source of sound to receptor; surrounding terrain; ambient sound level; time of day; wind direction; temperature gradient and relative humidity.

There are three major categories of noise sources associated with mining. They are: fixed equipment or process operations (generators, pumps, conveyors, electrical equipment); mobile equipment or process operations (drilling, haulage, service operations); and transport movements of products, raw material or waste (truck traffic) (SVT, 2005).

11.1.5.2 Objectives

The objectives of the noise assessment are:

- To prepare a report, including applicable maps identifying noise monitoring sites and tables indicating measured noise levels with comments;
- Identify possible noise sensitive receptors, both human and non-human;
- To describe and assess potential noise impacts, including cumulative impacts resulting from project related activities;
- To include mitigation measures for the potential noise impacts and suitable recommendations;
- To recommend a noise monitoring programme detailing the frequency and reporting to be implemented prior to and during the life of mine.

11.1.5.3 Methodology

In order to assess ambient noise levels, baseline noise monitoring needs to be conducted on weekends and during the week, in areas where noise sources will be generated and at possible noise receptors, such as the proposed mine site, nearby roads (more specifically the R33), and on the following farmlands: Portion 10 – Zoekop, Portions 4 & 17, Blyvooruitzicht and Portion 2 – Weltevreden.

All measurements need to be taken with a type 1 integrated sound level meter (SANS 10103:2004), once during the daytime and once during night time at each identified noise source site. According to the (SANS 10103:2004) guidelines, 'daytime' constitutes from being between 06:00 to 22:00, and 'night time' constitutes from being between 22:00 to 06:00. Monitoring should be taken at a measurement of 1.8 meters above ground level, and between a minimum period of 30 minutes and a maximum period of one hour.

Noise monitoring should be conducted before, as mine construction commences, and during the operation of the mine. The averages can then be calculated and used to compile an acceptable minimum and maximum noise range. Predicted noise levels (delta rating) will be calculated and a comparative analysis will be completed with the baseline data.

The integrated sound level meter used will be calibrated and a calibration certificates will be available on request.

A report will be compiled using the data collected together with a recommended noise monitoring programme.

11.1.6 Surface Water Assessment

11.1.6.1 Terms of Reference

The quantity and quality of the surface water resources that may be affected by the proposed opencast mining operations on the Weltevreden site should be examined prior to mining activities taking place. The aim of this study is to gather baseline information about the surface water systems in order to determine and predict the impacts that the mining activities might have on it.

11.1.6.2 Methodology

The following tasks will be completed during the execution of the surface water studies.

- Site assessment
 - A site visit will be conducted in order for the specialists to obtain a good understanding of the overall surface water conditions of the proposed site. All the surface water bodies will be identified and the GPS coordinates noted. Water samples should be taken from these bodies and analysed in an accredited laboratory to determine the concentrations of the constituents in the water for baseline information.
- Report
 - A desk top study will be done to gather existing information relating to the site and the surrounding area. All the data should then be collated, evaluated and interpreted. GIS maps should be used to depict the results of the study visually.
 - Identify the anticipated impacts, as well as cumulative impacts, of the proposed project on the current surface water conditions for all 3 phases of the project, i.e. construction, operation and decommissioning phases;
 - Draw up a surface water management plan to mitigate these anticipated impacts for all 3 phases of the project;
 - Provide a suitable monitoring programme for the surface water for the life of project;

The following aspects should be considered:

1. Surface water quantity

- Catchment boundaries
 - A topography map covering the catchment area should be obtained to determine the catchment boundaries of the streams flowing through the site. The boundaries

will be indicated on the surface water map which will be included in the report. The quaternary catchment should also be identified.

- Mean annual run-off (MAR)
 - The MAR for the catchment which will be impacted by the proposed project will be determined in proportion to the total MAR. This information can be obtained from the Department of Water Affairs and Forestry (DWAF).
- Normal dry weather flow
 - Data on the normal dry weather flow should be obtained from the DWAF.
- Flood volumes
 - The flood volumes for the streams will be determined using South African methods such as the Standard Design Flood which takes the floods which occurred in 2000 in the Southern African region into account. The flood lines will then be indicated on the surface water map.

2. Surface water quality

Samples will be taken upstream and down stream of the proposed site and the water quality discussed as part of the baseline investigations.

The potential impacts associated with the project will be discussed and rated in accordance with the proposed EIA methodology for the project. Mitigatory measures will be recommended as part of the study.

Any existing data for surface water quality monitoring points in the area already being monitored by Department of Water Affairs and Forestry (DWAF) will be requested in order to provide baseline data and evaluate any trends currently existing in the area.

3. Surface water use

Surface water users identified should be recorded and additional mitigatory measures should be proposed to reduce any impacts from the project on these users.

4. Drainage density of areas to be disturbed

The drainage densities of the areas to be disturbed will be determined from a measurement of the length of rivers and streams within the area of interest as well as the catchment area.

5. Water authority

The local water authority should be identified and consulted as part of the Public Participation Process.

11.1.7 Groundwater Assessment

11.1.7.1 Terms of Reference

A baseline assessment is a detailed assessment of an area to e.g. define the groundwater system of an area or determine the extent of an impact on the groundwater resource. Tasks

related to the site-specific geohydrological evaluation of the Weltevreden project area include:

11.1.7.2 Objectives and methodology

The objective of the baseline study is to give a quantitative, site specific description of the current hydrogeological status. The baseline study will entail the gathering of information and data. Once all this is done the description of the baseline Geohydrological conditions will be noted in a report.

The following will be undertaken as the methodology in order to assess the geological environment of the proposed project area:

The gathering of information will include

- The collection of data relevant to the site and the scale of the assessment. Sources will include:
 - DWAF Directorate: Information Management;
 - Geological reports from the exploration phase;
 - Information types include:
 - Hydrogeological reports, borehole logs, test data;
 - Existing Monitoring data;
 - Published geological maps;
 - Published hydrogeological maps;
 - Aerial photographs and
 - Information on water levels, quality and water use.
- A site assessment and hydrocensus
 - A site visit is needed to initiate the project and familiarise DWA with the current on-site water use activities and state of the groundwater regime. During the hydrocensus information on the farm Weltevreden and directly adjacent farms will be collected. This information will include borehole coordinates, depth of borehole (if available), water level, water quality samples will be taken where possible, borehole yield (if available) and water uses from the boreholes. Field notes such as topographical setting and land use in close vicinity of the boreholes are also recorded.
- A conceptual Geohydrological model will be determined from the information that was collated, evaluated and interpreted. The description of the Conceptual Geohydrological model will include:
 - The type of aquifer and aquifer classification
 - Borehole Yields
 - Water Levels

- Groundwater flow directions
- Groundwater recharge
- Groundwater quality (regional and site specific)
- Groundwater use
- Groundwater protection zones
- GIS maps will be prepared at an appropriate scale indicating the:
 - Geology and hydrogeology of the site (including structural controls);
- Groundwater flow directions, potential pollution sources and position of boreholes;
- Expected impacted/risk areas and level of impact/risk;
- Protection zones.
 - Site specific groundwater impact assessment that will address the possible impacts of all mining related activities (e.g. opencast mining, storage of fuel, waste rock dumps, etc) on the quantity and quality of the groundwater resources in the project area, according to the conceptual model and monitoring data available. The impact assessment methodology and risk rating that will be used is the same as described for the EIA .
 - Groundwater management measures or mitigation measures as it is named in the EIA/EMP, will be identified based on the outcome of the impact and risk assessment. The objective of these measurements will be to prevent and contain any pollution from occurring as far as possible. Emergency measures are also addressed in the instance of an accident occurring which may have an impact on the groundwater regime.
 - Groundwater monitoring plan will be compiled based on the conditions and activities on site and will include the location of the monitoring boreholes, frequency of monitoring, list of chemical parameters to be monitored, sampling methodology, description of data capturing and reporting requirements.

11.1.8 Soil and Land Capability Survey

11.1.8.1 Terms of Reference

As part of the environmental investigations into the impact of mining activities on the project area, DWA appointed Rehab Green (cc) as specialist soil scientists. A soil survey will be conducted in order to provide a permanent record of the present soil resources in the area. The soils will further be assessed in terms of their potential agricultural land capability. The potential impacts of mining activities on the soil environment will be assessed and suitable alternatives or mitigation measures will be proposed. This will ensure that soil as an agricultural resource is conserved for future use.

11.1.8.2 Objectives

The objectives for the soil study are:

- To indicate the scope and the purpose for which the Soil Study was undertaken;
- To describe the methodology applied during soil investigations;
- To describe the impact of the proposed activities or alternatives on soils, land use and land capability in the project area; and
- To recommend mitigation measures to minimise the potential impacts on soils, land use and land capability.

11.1.8.3 Methodology

The following tasks will be completed during the execution of the Soil Study:

- Field Survey

During the field survey, a fixed point grid with a density of 150 x 150 m will be generated. At each point, the soils will be surveyed to the depth of the first restricting layer or to a maximum depth of 1500 mm, using a hand auger. Characteristics such as the soil form and family, depth, texture, structure, as well as the nature of underlying material, current land use and land capability will be determined at each point. Additional observations will be made in-between the grid points to determine soil boundaries.

Representative topsoil and subsoil samples will be taken for each 100 ha of the project area and analysed for pH, extractable cations and phosphorus. The GPS coordinates of each soil observation and sampling point will be taken in order to generate a general map of indicating the soil types of the study area.

- Land Use Assessment

The extent of all land use practices will be surveyed and mapped during the field survey.

- Land Capability Assessment

The soil properties of soil types mapped during the detailed soil assessment will be evaluated and categorized in land capability classes of arable land, grazing, wetlands and wilderness land.

- Wetland Soils Delineation

Soils form and soil wetness indicators will be used to determine the extent of wetlands in the study area. These observations and GPS coordinates will be used to map and delineate wetlands.

11.1.9 Visual Impact Assessment

11.1.9.1 Terms of Reference

Visual Assessments are used to determine the impact a proposed development will have on the visual aesthetic of the surrounding area. The proposed Weltevreden Open Cast Mine will disturb the visual integrity of the site itself as well as the surrounding area.

11.1.9.2 Objectives

The objectives of the visual assessment are:

- To identify the visibility of the project and the nature and intensity of the visual impact.
- To describe the visual sensitivity of the area and residing receptors.
- To determine the size of the viewshed area (area which has a direct visual connection / line-of-sight with the proposed site).
- To determine the nature and susceptibility of receptors within the viewshed area (residents, roads nature reserves etc).
- To determine the visual absorption capacity (ability of the environment to absorb the visual impacts).

11.1.10 Methodology

The methodology employed will be as follows:

- Topographical information will be used in a Geographical Information System (GIS) to form a Digital Terrain Model (DTM) which depicts elevations and slopes in the relevant area. The DTM in conjunction with the proposed site plan will be used to model the Viewshed area.
- Aerial Photography / Satellite Imagery will be used to identify potential receptors within the viewshed area in order to assess the significance of the visual disturbance.
- Factors and impacts will be investigated and rated. Findings will be incorporated into the EIA/EMP document, a separate report will not be provided.
- Mitigation measures which can reduce the visual impact will be recommended.

11.1.11 Traffic Assessment

11.1.11.1 Terms of Reference

Issues around traffic and road safety are of concern to users of the R33 which connects Carolina and Belfast. A basic traffic study will be conducted in order to assess the volume of vehicles which make use of the roads at present (baseline), this study will generate a prediction of the expected increase in vehicles using the road once the colliery is in operation.

11.1.11.2 Objective

To conduct a traffic and safety study that will generate baseline information on the volume of vehicles that makes use of the R33. This information will be used in the compilation of a traffic and safety report which will contain the baseline information and the predicted increase in traffic with the introduction of coal hauling trucks.

11.1.11.3 Methodology

Traffic studies will be carried out along the R33 where an intersection will be required for access to the proposed Weltevreden project. A traffic study is conducted by physically counting the number of various road users (cars, buses, trucks, Mini-buses, etc) who will pass a certain point over a specified period of time. This information is tabulated and used in the generation of predicted traffic volume increase.

11.1.11.4 Deliverable

A traffic and safety report that will inform on the number of vehicles that make use of the R33. The report will also inform on the predicted increase in traffic along the route, mitigation measures to ensure the safety of road users and recommendation in further studies.

11.1.12 Vibration and Air Blasting Assessment

11.1.12.1 Terms of Reference

The vibration and air blasting assessment will be undertaken by Blast Management & Consulting..

11.1.12.2 Objectives

The objectives of a vibration and air blasting report are:

- Assessing the possible impact of blasting operations on the immediate surroundings and current infrastructure in the vicinity of the proposed project area with regards to the following aspects:
 - Review of area and identification of infrastructure;
 - Current legislation and protocols;
 - Ground Vibration;
 - Air blast;
 - Fly rock;
 - Safety and Limits;
 - Surface blasting and Underground blasting influences;
 - Monitoring;
 - Pre-Blasting recommendations; and
 - Recommendations on minimising impacts where applicable;

11.1.12.3 Methodology

The methodology used to assess the ground vibration and airblast potential of the blasting activities during construction and operations include the following:

- Visualization of the Proposed Site:
 - Location of the site, (general overview);
 - Identifying the surface structures that are on and around the site;
 - Identifying any specific structure of concern indicated by the client;
 - Identifying any activity that could have influence on the blasting operations;
- Blasting Requirements:
 - What drilling and blasting will be done;
 - Calculate minimum and maximum's with regards to the blasting operations – with regards to charge masses that could or should be used;
 - Ground Vibration and Prediction;
 - Discuss ground vibration prediction;
 - Calculate expected Ground Vibration from blast design;
 - Apply expected maximum and expected minimums to location of critical structures;
 - Review of possible influences;
 - Limitations on Structures;
 - Define limitations with regards to structures;
 - Review influences in relation to accepted limits;
 - Limitations with regards to Human perception;
 - Define limitations of people;
 - Review influences with regards to people and people's perception;
- Air blast and Prediction:
 - Discuss airblast prediction;
 - Calculate expected Air blast from blast design;
 - Apply expected maximum and expected minimums to location of critical structures;
 - Review possible influences;
- Fly Rock:
 - Discuss flyrock and flyrock control,
- Noxious Fumes:

- Discuss fumes and controls;
- Site Specific Recommendations:
 - Specific attention is then given to the site in particular to the following aspects:
 - Blast Initiation
 - Safe Blasting Procedures
 - Monitoring
 - Risk Assessment

11.1.13 Public participation process

11.1.13.1 Terms of Reference

The Public Participation Process (PPP) must comply with the National Environmental Management Act , Act No. 107 of 1998 (NEMA) and the Minerals and Petroleum Resources Development Act , Act No. 28 of 2002 (MPRDA) and the relevant regulations promulgated in terms thereof. .

Appropriate methods of communication will need to be considered and participation will be shaped in its extent by ongoing refinement in the project description and activities. Additional levels of consultation and participation may need to be included as appropriate.

11.1.13.2 PPP Methodology

- The PPP approach will incorporate the following principles:
 - To meet legislative requirements;
 - The PPP must be appropriate and flexible and must be subject to change depending on the needs of the stakeholders;
 - The PPP will provide for transparent engagement and consultation
 - Information will be provided about the project to enable stakeholders to make informed comments and observations;
 - Specialists will be involved during the scoping phase to identify issues in order to ensure that detailed assessments are undertaken
 - The investigation of project alternatives will be included;
 - A complaints register will be maintained;

Stakeholders will be fully engaged from the beginning of the scoping phase, up to and including the end of the EIA phase, to ensure that all issues and concerns raised are collated and included into the PPP. Feedback will be provided in the EIA phase and will be included in the draft PPP report.

The PPP will be undertaken in accordance with the MPRDA and NEMA regulations. The PPP will also follow the 1998 Doing Better Business through Effective Public Consultation

and Disclosure document of the IFC, and well as the IAP2's Core Values for the Practice of Public Participation and the Code of Ethics of Public Participation Practitioners will be adhered to.

Table 11-4 The Public Participation strategy is shown in the table below.

Task	Methodology	Deliverable
Project initiation and refinement of scope of work	Develop lists of stakeholders. Site visit and hold discussions with key stakeholders. Refine the proposed PPP strategy. Prepare and submit a refined PPP for review and approval of scope of work.	Detailed scope of work. Information needs list. Refined PPP strategy. Records of discussions with key stakeholders. Update stakeholder database.
Prepare public information for distribution	Prepare Background Information Document, invitations, posters, brochures where necessary, media notices, questionnaires / response sheets and registration forms. Translate documentation (if applicable).	Draft documentation. Final documentation. Distribution lists.
Distribution of information to stakeholders and comments period	Distribute information to stakeholders inviting them to attend meeting and give comment on any concerns or issues they may have.	Proof of delivery where necessary or required.
Collect issues and comments from stakeholders	Hold information sharing meetings with authorities, key stakeholders and the general public and directly affected parties. (Two authorities meetings, one key stakeholder meeting, one public meeting and micro and group meetings with directly affected parties are anticipated). Collate all responses received. Manage telephonic communication. Update stakeholder database. Prepare minutes and issues report and distribute for comment. Distribute minutes and issues report to stakeholders. Establish an issues/ complaints register.	Draft issues report. Finalise report after comments period. Distribution list. Update Stakeholder databases. Minutes from meetings. Tracking issues/ complaints register.
PPP report	Prepare draft PPP report. Integration workshop with core team. Distribute draft report for comment. Collate comments. Finalise PPP and submit to DME and DEAT.	Draft PPP report. Record of comments. Final PPP report.



Task	Methodology	Deliverable
Feedback to stakeholders	<p>Prepare summary of draft PPP including updated issues stating how the issues will be addressed.</p> <p>Advertise and invite all stakeholders to feedback meetings.</p> <p>Translation of documentation.</p> <p>Hold meetings.</p> <p>Prepare minutes and comments report form meetings held.</p> <p>Distribute minutes and final issues report to stakeholders.</p>	<p>Summary of draft PPP report.</p> <p>Updated issues report</p> <p>Media notices and documentation for distribution.</p> <p>Minutes from meetings.</p> <p>Final issues/ comments report.</p>
Final PPP report	<p>Update and modify report with comments from feedback meetings.</p> <p>Update stakeholder database.</p> <p>Submit final PPP report to client.</p>	<p>PPP report.</p> <p>Updated stakeholders database.</p>

11.1.13.3 Deliverables

- Development of database of stakeholders
- Produce BID(s) and other information material
- Distribute BID and other information material to stakeholders
- Arrange logistical arrangements for all meetings
- Minutes of all meetings, these will need to be translated into Afrikaans and Zulu and signed off and distributed to all stakeholders as agreed
- Issues Report to be formulated
- A PPP for the lifetime of the project

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Appendix A: List of Plans



Plan 1: Regional Setting

Plan 2: Conceptual Mine Plan

Plan 3: Topographical Map

Plan 4: Geological map

Plan 5: Agriculture Potential

Plan 6: Vegetation Types



Appendix B: Public Participation Documentation



Appendix B1: Stakeholder Database



Appendix B2: Registration Comment Sheet



Appendix B3: Newspaper Advert



Appendix B4: Site Notices



Appendix B5: Comments and Response Report



Appendix C: Bird List



Title:	QDS	2530CC
Species:	388	
Rob	English Name	Scientific
1	Ostrich	<i>Struthio camelus</i>
6	Great Crested Grebe	<i>Podiceps cristatus</i>
8	Dabchick	<i>Tachybaptus ruficollis</i>
55	Whitebreasted Cormorant	<i>Phalacrocorax lucidus</i>
58	Reed Cormorant	<i>Phalacrocorax africanus</i>
60	Darter	<i>Anhinga rufa</i>
62	Grey Heron	<i>Ardea cinerea</i>
63	Blackheaded Heron	<i>Ardea melanocephala</i>
64	Goliath Heron	<i>Ardea goliath</i>
65	Purple Heron	<i>Ardea purpurea</i>
66	Great White Egret	<i>Egretta alba</i>
67	Little Egret	<i>Egretta garzetta</i>
68	Yellowbilled Egret	<i>Egretta intermedia</i>
69	Black Egret	<i>Egretta ardesiaca</i>
71	Cattle Egret	<i>Bubulcus ibis</i>
72	Squacco Heron	<i>Ardeola ralloides</i>
74	Greenbacked Heron	<i>Butorides striatus</i>
76	Blackcrowned Night Heron	<i>Nycticorax nycticorax</i>
78	Little Bittern	<i>Ixobrychus minutus</i>
80	Bittern	<i>Botaurus stellaris</i>
81	Hamerkop	<i>Scopus umbretta</i>
83	White Stork	<i>Ciconia ciconia</i>
84	Black Stork	<i>Ciconia nigra</i>
85	Abdim's Stork	<i>Ciconia abdimii</i>
89	Marabou Stork	<i>Leptoptilos crumeniferus</i>
90	Yellowbilled Stork	<i>Mycteria ibis</i>
91	Sacred Ibis	<i>Threskiornis aethiopicus</i>
92	Bald Ibis	<i>Geronticus calvus</i>
93	Glossy Ibis	<i>Plegadis falcinellus</i>
94	Hadeda Ibis	<i>Bostrychia hagedash</i>
95	African Spoonbill	<i>Platalea alba</i>
96	Greater Flamingo	<i>Phoenicopterus ruber</i>
97	Lesser Flamingo	<i>Phoenicopterus minor</i>
99	Whitefaced Duck	<i>Dendrocygna viduata</i>
100	Fulvous Duck	<i>Dendrocygna bicolor</i>
101	Whitebacked Duck	<i>Thalassornis leuconotus</i>
102	Egyptian Goose	<i>Alopochen aegyptiacus</i>
103	South African Shelduck	<i>Tadorna cana</i>
104	Yellowbilled Duck	<i>Anas undulata</i>
105	African Black Duck	<i>Anas sparsa</i>
106	Cape Teal	<i>Anas capensis</i>
107	Hottentot Teal	<i>Anas hottentota</i>
108	Redbilled Teal	<i>Anas erythrorhyncha</i>
112	Cape Shoveller	<i>Anas smithii</i>
113	Southern Pochard	<i>Netta erythrophthalma</i>
114	Pygmy Goose	<i>Nettapus auritus</i>
115	Knobbilled Duck	<i>Sarkidiornis melanotos</i>



116	Spurwinged Goose	<i>Plectropterus gambensis</i>
117	Maccoa Duck	<i>Oxyura maccoa</i>
118	Secretarybird	<i>Sagittarius serpentarius</i>
122	Cape Vulture	<i>Gyps coprotheres</i>
126	Black Kite	<i>Milvus migrans</i>
126.1	Yellowbilled Kite	<i>Milvus aegyptius</i>
127	Blackshouldered Kite	<i>Elanus caeruleus</i>
128	Cuckoo Hawk	<i>Aviceda cuculoides</i>
130	Honey Buzzard	<i>Pernis apivorus</i>
131	Black Eagle	<i>Aquila verreauxii</i>
133	Steppe Eagle	<i>Aquila nipalensis</i>
136	Booted Eagle	<i>Hieraaetus pennatus</i>
137	African Hawk Eagle	<i>Hieraaetus spilogaster</i>
138	Ayres' Eagle	<i>Hieraaetus ayresii</i>
140	Martial Eagle	<i>Polemaetus bellicosus</i>
141	Crowned Eagle	<i>Stephanoaetus coronatus</i>
142	Brown Snake Eagle	<i>Circaetus cinereus</i>
143	Blackbreasted Snake Eagle	<i>Circaetus pectoralis</i>
148	African Fish Eagle	<i>Haliaeetus vocifer</i>
149	Steppe Buzzard	<i>Buteo vulpinus</i>
150	Forest Buzzard	<i>Buteo trizonatus</i>
152	Jackal Buzzard	<i>Buteo rufofuscus</i>
155	Redbreasted Sparrowhawk	<i>Accipiter rufiventris</i>
157	Little Sparrowhawk	<i>Accipiter minullus</i>
158	Black Sparrowhawk	<i>Accipiter melanoleucus</i>
159	Little Banded Goshawk	<i>Accipiter badius</i>
160	African Goshawk	<i>Accipiter tachiro</i>
161	Gabar Goshawk	<i>Melierax gabar</i>
164	Eurasian Marsh Harrier	<i>Circus aeruginosus</i>
165	African Marsh Harrier	<i>Circus ranivorus</i>
166	Montagu's Harrier	<i>Circus pygargus</i>
167	Pallid Harrier	<i>Circus macrourus</i>
168	Black Harrier	<i>Circus maurus</i>
169	Gymnogone	<i>Polyboroides typus</i>
170	Osprey	<i>Pandion haliaetus</i>
171	Peregrine Falcon	<i>Falco peregrinus</i>
172	Lanner Falcon	<i>Falco biarmicus</i>
173	Northern Hobby Falcon	<i>Falco subbuteo</i>
179	Western Redfooted Kestrel	<i>Falco vespertinus</i>
180	Eastern Redfooted Kestrel	<i>Falco amurensis</i>
181	Rock Kestrel	<i>Falco rupicolis</i>
182	Greater Kestrel	<i>Falco rupicoloides</i>
183	Lesser Kestrel	<i>Falco naumanni</i>
188	Coqui Francolin	<i>Peliperdix coqui</i>
190	Greywing Francolin	<i>Scleroptila africanus</i>
191	Shelley's Francolin	<i>Scleroptila shelleyi</i>
192	Redwing Francolin	<i>Scleroptila levaillantii</i>
196	Natal Francolin	<i>Pternistis natalensis</i>
198	Rednecked Francolin	<i>Pternistis afer</i>
199	Swainson's Francolin	<i>Pternistis swainsonii</i>



200	Common Quail	<i>Coturnix coturnix</i>
201	Harlequin Quail	<i>Coturnix delegorguei</i>
203	Helmeted Guineafowl	<i>Numida meleagris</i>
205	Kurrichane Buttonquail	<i>Turnix sylvatica</i>
207	Wattled Crane	<i>Grus carunculatus</i>
208	Blue Crane	<i>Anthropoides paradisea</i>
209	Crowned Crane	<i>Balearica regulorum</i>
210	African Rail	<i>Rallus caerulescens</i>
211	Corncrake	<i>Crex crex</i>
213	Black Crake	<i>Amaurornis flavirostris</i>
215	Baillon's Crake	<i>Porzana pusilla</i>
217	Redchested Flufftail	<i>Sarothrura rufa</i>
222	Whitewinged Flufftail Rare	<i>Sarothrura ayresi</i>
223	Purple Gallinule	<i>Porphyrio madagascariensis</i>
226	Common Moorhen	<i>Gallinula chloropus</i>
228	Redknobbed Coot	<i>Fulica cristata</i>
229	African Finfoot	<i>Podica senegalensis</i>
231	Stanley's Bustard	<i>Neotis denhami</i>
233	Whitebellied Korhaan	<i>Eupodotis barrowii</i>
234	Blue Korhaan	<i>Eupodotis caerulescens</i>
238	Blackbellied Korhaan	<i>Eupodotis melanogaster</i>
240	African Jacana	<i>Actophilornis africanus</i>
242	Old World Painted Snipe	<i>Rostratula benghalensis</i>
245	Ringed Plover	<i>Charadrius hiaticula</i>
248	Kittlitz's Plover	<i>Charadrius pecuarius</i>
249	Threebanded Plover	<i>Charadrius tricollaris</i>
252	Caspian Plover	<i>Charadrius asiaticus</i>
255	Crowned Plover	<i>Vanellus coronatus</i>
257	Blackwinged Plover	<i>Vanellus melanopterus</i>
258	Blacksmith Plover	<i>Vanellus armatus</i>
260	Wattled Plover	<i>Vanellus senegallus</i>
262	Ruddy Turnstone	<i>Arenaria interpres</i>
264	Common Sandpiper	<i>Actitis hypoleucos</i>
265	Green Sandpiper	<i>Tringa ochropus</i>
266	Wood Sandpiper	<i>Tringa glareola</i>
269	Marsh Sandpiper	<i>Tringa stagnatilis</i>
270	Greenshank	<i>Tringa nebularia</i>
272	Curlew Sandpiper	<i>Calidris ferruginea</i>
274	Little Stint	<i>Calidris minuta</i>
281	Sanderling	<i>Calidris alba</i>
284	Ruff	<i>Philomachus pugnax</i>
286	Ethiopian Snipe	<i>Gallinago nigripennis</i>
290	Whimbrel	<i>Numenius phaeopus</i>
294	Pied Avocet	<i>Recurvirostra avosetta</i>
295	Blackwinged Stilt	<i>Himantopus himantopus</i>
297	Spotted Dikkop	<i>Burhinus capensis</i>
298	Water Dikkop	<i>Burhinus vermiculatus</i>
300	Temminck's Courser	<i>Cursorius temminckii</i>
305	Blackwinged Pratincole	<i>Glareola nordmanni</i>



315	Greyheaded Gull	<i>Larus cirrocephalus</i>
322	Caspian Tern	<i>Sterna caspia</i>
338	Whiskered Tern	<i>Chlidonias hybridus</i>
339	Whitewinged Tern	<i>Chlidonias leucopterus</i>
348	Feral Pigeon	<i>Columba livia</i>
349	Rock Pigeon	<i>Columba guinea</i>
350	Rameron Pigeon	<i>Columba arquatrix</i>
352	Redeyed Dove	<i>Streptopelia semitorquata</i>
354	Cape Turtle Dove	<i>Streptopelia capicola</i>
355	Laughing Dove	<i>Streptopelia senegalensis</i>
356	Namaqua Dove	<i>Oena capensis</i>
358	Greenspotted Dove	<i>Turtur chalcospilos</i>
359	Tambourine Dove	<i>Turtur tympanistria</i>
361	African Green Pigeon	<i>Treron calva</i>
371	Purplecrested Lourie	<i>Musophaga porphyreolopha</i>
373	Grey Lourie	<i>Corythaixoides concolor</i>
374	Eurasian Cuckoo	<i>Cuculus canorus</i>
375	African Cuckoo	<i>Cuculus gularis</i>
377	Redcheded Cuckoo	<i>Cuculus solitarius</i>
378	Black Cuckoo	<i>Cuculus clamosus</i>
380	Great Spotted Cuckoo	<i>Clamator glandarius</i>
381	Striped Cuckoo	<i>Clamator levaillantii</i>
382	Jacobin Cuckoo	<i>Clamator jacobinus</i>
385	Klaas's Cuckoo	<i>Chrysococcyx klaas</i>
386	Diederik Cuckoo	<i>Chrysococcyx caprius</i>
391	Burchell's Coucal	<i>Centropus burchellii</i>
392	Barn Owl	<i>Tyto alba</i>
393	Grass Owl	<i>Tyto capensis</i>
395	Marsh Owl	<i>Asio capensis</i>
397	Whitefaced Owl	<i>Ptilopus granti</i>
400	Cape Eagle Owl	<i>Bubo capensis</i>
401	Spotted Eagle Owl	<i>Bubo africanus</i>
404	Eurasian Nightjar	<i>Caprimulgus europaeus</i>
405	Fierynecked Nightjar	<i>Caprimulgus pectoralis</i>
408	Freckled Nightjar	<i>Caprimulgus tristigma</i>
411	Eurasian Swift	<i>Apus apus</i>
412	Black Swift	<i>Apus barbatus</i>
415	Whiterumped Swift	<i>Apus caffer</i>
416	Horus Swift	<i>Apus horus</i>
417	Little Swift	<i>Apus affinis</i>
418	Alpine Swift	<i>Tachymarptis melba</i>
421	Palm Swift	<i>Cypsiurus parvus</i>
424	Speckled Mousebird	<i>Colius striatus</i>
426	Redfaced Mousebird	<i>Urocolius indicus</i>
428	Pied Kingfisher	<i>Ceryle rudis</i>
429	Giant Kingfisher	<i>Megaceryle maxima</i>
430	Halfcollared Kingfisher	<i>Alcedo semitorquata</i>
431	Malachite Kingfisher	<i>Alcedo cristata</i>
432	Pygmy Kingfisher	<i>Ispidina picta</i>



433	Woodland Kingfisher	<i>Halcyon senegalensis</i>
435	Brownhooded Kingfisher	<i>Halcyon albiventris</i>
438	Eurasian Bee-eater	<i>Merops apiaster</i>
443	Whitefronted Bee-eater	<i>Merops bullockoides</i>
444	Little Bee-eater	<i>Merops pusillus</i>
446	Eurasian Roller	<i>Coracias garrulus</i>
451	African Hoopoe	<i>Upupa africana</i>
452	Redbilled Woodhoopoe	<i>Phoeniculus purpureus</i>
454	Scimitarbilled Woodhoopoe	<i>Rhinopomastus cyanomelas</i>
464	Blackcollared Barbet	<i>Lybius torquatus</i>
465	Pied Barbet	<i>Tricholaema leucomelas</i>
470	Yellowfronted Tinker Barbet	<i>Pogoniulus chrysoconus</i>
473	Crested Barbet	<i>Trachyphonus vaillantii</i>
474	Greater Honeyguide	<i>Indicator indicator</i>
475	Scalythroated Honeyguide	<i>Indicator variegatus</i>
476	Lesser Honeyguide	<i>Indicator minor</i>
478	Sharpbilled Honeyguide	<i>Prodotiscus regulus</i>
480	Ground Woodpecker	<i>Geocolaptes olivaceus</i>
483	Goldentailed Woodpecker	<i>Campethera abingoni</i>
486	Cardinal Woodpecker	<i>Dendropicos fuscescens</i>
488	Olive Woodpecker	<i>Dendropicos griseocephalus</i>
489	Redthroated Wryneck	<i>Jynx ruficollis</i>
494	Rufousnaped Lark	<i>Mirafra africana</i>
495.2	Eastern Clapper Lark	<i>Mirafra fasciolata</i>
496	Flappet Lark	<i>Mirafra rufocinnamomea</i>
498	Sabota Lark	<i>Calendulauda sabota</i>
499	Rudd's Lark	<i>Heteromirafra ruddi</i>
500.2	Eastern Longbilled Lark	<i>Certhilauda semitorquata</i>
506	Spikeheeled Lark	<i>Chersomanes albofasciata</i>
507	Redcapped Lark	<i>Calandrella cinerea</i>
508	Pinkbilled Lark	<i>Spizocorys conirostris</i>
518	Eurasian Swallow	<i>Hirundo rustica</i>
520	Whitethroated Swallow	<i>Hirundo albigularis</i>
523	Pearlbreasted Swallow	<i>Hirundo dimidiata</i>
524	Redbreasted Swallow	<i>Hirundo semirufa</i>
526	Greater Striped Swallow	<i>Hirundo cucullata</i>
528	South African Cliff Swallow	<i>Hirundo spilodera</i>
529	Rock Martin	<i>Hirundo fuligula</i>
530	House Martin	<i>Delichon urbica</i>
531	Greyrumped Swallow	<i>Pseudhirundo griseopyga</i>
532	Sand Martin	<i>Riparia riparia</i>
533	Brownthroated Martin	<i>Riparia paludicola</i>
534	Banded Martin	<i>Riparia cincta</i>
536	Black Sawwing Swallow	<i>Psalidoprocne holomelaena</i>
538	Black Cuckooshrike	<i>Campephaga flava</i>
541	Forktailed Drongo	<i>Dicrurus adsimilis</i>



542	Squaretailed Drongo	<i>Dicrurus ludwigii</i>
545	Blackheaded Oriole	<i>Oriolus larvatus</i>
547	Black Crow	<i>Corvus capensis</i>
548	Pied Crow	<i>Corvus albus</i>
554	Southern Black Tit	<i>Parus niger</i>
558	Grey Penduline Tit	<i>Anthoscopus caroli</i>
560	Arrowmarked Babbler	<i>Turdoides jardineii</i>
568	Blackeyed Bulbul	<i>Pycnonotus tricolor</i>
576	Kurrichane Thrush	<i>Turdus libonyanus</i>
577	Olive Thrush	<i>Turdus olivaceus</i>
579	Orange Thrush	<i>Zoothera gurneyi</i>
580	Groundscraper Thrush	<i>Psophocichla litsipsirupa</i>
581	Cape Rockthrush	<i>Monticola rupestris</i>
582	Sentinel Rockthrush	<i>Monticola explorator</i>
586	Mountain Chat	<i>Oenanthe monticola</i>
587	Capped Wheatear	<i>Oenanthe pileata</i>
588	Buffstreaked Chat	<i>Oenanthe bifasciata</i>
589	Familiar Chat	<i>Cercomela familiaris</i>
593	Mocking Chat	<i>Thamnolaea cinnamomeiventris</i>
595	Anteating Chat	<i>Myrmecocichla formicivora</i>
596	Stonechat	<i>Saxicola torquata</i>
598	Chorister Robin	<i>Cossypha dichroa</i>
600	Natal Robin	<i>Cossypha natalensis</i>
601	Cape Robin	<i>Cossypha caffra</i>
602	Whitethroated Robin	<i>Cossypha humeralis</i>
613	Whitebrowed Robin	<i>Cercotrichas leucophrys</i>
619	Garden Warbler	<i>Sylvia borin</i>
621	Titbabbler	<i>Parisoma subcaeruleum</i>
625	Icterine Warbler	<i>Hippolais icterina</i>
628	Great Reed Warbler	<i>Acrocephalus arundinaceus</i>
631	African Marsh Warbler	<i>Acrocephalus baeticatus</i>
633	Eurasian Marsh Warbler	<i>Acrocephalus palustris</i>
634	Eurasian Sedge Warbler	<i>Acrocephalus schoenobaenus</i>
635	Cape Reed Warbler	<i>Acrocephalus gracilirostris</i>
637	Yellow Warbler	<i>Chloropeta natalensis</i>
638	African Sedge Warbler	<i>Bradypterus baboecala</i>
643	Willow Warbler	<i>Phylloscopus trochilus</i>
645	Barthroated Apalis	<i>Apalis thoracica</i>
648	Yellowbreasted Apalis	<i>Apalis flavida</i>
651	Longbilled Crombec	<i>Sylvietta rufescens</i>
661	Grassbird	<i>Sphenoecus afer</i>
664	Fantailed Cisticola	<i>Cisticola juncidis</i>
665	Desert Cisticola	<i>Cisticola aridulus</i>
666	Cloud Cisticola	<i>Cisticola textrix</i>
667	Ayres' Cisticola	<i>Cisticola ayresii</i>
668	Palecrowned Cisticola	<i>Cisticola cinnamomeus</i>



670	Wailing Cisticola	<i>Cisticola lais</i>
677	Levaillant's Cisticola	<i>Cisticola tinniens</i>
678	Croaking Cisticola	<i>Cisticola natalensis</i>
679	Lazy Cisticola	<i>Cisticola aberrans</i>
681	Neddicky	<i>Cisticola fulvicapillus</i>
683	Tawnyflanked Prinia	<i>Prinia subflava</i>
685	Blackchested Prinia	<i>Prinia flavicans</i>
686.1	Spotted Prinia	<i>Prinia hypoxantha</i>
689	Spotted Flycatcher	<i>Muscicapa striata</i>
690	Dusky Flycatcher	<i>Muscicapa adusta</i>
693	Fantailed Flycatcher	<i>Myioparus plumbeus</i>
694	Black Flycatcher	<i>Melaenornis pammelaina</i>
698	Fiscal Flycatcher	<i>Sigelus silens</i>
700	Cape Batis	<i>Batis capensis</i>
706	Fairy Flycatcher	<i>Stenostira scita</i>
708	Bluemantled Flycatcher	<i>Trochocercus cyanomelas</i>
710	Paradise Flycatcher	<i>Terpsiphone viridis</i>
711	African Pied Wagtail	<i>Motacilla aguimp</i>
712	Longtailed Wagtail	<i>Motacilla clara</i>
713	Cape Wagtail	<i>Motacilla capensis</i>
714	Yellow Wagtail	<i>Motacilla flava</i>
716	Grassveld Pipit	<i>Anthus cinnamomeus</i>
717	Longbilled Pipit	<i>Anthus similis</i>
718	Plainbacked Pipit	<i>Anthus leucophrys</i>
719	Buffy Pipit	<i>Anthus vaalensis</i>
720	Striped Pipit	<i>Anthus lineiventris</i>
725	Yellowbreasted Pipit	<i>Anthus chloris</i>
727	Orangethroated Longclaw	<i>Macronyx capensis</i>
728	Yellowthroated Longclaw	<i>Macronyx croceus</i>
731	Lesser Grey Shrike	<i>Lanius minor</i>
732	Fiscal Shrike	<i>Lanius collaris</i>
733	Redbacked Shrike	<i>Lanius collurio</i>
736	Southern Boubou	<i>Laniarius ferrugineus</i>
740	Puffback	<i>Dryoscopus cubla</i>
741	Brubru	<i>Nilaus afer</i>
743	Threestreaked Tchagra	<i>Tchagra australis</i>
744	Blackcrowned Tchagra	<i>Tchagra senegala</i>
746	Bokmakierie	<i>Telophorus zeylonus</i>
748	Orangebreasted Bush Shrike	<i>Telophorus sulfureopectus</i>
750	Olive Bush Shrike	<i>Telophorus olivaceus</i>
751	Greyheaded Bush Shrike	<i>Malaconotus blanchoti</i>
753	White Helmetshrike	<i>Prionops plumatus</i>
758	Indian Myna	<i>Acridotheres tristis</i>
759	Pied Starling	<i>Spreo bicolor</i>
760	Wattled Starling	<i>Creatophora cinerea</i>
761	Plumcoloured Starling	<i>Cinnyricinclus leucogaster</i>
764	Glossy Starling	<i>Lamprotornis nitens</i>
769	Redwinged Starling	<i>Onychognathus morio</i>
772	Redbilled Oxpecker	<i>Buphagus erythrorhynchus</i>



775	Malachite Sunbird	<i>Nectarinia famosa</i>
783	Lesser Doublecollared Sunbird	<i>Cinnyris chalybea</i>
785	Greater Doublecollared Sunbird	<i>Cinnyris afra</i>
787	Whitebellied Sunbird	<i>Cinnyris talatala</i>
791	Scarletched Sunbird	<i>Chalcomitra senegalensis</i>
792	Black Sunbird	<i>Chalcomitra amethystina</i>
796	Cape White-eye	<i>Zosterops virens</i>
799	Whitebrowed Sparrowweaver	<i>Plocepasser mahali</i>
801	House Sparrow	<i>Passer domesticus</i>
803	Cape Sparrow	<i>Passer melanurus</i>
804	Southern Greyheaded Sparrow	<i>Passer diffusus</i>
805	Yellowthroated Sparrow	<i>Petronia supercilialis</i>
807	Thickbilled Weaver	<i>Amblyospiza albifrons</i>
810	Spectacled Weaver	<i>Ploceus ocularis</i>
811	Spottedbacked Weaver	<i>Ploceus cucullatus</i>
813	Cape Weaver	<i>Ploceus capensis</i>
814	Masked Weaver	<i>Ploceus velatus</i>
815	Lesser Masked Weaver	<i>Ploceus intermedius</i>
816	Golden Weaver	<i>Ploceus xanthops</i>
819	Redheaded Weaver	<i>Anaplectes rubriceps</i>
820	Cuckoofinch	<i>Anomalospiza imberbis</i>
821	Redbilled Quelea	<i>Quelea quelea</i>
824	Red Bishop	<i>Euplectes orix</i>
826	Golden Bishop	<i>Euplectes afer</i>
827	Yellowrumped Widow	<i>Euplectes capensis</i>
828	Redshouldered Widow	<i>Euplectes axillaris</i>
829	Whitewinged Widow	<i>Euplectes albonotatus</i>
831	Redcollared Widow	<i>Euplectes ardens</i>
832	Longtailed Widow	<i>Euplectes progne</i>
840	Bluebilled Firefinch	<i>Lagonosticta rubricata</i>
842	Redbilled Firefinch	<i>Lagonosticta senegala</i>
844	Blue Waxbill	<i>Uraeginthus angolensis</i>
845	Violeteared Waxbill	<i>Granatina granatina</i>
846	Common Waxbill	<i>Estrilda astrild</i>
850	Sweet Waxbill	<i>Estrilda melanotis</i>
852	Quail Finch	<i>Ortygospiza atricollis</i>
854	Orangebreasted Waxbill	<i>Amandava subflava</i>
855	Cutthroat Finch	<i>Amadina fasciata</i>
856	Redheaded Finch	<i>Amadina erythrocephala</i>
857	Bronze Mannikin	<i>Lonchura cucullata</i>
860	Pintailed Whydah	<i>Vidua macroura</i>
862	Paradise Whydah	<i>Vidua paradisaea</i>
864	Black Widowfinch	<i>Vidua funerea</i>
867	Steelblue Widowfinch	<i>Vidua chalybeata</i>
869	Yelloweyed Canary	<i>Serinus mozambicus</i>
870	Blackthroated Canary	<i>Serinus atrogularis</i>
872	Cape Canary	<i>Serinus canicollis</i>



877	Bully Canary	<i>Serinus sulphuratus</i>
881	Streakyheaded Canary	<i>Serinus gularis</i>
884	Goldenbreasted Bunting	<i>Emberiza flaviventris</i>
885	Cape Bunting	<i>Emberiza capensis</i>
886	Rock Bunting	<i>Emberiza tahapisi</i>