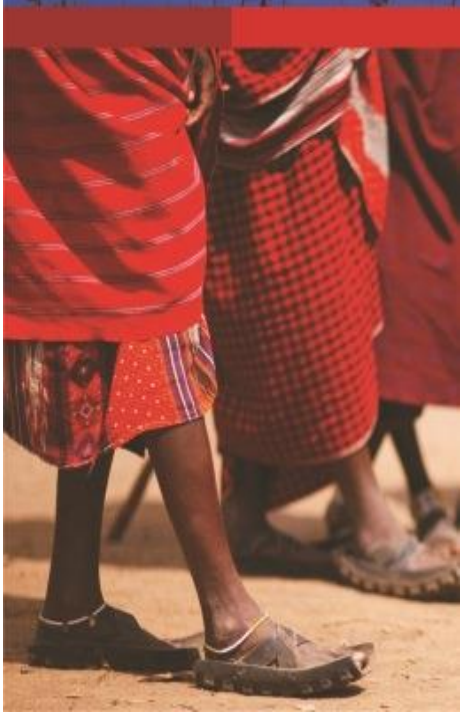

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ENVIRONMENTAL

NEMA REF NUMBER

PROJECT REF NO.	17/2/3N-272

Northern Coal Weltevreden Open Pit Coal Mine

Draft Environmental Impact Assessment / Environmental Management Plan

Part 1 – EIA/EMP Report

Project Number:

NOR1982

Prepared for:

Northern Coal (Pty) Ltd

August 2014

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This document has been prepared by Digby Wells Environmental.

Report Type:	**Draft Environmental Impact Assessment / Environmental Management Plan**
Project Name:	**Northern Coal Weltevreden Open Pit Coal Mine**
Project Code:	**NOR1982**

Name	Responsibility	Signature	Date
Andy Pirie	Report Writer & Project Administrator		August 2014
Stephanie Aken	1ST Review		August 2014
Michael Hennessy	2nd Review		August 2014
Lucy Koeslag	3rd Review and Project Manager		August 2014

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. A detailed Environmental Impact Assessment (EIA) and public consultation was undertaken during the MRA process for the Weltevreden Open Pit Coal Mine Project. The MRA was approved and a Mining Right was granted by the Department of Mineral Resources (DMR) on 4 December 2013 (File Ref No. MP30/5/1/1/2/385 MR). Based on the results of feasibility studies, which took into account the demand for coal within the 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 an independent Environmental Assessment Practitioner (EAP) to undertake the environmental investigations and necessary public consultation to compile the environmental reports required by the Mpumalanga 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, 2 and 3 (GN R. 543, GN R. 544, GN R. 545 and GN R.546). A list of all activities applied for are described in the table below.

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.

Government Notice Regulation (GN R.)	Listed activity number	The proposed activity
Notice No. 545, 18/06/2010	5	The construction of two pollution control dams (PCD's) and a ROM Stockpile which requires an Integrated Water Use Licence in terms of Section 21 of the NWA.
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.

Project Location and Description

The Northern Coal Weltevreden Project is located 10 km south of the town of Belfast, in the Emakhazeni Local Municipality and Nkangala District Municipality of the Mpumalanga Province (Plan 1, Appendix A). Northern Coal proposes to develop an open pit coal mine for the mining of No. 2 Seam of the Witbank coal field on portions 15 and 16 of the farm Weltevreden 381 JT (Plan 2 and Plan 3, Appendix A).

With the proposed mine development, minimal infrastructure is planned. Planned mine infrastructure will comprise of a Run of Mine (ROM) stockpile, crusher and screening plant, and a 46 m^3 above ground storage facility for hydrocarbons (which will be placed within a bunded area). A 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 by constructing a road crossing from the haul road onto 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.

Purpose of this report

The overarching objectives of this EIA/EMP report are to:

- Prepare integrated sensitivity maps for the Project 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 all the listed activities in terms of NEMA (approval has already been obtained from the DMR for mining activities); and

- Recommend mitigation and management measures to ensure that the development is undertaken in such a way as to minimise negative impacts.

This report also describes the current environment of the Project area and evaluates all the impacts that have been identified during the specialist studies undertaken. Furthermore an Environmental Management plan has been developed to mitigate and manage all environmental impacts associated with each Project activities.

Specialist Studies conducted as part of this EIA/EMP Report

The following specialist studies were previously conducted in support of a mining right under the Mineral and Petroleum Resources Act (MPRDA) and were used in this EIA/EMP report:

- Topography Assessment;
- Visual Assessment;
- Soil and Land Capability Assessment;
- Fauna and Flora Assessment;
- Avifauna Assessment;
- Wetlands and Aquatic Assessment;
- Surface Water (Hydrological) Assessment;
- Groundwater (Geohydrological) Assessment;
- Air Quality Assessment;
- Noise Assessment;
- Traffic Assessment;
- Blasting and Vibration Assessment;
- Archaeological and Heritage Assessment; and
- Sustainability Assessment

Subsequently, a number of specialist studies required updating for environmental authorisation under NEMA for this EIA/EMP report. These included:

- Fauna and Flora Assessment;
- Wetlands Assessment;
- Surface Water (Hydrological) Assessment; and
- Heritage Assessment.

A socio-economic baseline community survey was also conducted on households to the north-east of the study area.

Significant Findings

Some of the more significant positive and negative impacts that are expected to result from the Weltevreden Project include the following:

- Alteration to topography from open pit pits and rehabilitation will have a negative impact on the topography of the site;
- Disturbance to the geological sequence and removal of coal. This is a permanent impact and mitigation will not be possible;
- Increase in erosion potential to soils from surface disturbance and vegetation removal. This could result in the loss of topsoil;
- Loss of the natural soil structure and soil properties from handling and contamination;
- Loss of the current agricultural land use and loss of high agricultural potential land;
- AMD could result in deterioration of surface and groundwater resources after closure;
- The establishment of the open pit may dewater the surrounding aquifers;
- The open pit areas will result in the destruction of habitats. A buffer zone will be required around the wetland areas and aquatic ecosystems to minimise/prevent impacts on them;
- Modification of hydrological processes will occur in areas where dewatering will take place; and
- Positive impacts are expected in terms of employment (limited), skills development, regional spending, and contribution to taxes, implementation of the Social and Labour Plan and the continuous supply of coal to Eskom to ensure electricity generation.

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LIST OF ACRONYMS

AMD	Acid Mine Drainage
BID	Background Information Document
˚C	Degrees Celsius
CFP	Chance Find Procedure
CMP	Conservation Management Plan
D	Dust fallout rate
DEA	The Directorate responsible for environmental affairs within the Department of Water and Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DEDET	Mpumalanga Department of Economic Development and Tourism
Digby Wells	Digby Wells Environmental
DMR	Department of Mineral Resources
DSR	Draft Scoping Report
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EC	Electrical Conductivity
ELM	Emakhazeni Local Municipality
EMP	Environmental Management Plan
FSR	Final Scoping Report
GRDM	Groundwater Resources Directed Measures
GG	Government Gazette
GIS	Geographic Information System
GN R.	Government Notice
ha	Hectares
I&AP	Interested and Affected Party
km	Kilometre
kV	Kilo Voltage

LoM	Life of Mine
L/d	Litres per day
L/s	Litres per second
MAP	Mean Annual Precipitation
MAE	Mean Annual Evaporation
m	Metres
mm	Millimetres
Mm^3	Million cubic metres
m^3/s	Cubic metres per second
Mm^3/a	Million cubic metres per annum
m/s	Metres per second
mamsl	Metres above mean sea level
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)
NEMAQA	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NDM	Nkangala District Municipality
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
No.	Number
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PCD	Pollution Control Dam
PPP	Public Participation Process
R33	Regional Route 33
ROM	Run of Mine
SANAS	South African National Accredited System
SANS	South African National Standards
SDC	Source Directed Control
SDF	Standard Design Flood

SCS	Soil Conservation Service
SS	Suspended Solids
SSC	Species of Special Concern
TDS	Total Dissolved Solids
WARMS	Water Authorisation Registration and Management System
WCF	Waterberg Coalfield
WRC	Water Research Commission
WULA	Water Use Licence Application

1 Introduction

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 (Plan 1 and 2, Appendix A). The MRA was approved and a Mining Right was granted by the Department of Mineral Resources (DMR) on 4 December 2013 (File Ref No. MP30/5/1/1/2/385 MR). Based on the results of feasibility studies, which took into account the demand for coal within the 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 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) an Environmental Impact Assessment Report (EIA) is required in respect of listed activities stipulated in Government Listing Notices 1 to 3 (GN R. 544, GN R. 545 and GN R. 546). This EIA will be submitted to the Mpumalanga Department of Economic Development, Environment and Tourism (DEDET) to obtain authorisation for the undertaking of proposed listed activities to occur on the above mining site.

This report includes all specialist studies required to identify the potential environmental impacts identified for the Project and its related activities. A list of all the NEMA activities (in terms of Government Notice (GN) R. 544, 545 and 546) are provided in Table 3-1.

1.1 Applicant Details

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

Table 1-1: 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, 10th Road, Kew, Johannesburg, 2132
Postal Address:	P. O. Box 52651, Saxonwold, 2132

1.2 Details of the Environmental Assessment Practitioner

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 Table 3-1 of this report. Digby Wells is a South African company with international expertise in delivering comprehensive environmental and social solutions for clients in diverse sectors such as the energy, minerals, and mining industries

Particulars of the EAP are provided in Table 1-2 below.

Table 1-2: Particulars of the EAP

EAP Name:	Digby Wells Environmental
Contact Person:	Lucy Koeslag
Telephone No:	+27 11 789 9495
Fax No:	+27 11 789 9498
Email address:	lucy.koeslag@digywells.com
Physical Address:	Fern Isle Building, 359 Pretoria Avenue, Randburg, Gauteng, 2125
Postal Address:	Private Bag X10046, Randburg, Gauteng, 2125

2 Environmental Impact Assessment Process

The South African Environmental Impact Assessment (EIA) framework is illustrated in Figure 2-1 below.

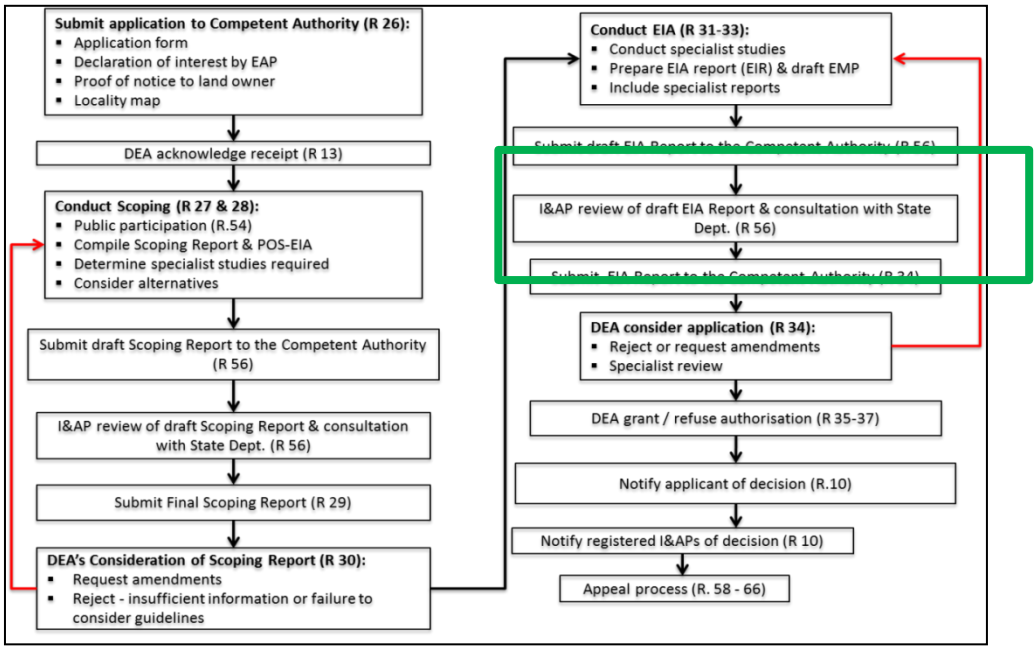

Figure 2-1: The South African legislative framework for EIA

2.1 Scoping Process

The Scoping Report forms part of the EIA process and aims to identify those environmental issues and concerns that require investigation as well as to determine feasible alternatives. This information is then used to determine the scope of work for the EIA. During the scoping phase those persons interested or affected by the Project were informed of the Project and afforded the opportunity to provide their input in terms of issues and concerns they may have.

Potential positive and negative impacts that the Project may have on the environment were identified and discussed in the scoping phase and a description of further investigations required for the impact assessment studies were proposed.

A scoping report was compiled and the draft and final versions were submitted to DEDET.

The aims of the Scoping Report were to:

- Provide information to the authorities and to other I&APs/stakeholders on the Project to allow them to comment and raise issues of concern;
- Consider alternatives to the Project;
- Provide stakeholders with the opportunity to contribute to the Project, and to allow them to verify that the issues they have raised have been recorded and considered;
- Provide a description of the baseline receiving environment; and
- Highlight potential impacts that should be investigated further during the EIA process.

2.2 Environmental Impact Assessment

An EIA is a process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects or impacts identified for a proposed development prior to major decisions being taken and commitments made.

The purpose of an EIA is to:

- Provide information for decision-making on the environmental consequences of a Project; and
- Promote environmentally sound and sustainable development through the identification of appropriate enhancement and mitigation measures.

During the draft EIA phase the following activities were carried out:

- Specialist investigations;
- Compilation of this draft EIA report;
- Compilation of a draft Environmental Management Plan (EMP);

- Compilation and distribution of a letter announcing the availability of draft EIA report for comment and distribution of copies of the report to Interested and Affected Parties (I&APs) upon request;
- Conduct key stakeholder meetings;
- Compilation of a Proceedings Report as a Comments and Response Report (CRR);
- Distribution of copies of the Final EIA and EMP Report to relevant authorities; and
- Announcing authority decision to all registered I&APs.

2.3 Environmental Management Plan

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

The EMP will address the environmental impacts during the design, construction and operational phases of the Project. Due regard must be given to environmental protection during the entire Project. To achieve this, a number of environmental specifications/recommendations are made. These are aimed at ensuring that the project proponent maintains adequate control over the Project to:

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

2.4 Decision-Making Authority

DEDET will have jurisdiction on the consideration of the application for environmental authorisation under NEMA. The Water Use Licence Application (WULA) will be submitted to the Department of Water Affairs (DWA).

3 Legal and Statutory Requirements

The following legislation and guidelines are applicable to this EIA process:

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

Section 24 of the Constitution 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:

- Prevent pollution and ecological degradation;
- Promote conservation; and

- Secure 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 the 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.

3.2 National Environmental Management Act, 1998 (Act No. 107 of 1998)

The NEMA EIA Regulations were published on the 18 June 2010 in GN R.543 and came into effect on 2 August 2010 (the NEMA EIA Regulations). Together with the NEMA EIA Regulations, the Minister also published the following Regulations in terms of Sections 24 and 24D of the NEMA:

- Regulation GN R. 544 - Listing Notice 1: This listing notice provides a list of various activities which require environmental authorisation and which must follow the basic assessment process as described in Sections 21 to 25 of the NEMA Regulations;
- Regulation GN R. 545 – Listing Notice 2: This listing notice provides a list of various activities which require environmental authorisation and which must follow an environmental impact assessment process as describer in Sections 26 to 35 of the NEMA Regulations; and
- Regulation GN R. 546 – Listing Notice 3: This notice provides a list of various environmental activities which have been identified by provincial governmental bodies which if undertaken within the stipulated provincial boundaries will require environmental authorisation. The basic assessment process as described in Sections 21 to 25 of the NEMA Regulations will need to be followed.

Table 3-1 below gives a summary of the listed activities for which Northern Coal intends to apply for an Environmental Authorisation.

Table 3-1: The listed activities that Northern Coal intends to apply for in terms of NEMA

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 Stockpile which requires an Integrated Water Use Licence in terms of Section 21 of the NWA.
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

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

In accordance with Section 21 and 40 of the NWA, a Water Use License Application (WULA) has been submitted to the DWA. The WULA covers the following water uses:

- Section 21 a – Taking of water from a borehole;
- 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 a stream via causeways;
- 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, dust suppression, overburden dumps and coal stockpiles;
- 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.

3.3.1 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, person(s) may not 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 the GN 704 Regulations are likely to be contravened, the user should apply for an exemption of Regulations 4 and 5 from the Minister.

3.4 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.

3.5 Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)

Northern Coal must be in possession of an approved Mining Right before mining operations may commence on the respective farms. In terms of the MPRDA, various supporting documentation is required for the Project as part of the application for a Mining Right. In accordance with Section 23(5) of the MPRDA, the Mining Right will only come into effect on approval of an EMP.

On the 4 December 2013, Northern Coal was granted a Mining Right (File Ref No. MP30/5/1/1/2/385 MR) by the DMR to mine coal on Portions 15 and 16 the Farm Weltevreden 381 JT.

3.6 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 Project. Table 3-2 includes a non-exhaustive list of legislation and guidelines that will be considered during the EIA.

Table 3-2: Additional National Legislation, Associated Regulations and guidelines applicable to the Project area

Water
■ Water Services Act, 1997 (Act No. 108 of 1997)
■ DWAF: Best Practice Guideline G1: Storm Water Management (Aug, 2006);
■ 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.
Heritage Resources
■ National Heritage Resources Act, 1999 (Act No. 25 of 1999).
Fauna and Flora
■ National Environment Management: Biodiversity Act, (Act No. 10 of 2004) (NEM:BA); ■ National Forest Act, 1998, (Act No. 84 of 1998); and ■ Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)
Atmospheric Emissions
■ 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.
Hazardous Materials
■ Hazardous Substances Act, 1973 (Act No. 15 of 1973); ■ Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).
Noise
■ 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.
Roads & Rail
■ 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

4 Project Description

4.1 Project Location

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 Local Municipality (ELM) and the Nkangala District Municipality. The Project area is located on portion 15 and 16 of the farm Weltevreden 381 JT and is accessible from the R33 towards Belfast which links to the N4 (Plan 2, Appendix A). Site co-ordinates are 25˚43'0"S and 30˚03'0"E.

4.1.1 Municipal Settings

The Project is located in the Emakhazeni Local Municipality and the Nkangala District Municipality. Local municipalities are further divided into wards which have democratically elected ward councillors who are responsible for representing the needs of the people in the specific ward. The project area falls within ward 1 of the Emakhazeni Local Municipality.

4.1.2 Local Land Uses

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, 2013).

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 (ELM EMF, 2009).

Site specific land use is maize farming, with various other agricultural farming activities occurring in the surrounding area from cattle farming to organic cherry orchids. Commercial

agricultural land use therefore needs to be considered as an alternative land use to mining activities.

4.1.3 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 (Plan 2, Appendix A). Table 4-1 below gives the land owner information of these two portions and Table 4-2 gives the information of the adjacent land owners to the proposed operation.

Table 4-1: Landowner details of the project area

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

Table 4-2: Adjacent landowners to the Weltevreden Project

Farm Name	Portion	Landowner
Weltevreden 381 JT	2	Therésilda Lotter (Sold to Willie Pretorius)
Weltevreden 381 JT	9	Mr Samuel Johannes Lundall
Weltevreden 381 JT	RE	Mr Samuel Johannes Lundall
Zoekop 426 JT	10	Dr Koos Pretorius - Highlands Organics
Zoekop 426 JS	4	Mr André Viljoen
Blyvooruitzicht 383 JT	16	Mr Willem Pretorius
Blyvooruitzicht 383 JT	17	Mr Benjamin Kotzé

4.2 Mine Infrastructure and Servitudes

Minimal mine infrastructure will be developed for the Weltevreden Project (Plan 3, Appendix A). 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 where the haul road meets the R33. Temporary change houses will be placed on site. A 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).

Activities requiring NEMA authorisation have been listed in table Table 3-1 above.

4.3 Waste Management

4.3.1 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. Raw coal will be continually transported off site by road. Overburden will be stored and used as part of rehabilitation.

4.3.2 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.

4.3.3 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 regularly and treated at a suitable sewage treatment works.

4.4 Water Use and Resource

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 be obtained from borehole 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 requirements have been included in the WULA. No abstraction of water is envisaged for the mining activities.

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

4.5 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 (Government Gazette 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. A storm water management plan will be submitted as part of the WULA.

4.6 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
- Duvha Power Station – 90 km
- Hendrina Power Station – 93 km
- Khusile Power Station – 130 km
- Komatipoort Power Station – 112 km
- Majuba Power Station – 180 km
- Tutuka Power Station – 202 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 trucks 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 and settlements. No accommodation will be provided on site for labourers, neither will they be allowed to reside within the local communities, unless sourced from them.

4.7 Project Activities

The proposed mining activities during the construction, operational and decommissioning phases are indicated in Table 4-3.

Table 4-3: The main project activities occurring during the various phases of the life of the mine

Phase	No	Main Activity
Construction	1	Removal of topsoil
	2	Construction of haul roads
	3	Construction of a hydrocarbon facility (fuel depot)
	4	Construction of offices and change houses
	5	Construction of lined pollution control dams
	6	Construction of storm water diversion berms
	7	Construction of portable crusher plant
	8	Construction of a fixed workshop
	9	Placement 11kV electrical line
	10	Blasting
	11	Development of initial open cast cuts
	12	Stockpiling of soil and overburden from initial cuts
Operation	13	Transportation of coal
	14	Use and maintenance of haul roads
	15	Domestic and industrial waste storage and removal
	16	Hazardous waste storage and removal
	17	Operation of portable ablutions
	18	Operation of fuel depot
	19	Operation of pollution control dam and storm water management systems
	20	Removal of overburden and backfilling
	21	Mining process removal of coal
	22	Crushing of coal
	23	ROM coal Stockpile
	24	Maintenance of equipment
	25	Rehabilitation as mining progresses

Phase	No	Main Activity
Decommissioning	26	Removal of all infrastructure
	27	Filling of final void
	28	Spreading of sub-soils and topsoil
	29	Re-vegetation of disturbed areas
	30	Profiling and contouring of the area to preserve natural drainage lines
	31	Environmental monitoring of decommissioning activities

5 Alternatives Considered

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

5.1 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 coalfield 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 for Eskom to meet increasing power demands across the country. In terms of resource alternatives, the Waterberg Coalfield (WCF) is becoming an important future resource for coal requirements to meet demand. Currently this resource is constrained in being considered as an alternative resource site. The WCF lies far from the industrial centres of the country and lacks significant infrastructure for its development. However, as Eskom expands operations in the WCF, 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.

5.2 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 area of the farm Weltevreden 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.

5.3 Mining Development and Infrastructure Alternatives

The mine planning has taken into consideration alternative open pit development and process of mining the coal. The alternative to one extensive open pit is to mine the reserve in three open pits which will allow for the preservation of the stream that cuts through the open pit area (Plan 3, Appendix A). The pan/depression towards the north-east of the project area has also been excluded from the open pit mining area and a 100m buffer has been assigned as recommended by DWA. An infrastructure alternative is to have temporary facilities on site which reduces the impact on the receiving environment from infrastructure development. This has been included in the mine plan (Plan 3, Appendix A).

5.4 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.

6 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 promote collaboration between stakeholders representing all relevant interests and sectors of society, technical specialists and the various organs of state that work together to produce better decisions than if they had acted independently. This section provides an overview of the PPP and describes the engagement activities undertaken to date.

6.1 Public Participation Methodology

6.1.1 Objectives of the Public Participation Process

The PPP has been designed to achieve the following objectives:

- To ensure that I&APs are well informed about the proposed project;
- To provide I&APs sufficient opportunity to engage and provide input and suggestions regarding the proposed project;
- To verify that stakeholder comments have been accurately recorded;
- To draw on local knowledge in the process of identifying environmental and social issues associated with the proposed project, and to involve I&APs in identifying ways in which these can be addressed; and
- To comply with legal requirements.

6.1.2 Phases of Public Participation

The PPP has been designed with three main phases of engagement, namely:

- Scoping phase
  - Identification of stakeholders.
  - Notification of the public of the formal process.
  - Distribution of a Background Information Document (BID), placement of newspaper adverts and site notices;
  - Gathering concerns, suggestions and comments from I&APs.
- Impact assessment phase (current phase)
  - Providing feedback regarding the specialist studies conducted and verify that comments have been considered in the environmental investigations.
  - Providing I&APs with the opportunity to comment on findings of the specialist impact assessments and proposed mitigation measures.
  - Verification that comments raised by stakeholders have been accurately recorded.
- Decision making phase

- With completion of the authorisation process all registered IAPs will be notified of the decision made by the competent authorities and will be provided with details should they want to appeal the decision.

6.1.2.1 Scoping Phase

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

6.1.2.1.1 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 Interested & Affected Parties (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.

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

6.1.2.1.2 Compilation of Public Participation Materials

The following methods have been used to disseminate project information to stakeholders (see Table 6-1 for further details):

- **Background Information Document (BID):** 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:** 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 around the project area and conspicuous public places. 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 Open House. 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 as Appendix B.

6.1.2.1.3 Consultation with Stakeholders

Consultation with stakeholders has taken place to gather their inputs regarding the environmental authorisation process. The types of consultations which have taken place are set out below.

- **Landowner Consultation:** One-on-one meetings were conducted on Tuesday, 11 and Wednesday, 12 February 2014 with directly affected Landowners. Comments, concerns and suggestions received from the landowners were captured in the Comment and Response Report (CRR).
- **Community Meeting:** A Community Meeting with farm workers was conducted on Wednesday, 5 March 2014 on the Farm of Koos Pretorious (Zoekop - 426 JT). The project was explained to the farm workers by using posters and presenting in Zulu, which ensured that the needed understanding about the project was created. Comments from the farm workers were taken up in the CRR.
- **Public Meeting / Open House:** The announcement documents indicated that an Open House would be held, this was changed to a public meeting to accommodate the stakeholders who requested a formal meeting. As a result of this request a Public Meeting was conducted on Wednesday, 5 March 2014 at the Belfast Royal Hotel. All stakeholders on the database were invited to attend the public meeting. Information

about the proposed project was shared at the public meeting by means of a formal PowerPoint presentation to:

- Discuss contents of the Draft Scoping Report in detail and view maps of the proposed project;
- Verify that comments raised during the initial consultation process were captured correctly; and
- Clarify any questions or comments raised.

- **Community Household Survey:** In anticipation of potential project-induced displacement, Digby Wells conducted a household survey of the community near the north-east of the proposed Northern Coal Weltevreden project (Appendix N). The household survey was conducted on the 16 and 17 July 2014. As part of this process, Digby Wells undertook a census, socio-economic and asset survey of all individuals and households residing within the aforementioned community. This exercise had the following objectives:
  - To determine the number and location of households in the potentially affected community in order to estimate the extent of physical or economic displacement as a result of the Northern Coal Weltevreden project, if any;
  - To establish the baseline socio-economic conditions of the potentially affected community, which is required both for resettlement planning and subsequent monitoring purposes; and
  - To detect and deter any influx of people, hoping to benefit from a possible resettlement and compensation process, into the community.

All comments raised by stakeholders at the respective meetings as indicated above, and throughout the Public Participation Process (PPP), have been captured into the Comment and Response Report (CRR) (**see *Appendix B5)***. Stakeholder comments will be closely considered and addressed, where applicable, in the specialist studies undertaken during the NEMA Authorisation process. Responses will be provided to the comments raised by stakeholders and are included in the CRR.

6.1.2.1.4 Availability of the Draft and Final Scoping Reports

The Draft Scoping Reports were made available for public comment from 12 February to 24 March 2014 and the Final Scoping Reports were made available from 16 April until 14 May 2014 at the following public places:

- Belfast Public Library, 24 Scheeper street, Belfast, 1100;
- Siyathuthuka Public Library, Stand 755 Zakheni & Sakhile street, Siyathuthuka 1102; and
- Digby Wells Environmental, Fern Isle, Section 5, 359 Pretoria Ave, Randburg.

The Scoping Reports were also available on www.digbywells.com (Public Documents).

6.1.2.2 *Impact Assessment Phase (Current Phase)*

Public Participation during the Impact Assessment phase revolves around I&APs providing comments on findings from specialist studies which were conducted and included as part of the Draft Environmental Impact Assessment Report (DEIAR).

6.1.2.2.1 *Availability of the Draft EIA/EMP Reports*

The Draft EIA/EMP Reports were made available for public comment from the 25 August to the 6 October 2014 at the following public places:

- Belfast Public Library, 24 Scheeper street, Belfast, 1100;
- Siyathuthuka Public Library, Stand 755 Zakheni & Sakhile street, Siyathuthuka 1102; and
- Digby Wells Environmental, Fern Isle, Section 5, 359 Pretoria Ave, Randburg.

The Draft EIA/EMP Reports are also available on www.digbywells.com (Public Documents).

6.1.2.2.2 *Consultation with Stakeholders*

Stakeholders were notified of availability of the Draft EIA/EMP on the 11 August 2014 via email and post. A Public meeting was/will be held with stakeholders on 17 September 2014 from 14:00 – 16:00 at the Belfast Royal Hotel. The CRR and PP Report will be updated with stakeholder comments and included in the Final EIA Report and Final EMP for submission to the Lead Authority for a decision about the proposed project. All stakeholders will be informed via email, post and advert of the outcome of the Authority's decision.

6.2 Summary of Public Participation Activities

In Table 6-1 more detail is provided regarding the Public Participation activities, together with referencing materials included as Appendices, which were undertaken as part of the NEMA Authorisation process.

Table 6-1: 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 announcement material	BID, announcement letter with comment and registration sheet was emailed and posted to stakeholders on ***Wednesday, 29 and Thursday,***	Appendix B2 BID, letter with registration and

Activity	Details	Reference in Report
	30 January 2014, in English, Afrikaans and IsiNdebele. The Background Information Document was also available on www.digbywells.com (Public Documents), ***on Wednesday, 29 January 2014.*** (Registration period: Wednesday, 29 January – Monday, 24 March2014)	comment sheet
Placing of advert	An advert was placed in the Middleburg Observer in (English) on ***Friday, 31 January 2014***.	Appendix B3 Newspaper Advert
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:*** ■ Belfast Public Library, 24 Scheeper street, Belfast, 1100; ■ Siyathuthuka Public Library, Stand 755 Zakheni & Sakhile street, Siyathuthuka 1102; and ■ A site notice map was developed which provided 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 were captured into the Comment and Response Report.	Appendix B5 Comment and Response Report
Announcement of Draft Scoping Report	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 were available at: ■ Belfast Public Library, 24 Scheeper street, Belfast, 1100; ■ Siyathuthuka Public Library, Stand 755 Zakheni & Sakhile street, Siyathuthuka 1102; and ■ Digby Wells Environmental, Fern Isle, Section 5, 359 Pretoria Ave, Randburg	Appendix B2 Announcement Letter

Activity	Details	Reference in Report
	The Scoping Report was also available on www.digbywells.com (Public Documents) and CDs of the report were made available at the Public Meeting. (Comment period: Wednesday, 12 February to Monday 24 March 2014) A poster was also put up at the Public Libraries mentioning the above to provide details of availability of the DSR and Open House.	
Community Meeting with Farm Workers	A Community Meeting was held with Farm Workers on ***Wednesday, 5 March 2014*** on Dr Koos Pretorius (Zoekop - 426 JT) Farm from 12:00 – 14:00. All comments received at this meeting have been captured into the Comments and Response Report.	Appendix B5 Comment and Response Report
Public Meeting with relevant stakeholders	A Public Meeting was held on ***Wednesday, 5 March 2014*** at the Belfast Royal Hotel from 14:00 – 16:00. All comments received at this meeting have been captured into the Comments and Response Report.	Appendix B5 Comment and Response Report
Obtained comments from stakeholders	Comments, concerns and suggestions received from stakeholders were captured into the Comment and Response Report.	Appendix B5 Comment and Response Report.
Final Scoping Report	The Final Scoping Report (FSR) was prepared with lapse of the public comment period for the DSR. It included additional comments raised by stakeholders and relevant information generated during the public comment period. Final Scoping Report was submitted to the Lead Authority on ***Wednesday, 16 April 2014***.	
Announcement of Final Scoping Report	A progress feedback letter informing stakeholders of the date of submission and availability of the FSR for 21 days to comment was emailed and posted to I&APs on Thursday, ***17 April 2014 2014.*** Hard copies of the report were placed at the following Public Places listed below: ■ Belfast Public Library, 24 Scheeper street, Belfast, 1100	Appendix B6 Letter announcing availability of the Final Scoping Report.

Activity	Details	Reference in Report
	■ Siyathuthuka Public Library, Stand 755 Zakheni & Sakhile street, Siyathuthuka 1102 ■ Digby Wells Environmental, Fern Isle, Section 5, 359 Pretoria Ave, Randburg. The Final Scoping Report was also available electronically on Digby Wells website: www.digbywells.com, under Public Documents, and was also available in CD format on request. (Comment period on the Final Scoping Report: Wednesday, 16 April 2014 – Wednesday, 14 May 2014)	
EMP/Impact Assessment Phase		
Household Survey	A household survey of a community located to the north-east of the project area was conducted on the 16 and 17 July 2014. This was done to determine the number and location of households, establish baseline socio-economic conditions and to detect and deter any influx of people.	Appendix N
Announcement of Draft EIA/EMP	Availability of the Draft EIA/EMP was announced on ***11 August 2014*** via email and post. Hard copies of the Draft EIA/EMP were made available on the ***25 August 2014*** at the following public places: ■ Belfast Public Library, 24 Scheeper street, Belfast, 1100 ■ Siyathuthuka Public Library, Stand 755 Zakheni & Sakhile street, Siyathuthuka 1102 ■ Digby Wells Environmental, Fern Isle, Section 5, 359 Pretoria Ave, Randburg. The Draft EIA/EMP report is also available on www.digbbywells.com, under Public Documents, as well as at the public meeting.	Appendix B7 Draft EIA/EMP announcement letter and poster

Activity	Details	Reference in Report
	The announcement letter also includes details about the public meetings that took place. (Comment period on the Draft EIA/EMP: 25 August – 6 October 2014)	
Meetings with relevant stakeholders	A Public meeting was/will be held with stakeholders on 17 September 2014 from 14:00 – 16:00 at the Belfast Royal Hotel. Comments received at this meeting will be included in the Comments and Response Report.	

7 The Receiving Environment for the Project Area

Specialist studies were conducted and impact assessment reports included in the Appendices.

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, 2007).

Climate data was obtained from the Belfast weather station (05170412) from 2005 to 2007 and interpreted to give a description of the climate experienced in the area. More recent climate data has been ordered from the South African Weather Service (SAWS) but was not received at the time of finalising this report and will be included in the final EIA/EMP report.

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 being experienced between November and February (Figure 7-1).The winter months contribute very little to the annual rainfall amount.

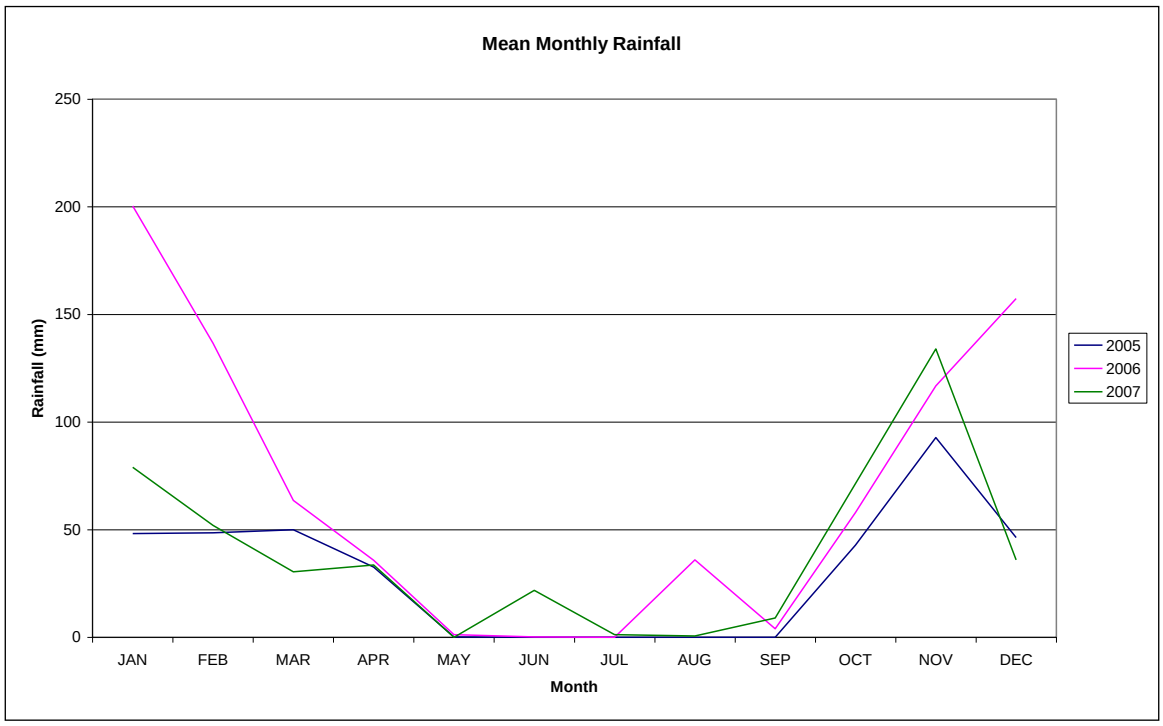

Figure 7-1: Mean annual rainfall for Belfast

7.1.2 Mean Monthly Temperature

The area of Belfast experiences an average daily maximum temperature of 21^{0}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.

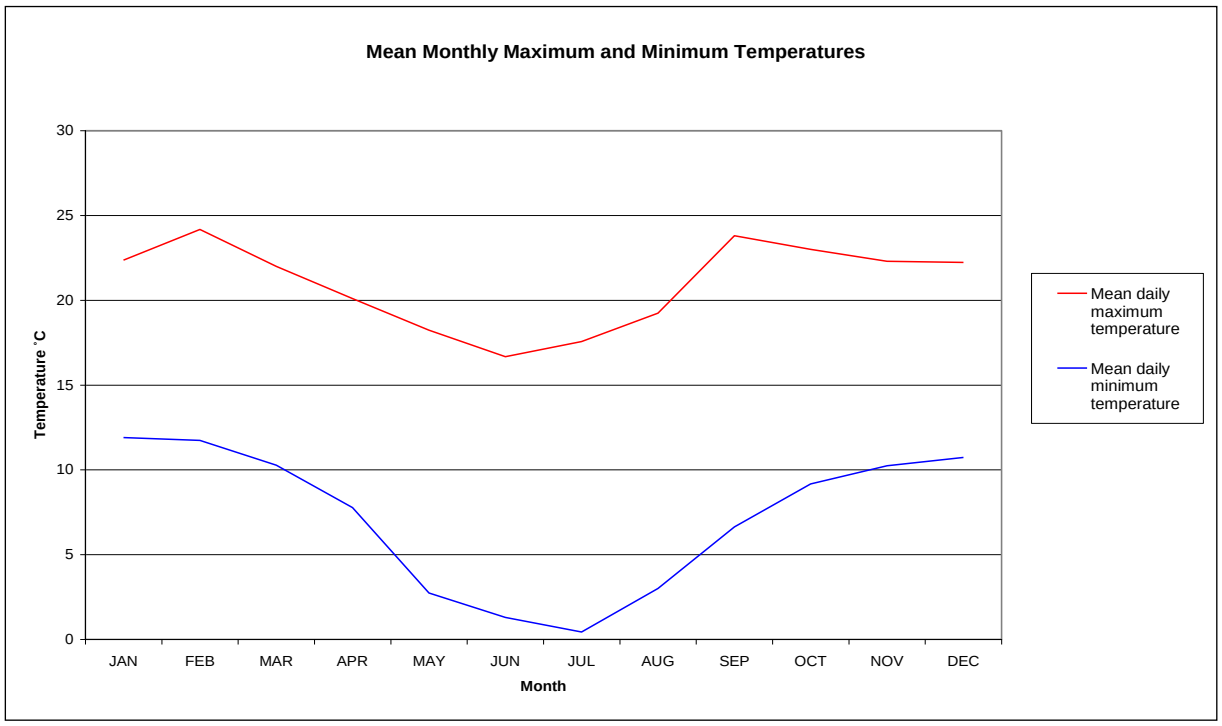

Figure 7-2: Mean monthly maximum temperature for Belfast weather station

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.

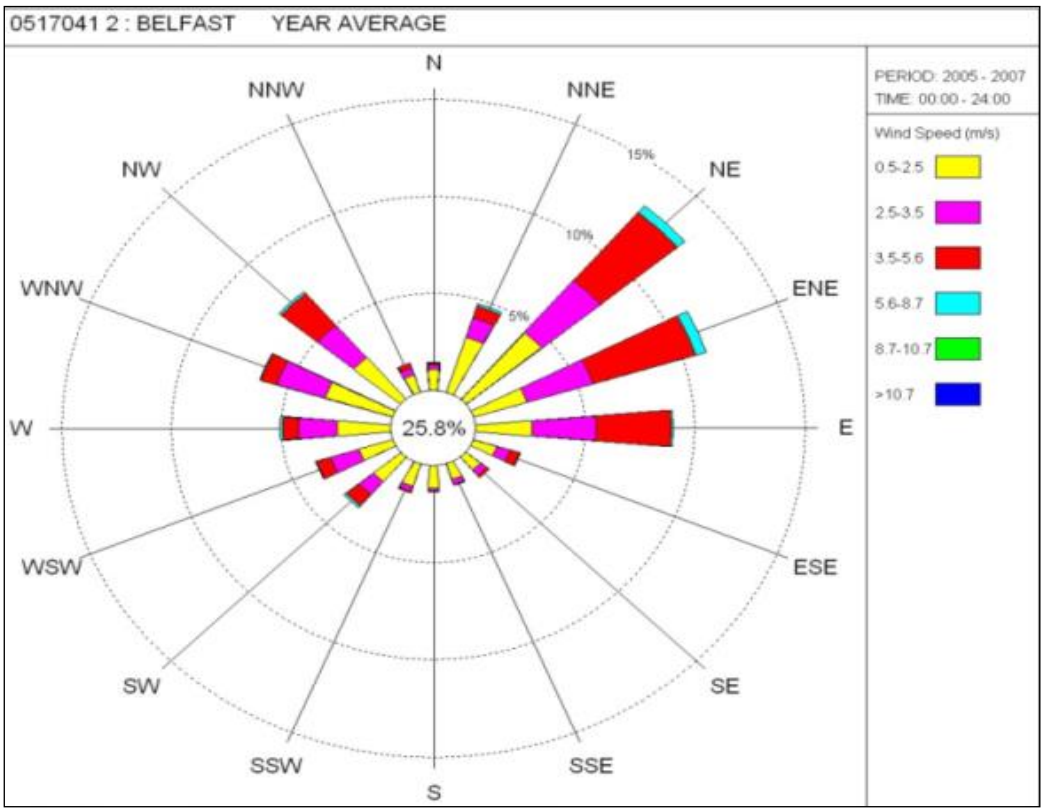

Figure 7-3: Average annual wind direction and speed for Belfast

7.2 Geology

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 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.

7.3 Land Use

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

7.4 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 4 (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 (mamsl.) at the highest point and 1795 mamsl 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%.

7.5 Soil and Land Capability

The Soil, Land Capability and Land Use Assessment Report can be found under Appendix C.

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, 2009).

Table 7-1: Land capability classes for Emakhazeni Local Municipality (EML EMF, 2009)

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. In accordance with Plan 5 (Appendix A), the project area is dominated by arable land with moderately deep to deep red and yellow soils with moderate to high agricultural potential.

7.6 Sensitive Areas

7.6.1 Important Bird Areas

An Important Bird Area (IBA) is an area recognised as being globally important habitat for the conservation of bird populations. Currently there are about 10,000 IBAs worldwide, the criteria for the declaration of an IBA is shown in Table 7-2 below. The study area is located

within the Steenkampsberg IBA (Figure 7-4). This IBA includes private farms in the Belfast–Dullstroom region and falls predominantly within the Emakhazeni Local Municipality. Mining in the form of open-cast coal mining, and to a lesser extent sand and diamond mining is one of the biggest threats to the area. Other general threats to the area include afforestation of the grasslands with Pine and Blue Gum, wetland degradation, increased acid rain and sulphur emissions from local power stations, and accidental and targeted poisoning of cranes.

Table 7-2: IBA Criteria according to Birdlife International

		Criterion	Notes
A1.	**Globally threatened species**	The site is known or thought regularly to hold significant numbers of a globally threatened species, or other species of global conservation concern.	The site qualifies if it is known, estimated or thought to hold a population of a species categorized by the IUCN Red List as Critically Endangered, Endangered or Vulnerable. In general, the regular presence of a Critical or Endangered species, irrespective of population size, at a site may be sufficient for a site to qualify as an IBA. For Vulnerable species, the presence of more than threshold numbers at a site is necessary to trigger selection. Thresholds are set regionally, often on a species by species basis. The site may also qualify if holds more than threshold numbers of other species of global conservation concern in the Near Threatened, Data Deficient and, formerly, in the no-longer recognized Conservation Dependent categories. Again, thresholds are set regionally.
A2.	**Restricted-range species**	The site is known or thought to hold a significant component of a group of species whose breeding distributions define an Endemic Bird Area (EBA) or Secondary Area (SA).	**Notes:** This category is for species of Endemic Bird Areas (EBAs). EBAs are defined as places where two or more species of restricted range, i.e. with world distributions of less than 50,000 km2, occur together. More than 70% of such species are also globally threatened. Also included here are species of Secondary Areas. A Secondary Area (SA) supports one or more restricted-range species, but does not qualify as an EBA because less than two species are entirely confined to it. Typical SAs include single restricted-range species which do not overlap in distribution with any other such species, and places where there are widely disjunct records of one or more restricted-range species, which are clearly geographically separate from any of the EBAs.

		Criterion	Notes
A3.	**Biome-restricted species**	The site is known or thought to hold a significant component of the group of species whose distributions are largely or wholly confined to one biome.	This category applies to groups of species with largely shared distributions of greater than 50,000 km^2, which occur mostly or wholly within all or part of a particular biome and are, therefore, of global importance. As with EBAs, it is necessary that a network of sites be chosen to protect adequately all species confined to each biome and, as necessary, in each range state in which the biome occurs. The 'significant component' term in the Criterion is intended to avoid selecting sites solely on the presence of one or more biome-restricted species that are common and adaptable within the EBA and, therefore, occur at other chosen sites. Additional sites may, however, be chosen for the presence of one or a few species which would, e.g. for reasons of particular habitat requirements, be otherwise under-represented.

		Criterion	Notes
A4.	**Congregations**	A site may qualify on any one or more of the four criteria listed below). Site known or thought to hold, on a regular basis, ≥ 1% of a biogeographic population of a congregatory waterbird species. ii). Site known or thought to hold, on a regular basis, ≥ 1% of the global population of a congregatory seabird or terrestrial species. iii). Site known or thought to hold, on a regular basis, ≥ 20,000 waterbirds or ≥ 10,000 pairs of seabirds of one or more species. iv). Site known or thought to exceed thresholds set for migratory species at bottleneck sites.	i. This applies to 'waterbird' species as defined by Delaney and Scott (2006) Waterbird Population Estimates, Fourth Edition, Wetlands International, Wageningen, The Netherlands, and is modelled on Criterion 6 of the Ramsar Convention for identifying wetlands of international importance. Depending upon how species are distributed, the 1% thresholds for the biogeographic populations may be taken directly from Delaney & Scott, they may be generated by combining flyway populations within a biogeographic region or, for those for which no quantitative thresholds are given, they are determined regionally or inter-regionally, as appropriate, using the best available information. ii. This includes those seabird species not covered by Delaney and Scott (2002). Quantitative data are taken from a variety of published and unpublished sources. iii. This is modelled on Citerion 5 of the Ramsar Convention for identifying wetlands of international importance. iv. Thresholds are set regionally or inter-regionally, as appropriate.

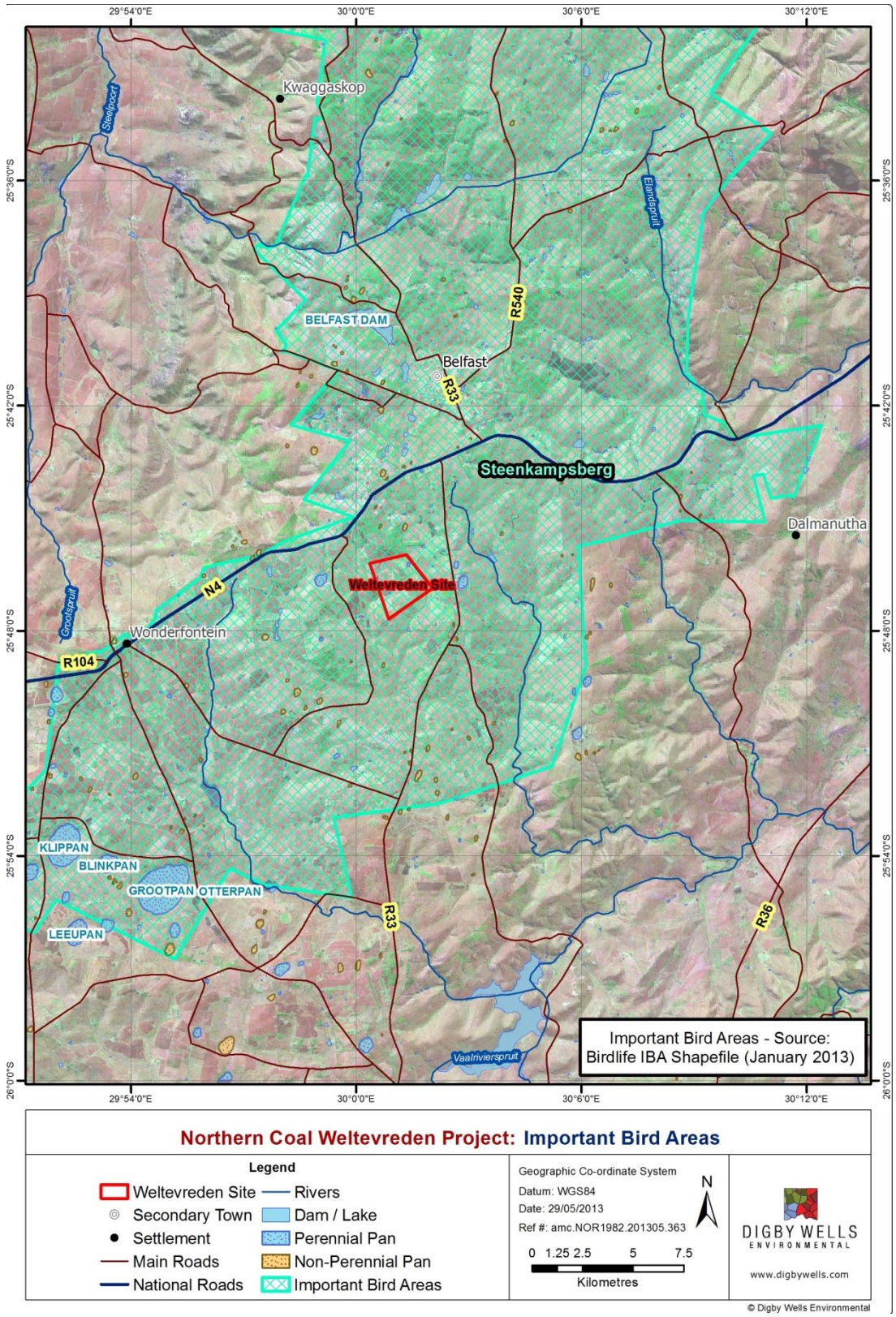

Figure 7-4: Important Bird Areas in relation to the study site

7.6.2 Threatened Ecosystems

The National threatened ecosystems list (National Environmental Management: Biodiversity Act, Act 10 of 2004) was referenced in order to ascertain the level of ecosystem threat of the ecosystems present within the study area. The list of national Threatened Ecosystems has been gazetted (NEMBA: National list of ecosystems that are threatened and in need of protection) and result in several implications in terms of development within these areas. These include areas were delineated based on as fine a scale as possible and are defined by one of several assessments:

- The approach must be explicit and repeatable;
- The approach must be target driven and systematic, especially for threatened ecosystems;
- The approach must follow the same logic as the IUCN approach to listing threatened species, whereby a number of criteria are developed and an ecosystem is listed based on its highest ranking criterion; and
- The identification of ecosystems to be listed must be based on scientifically credible, practical and simple criteria, which must translate into spatially explicit identification of ecosystems.
- The criteria for identifying threatened terrestrial ecosystems include six criteria overall, two of which are dormant due to lack of data (criteria B and E). The criteria are presented in Table 7-3 below.
- The South African Vegetation Map (Mucina and Rutherford 2006);
- National forest types recognised by the Department of Water Affairs and Forestry (DWAF);
- Priority areas identified in a provincial systematic biodiversity plan; and
- High irreplaceability forest patches or clusters identified by DWAF.

Table 7-3: Criteria for the listing of National Threatened Ecosystems

Criterion	Details
A1	Irreversible loss of natural habitat
A2	Ecosystem degradation and loss of integrity
B	Rate of loss of natural habitat
C	Limited extent and imminent threat
D1	Threatened plant species associations
D2	Threatened animal species associations
E	Fragmentation
F	Priority areas for meeting explicit biodiversity targets as defined in a systematic biodiversity plan

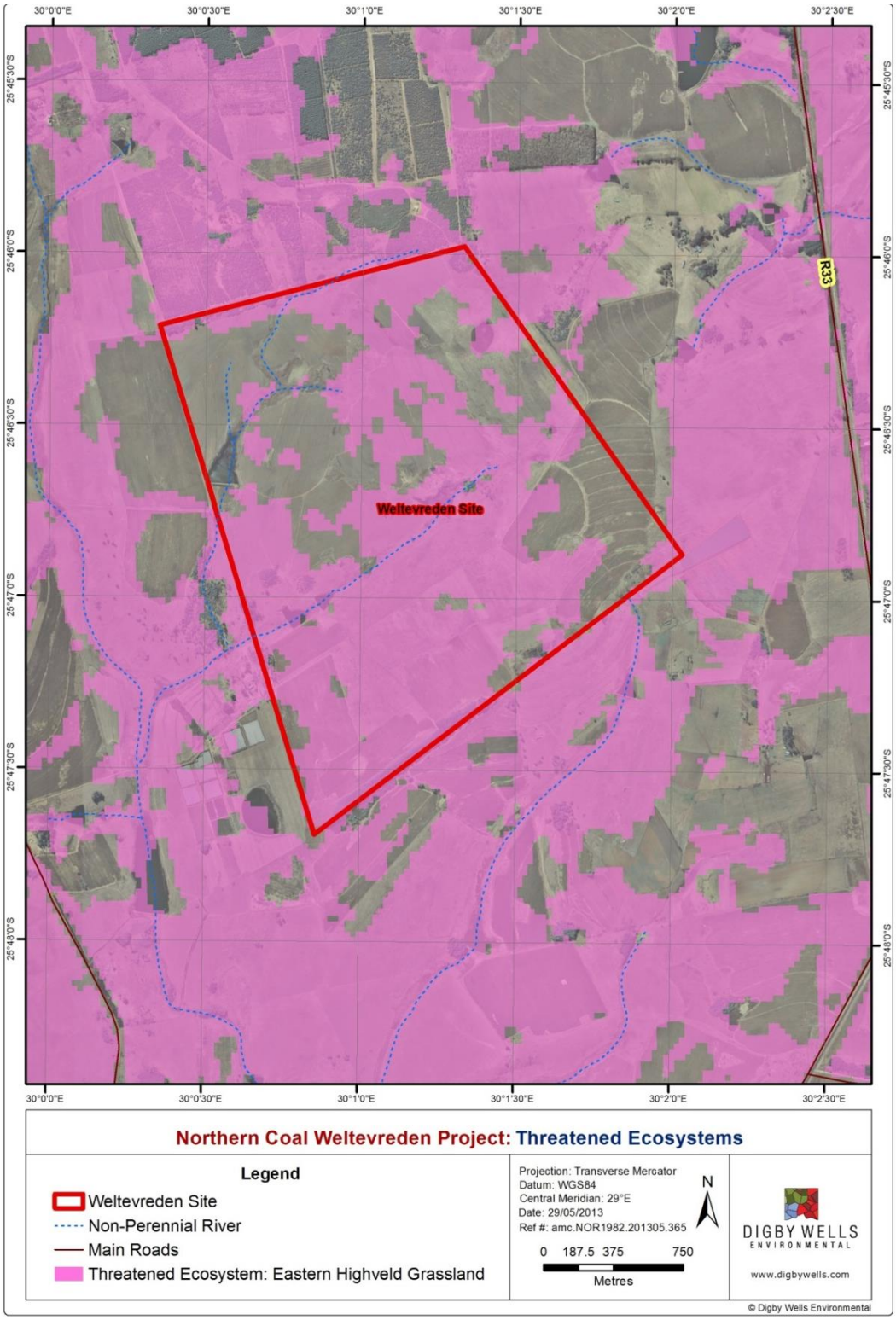

Figure 7-5: Threatened Ecosystems

The Weltevreden site coincides with the Threatened Ecosystem: Eastern Highveld Grasslands, as indicated in Figure 7-5 above.

7.6.3 Mpumalanga C-Plan

The Mpumalanga Biodiversity Conservation Plan (MBCP) is a plan developed conjointly by the Mpumalanga Tourism and Parks Agency (MPTA) and Department of Agriculture and land Administration (DALA) to guide conservation and land-use decisions in the province in order to support sustainable development. The MPTA recognises that wetlands are specialised systems that perform ecological functions that are crucial for human and environmental welfare. The site is not situated within any irreplaceable areas and the majority of the site is regarded as transformed (Figure 7-6).

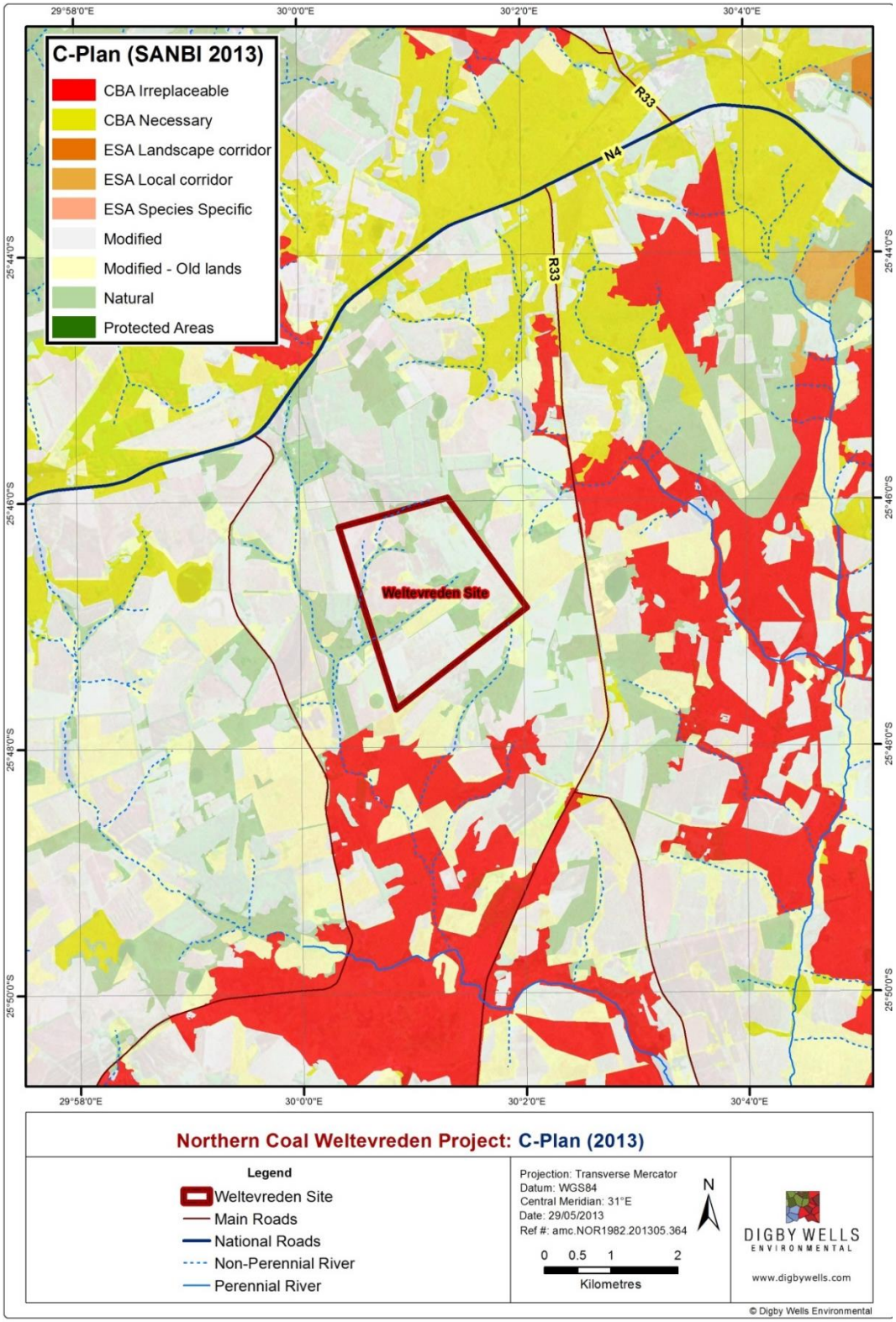

Figure 7-6: Mpumalanga C-Plan

7.6.4 Protected Areas

The Weltevreden site does not coincide with any formally Protected Areas (Figure 7-7). The nearest formally Protected Area to the site is the Nooitgedacht Dam Nature Reserve, which provides habitat for a diverse range of fauna, including animal SSC: Oribi (*Ourebia ourebia*) (EN) and Spotted-necked Otter (*Hydrictis maculicollis*). None of these species have been recorded on site and based on habitat present, are unlikely to occur.

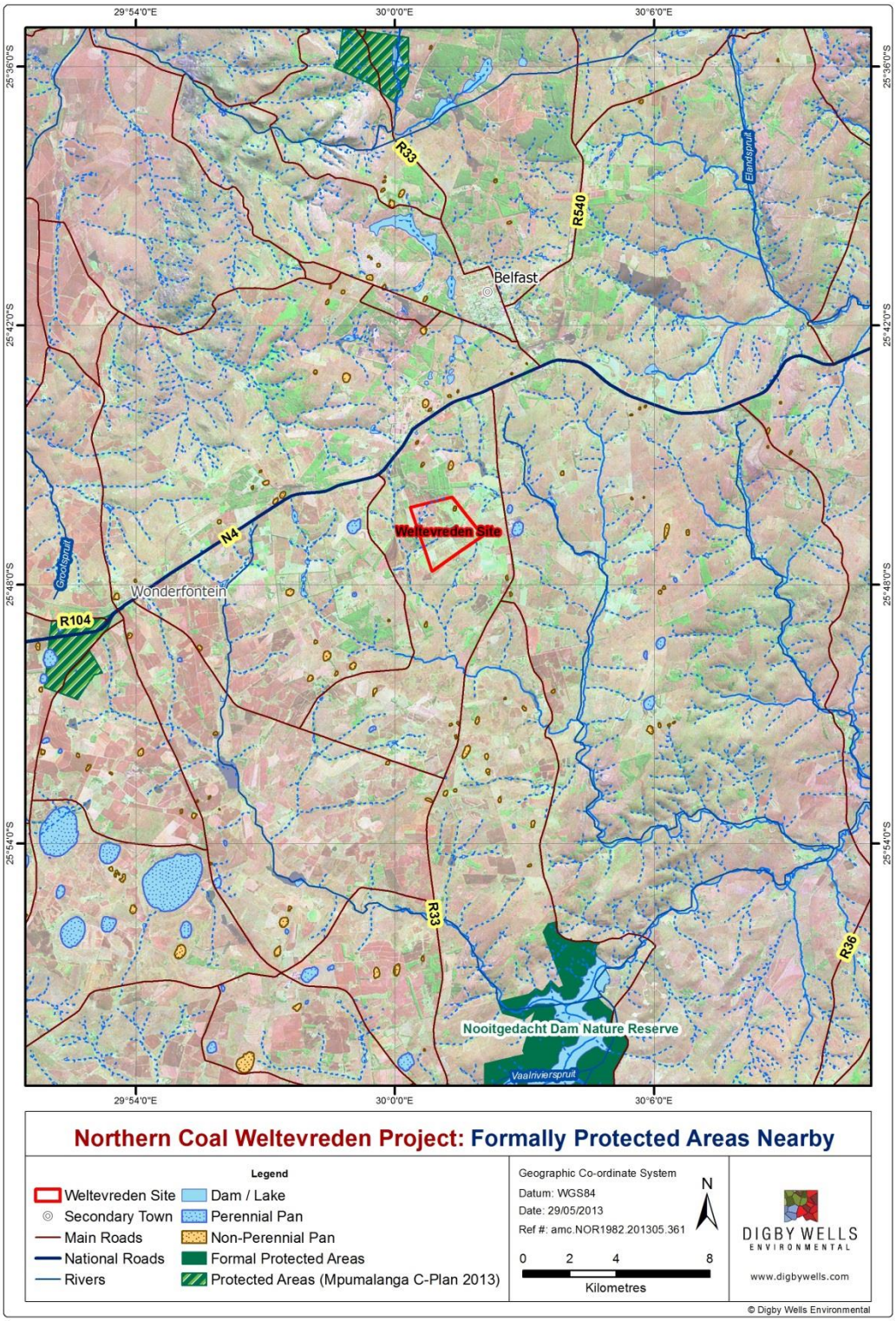

Figure 7-7: Formally Protected Areas

7.6.5 National Protected Areas Expansion Strategy (NPAES)

The NPAES are areas designated for future incorporation into existing protected areas (both National and Informal protected areas). These areas are large, mostly intact areas required to meet biodiversity targets, and suitable for protection. They may not necessarily be proclaimed as protected areas in the future and are a broad scale planning tool allowing for better development and conservation planning. No areas recognised by the NPAES coincide with the study site, as indicated in Figure 7-8.

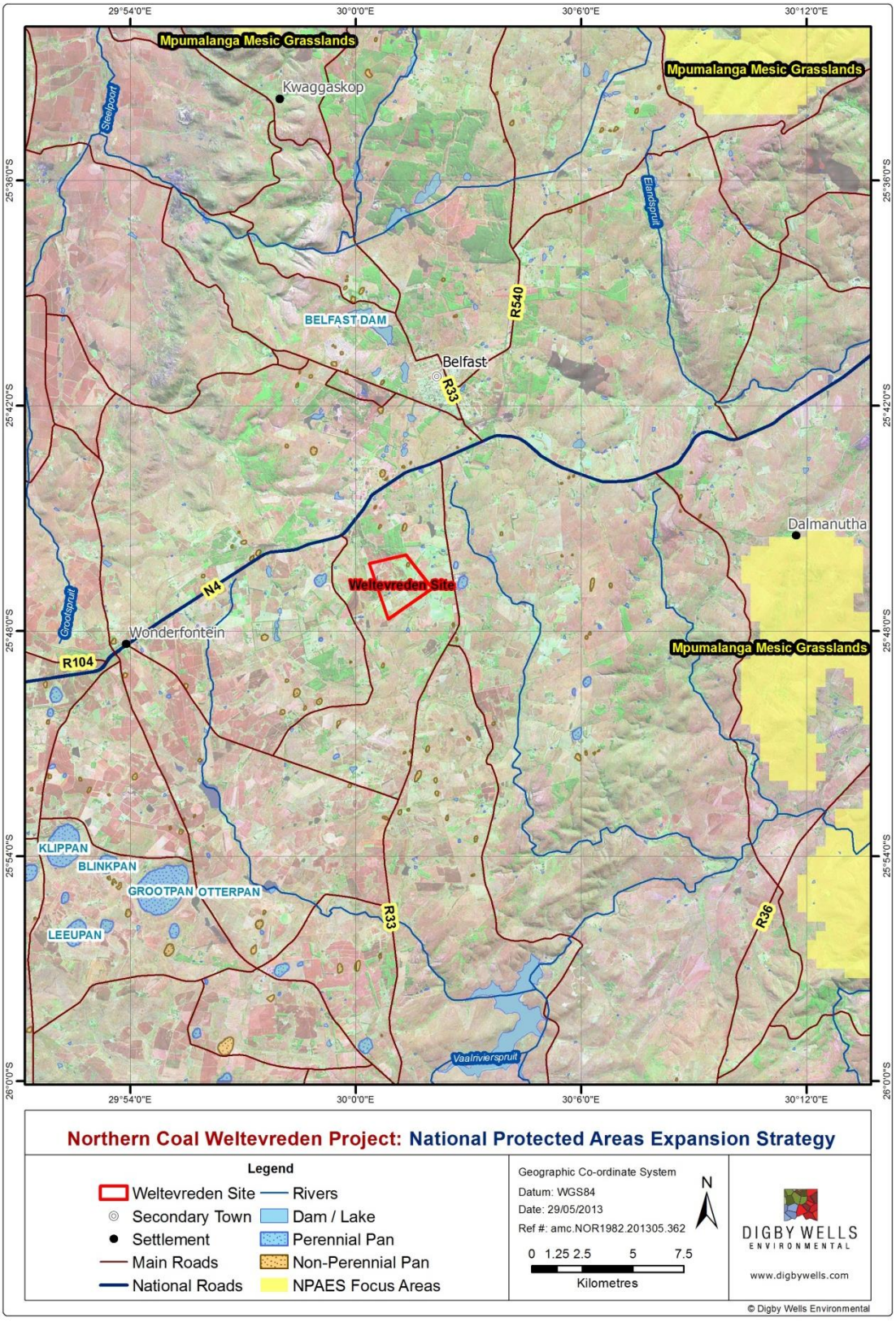

Figure 7-8: NPAES

7.7 Natural Vegetation (Flora)

The Flora and Fauna Assessment Reports can be found under Appendix D and Appendix E.

7.7.1 Regional Vegetation

The Weltevreden Project falls within the Eastern Highveld Grasslands vegetation type. The Eastern Highveld Grassland vegetation type, according to Mucina and Rutherford (2006), is situated in slightly to moderately undulating plains, including some low hills and pan depressions. It is made up of short dense grassland dominated by the usual highveld grass composition (*Aristida, Digitaria, Eragrostis, Themeda* and *Tristachya* spp.) with small, scattered rocky outcrops containing wiry, sour grasses and some woody species (*Acacia caffra, Celtis africana, Diospyros lycioides subsp. lycioides, Parinari capensis, Protea caffra, Protea welwitschii,* and *Searsia magaliesmontanum* spp.). The conservation status of this vegetation type is currently 'Endangered', with 24% of it statutorily conserved.

7.7.2 Site Specific Vegetation

83 plant species were recorded for the Weltevreden site, the majority of which were grasses. The complete species list can be found within the Flora and Fauna Assessment Report in Appendix D, and includes species identified in the 2014 and previous investigation conducted in 2009. The major land use in the study area is agriculture, with 153 ha (30.3%) of the site being employed for Maize (*Zea mays*) and Soy Bean (*Glycine max*) farming. Due to the history of poor land management on site, including crop and livestock agriculture, vegetation has undergone significant transformation from its original state. Further to this, alien bushclumps have established (covering an area of 15 ha).

The natural areas were comprised of terrestrial grassland, divided into two main varieties, namely: *Hyparrhenia – Tristachya* Grassland and *Themeda triandra* Rocky Grassland; as well as: Hydromorphic grassland (associated with the main wetland systems on site), *Agrostis lachnantha – Imperata cylindrica* Seeps and *Juncus effusus* Pan / Depression (Plan 6, Appendix A). The hydromorphic grassland had been infringed upon by agricultural practices and was characterised by stands of *Typha capensis* (Common Bulrush) in the middle of watercourses. Additional wetlands are characterised by small seeps, associated with aquifers, comprised of *Imperata cylindrica* (Cotton Wool Grass) and *Agrostis lachnantha* (African Bent Grass).

Four plant Species of Special Concern (SSC) were recorded on site, two 'Declining' species, *Boophone disticha* (Tumbleweed) and *Eucomis autumnalis* (Pineapple Flower); and two species (including *B. disticha and E. autumnalis*) listed as Protected according to Schedule 12 of the Mpumalanga Nature Conservation Act, No. 10 of 1998.

Table 7-4: Plant SSC recorded for the Weltevreden site

Family	Species Name	Common Name	Threat Status	Vegetation Unit
Amaryllidaceae	*Boophone disticha*	Tumbleweed	Declining; Protected	Hydromorphic Grassland
Asphodelaceae	*Aloe ecklonis*	Grass Aloe	Protected	*Themeda triandra* Rocky Grassland
Hyacinthaceae	*Eucomis autumnalis*	Pineapple Flower	Declining; Protected	Hydromorphic Grassland
Iridaceae	*Gladiolus crassifolius*		Protected	*Hyparrhenia – Tristachya* Grassland

7.8 Fauna

The Flora and Fauna Assessment Reports can be found under Appendix D and Appendix E.

7.8.1 Mammals

On two site visits, one conducted in 2010 and the other in 2014, a number of mammals were confirmed to occur within the Weltevreden study area and are listed in Table 7-5 below.

Table 7-5: Mammals identified within the Weltevreden Study Area

Family	Species	English name	Threat Status (SA)	Survey Recorded
Bathyergidae	*Unknown*	Mole-rat species	LC	2014
Bovidae	*Sylvicapra grimmia*	Common Duiker	LC	2010
Canidae	*Canis mesomelas*	Black-backed Jackal	LC	2014
Herpestidae	*Ichneumia albicauda*	White-tailed Mongoose	LC	2010
	Atilax paludinosus	Water Mongoose	LC	2014
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	LC	2014
Orycteropodidae	*Orycteropus afer*	Aardvark	LC	2014
Pedetidae	*Pedetes capensis*	Springhare	LC	2010
Procavidae	*Procavia capensis*	Rock Dassie	LC	2010
Viverridae	*Civettictis civetta*	African Civet	LC	2014

7.8.2 Avifauna

As mentioned previously, the Weltevreden Project falls within the Steenkampsberg Important Bird Area (IBA) (Plan 7, Appendix A). An IBA is an area recognised as being globally important habitat for the conservation of bird populations. This IBA includes private farms in the Belfast–Dullstroom region and falls predominantly within the Emakhazeni Local Municipality.

In 2010, a total of 15 bird species were identified during the dry season survey and 20 were observed during the wet season survey. Most of these birds were observed in the *Eucalyptus* – *Pinus* Alien Bushclumps. A total of 6 bird species were observed on Zoekop farm, and most of these birds were found in and around the pan.

In July 2014 a total number of 52 bird species were identified. The site visit was conducted during the mid-winter month of July when South African birdlife reaches one of its lowest densities and species diversities due to the lack of breeding and non-breeding summer migrants (October – March). The habitat of the proposed mining and surrounding area in general includes mesic Highveld grassland dominated by agriculture (sheep grazing and maize production). A complete list of bird species can be found in the Flora and Fauna Assessment Report under Appendix D.

During the day of the site visit a number of species were observed; the road infrastructure and entrance areas of the property included species such as Redeyed Dove (*Streptopelia semitorquata*), Laughing Dove (*Spilopelia senegalensis*), Cape Turtle Dove (*Streptopelia capicola*), Common Fiscal (*Lanius collaris*), Cape Sparrow (*Passer melanurus*), Neddicky (*Cisticola fulvicapilla*), Swainsons Spurfowl (Pternistis swainsonii), Helmeted Guineafowl (*Numida meleagris*), Black Shouldered Kite (*Elanus axillaris*) and large numbers of Feral Pigeons (*Columba livia domestica*). Throughout the more natural areas and hillslope seeps of the property a number of suspected Marsh Owl (*Asio capensis*) pellets were also found (the habitat of which is also ideal for African Grass Owl (*Tyto capensis*) (Whittington-Jones *et al.* 2011) which is currently on the red data list as being vulnerable in Southern Africa, with an estimated National population of only about 5000 birds – no signs of this species were observed on Weltevreden. Although not seen on the day of the site visit a number of birds of prey should be present periodically throughout the year and would in all likelihood include endangered summer migrant species such as Pallid and Montagu's Harrier.

The natural grasslands and agricultural fields of the property harbour a number of typical highveld endemics. These included several widow, weaver and bishop species (within the wetter areas). A number of African Quailfinch's (*Ortygospiza fuscocrissa*) were observed within the grasslands – these species generally feed on the seeds of the wetter grass species and are renowned wetland indicators. African Pipit (*Anthus cinnamomeus*) and Cape Longclaw (*Macronyx capensis*) were observed – although there is enough nesting habitat in the surrounding area for the more endangered lark and pipit species it must be noted that any explosives, increased traffic loads and earth movement will negatively impact on the breeding of all lark and pipit species, however this is usually not a permanent impact. The grassland area is also ideal habitat for quail and button-quail species although these

species are highly nomadic and were not identified during the site investigation. The altitude and species type of the grassland suggests that the area could be home to some endemic and endangered lark and pipit species such as Rudd's and Botha's Larks. These species were not observed during any of the surveys. The data from the Co-ordinated Road Count project (CAR) of the Avian Demography Unit shows that the wetlands in the Mpumalanga highveld are extensively used by Spurwing Goose (*Plectropterus gambensis)*, Black-headed Heron *(Ardea melanocephala)* and Grey Crowned Crane *(Balearica regulorum)*. Grey Crowned Cranes and Blue Cranes were recorded in the 2530CC Quarter degree grid cell (Harrison *et al.* 1997). It is however very unlikely that they occur in the study area itself.

A number of water birds were identified within the southern farm dam, associated with Hydromorphic Grassland habitat, such as: Sacred Ibis (*Threskiornis aethiopicus)*, Redknobbed Coot *(Fulica cristata)* , Grey Heron (*Ardea cinerea)*, Purple Heron (*Ardea purpurea)*, Egyptian Goose (*Alopochen aegyptiaca*), Cape Shoveler (*Anas smithii*), Spurwinged Goose (*Plectropterus gambensis)*, Yellowbilled Duck (*Anas undulata*), White-faced Duck (*Dendrocygna viduata*), White backed Duck *(Thalassornis leuconotus)*, Cattle Egret (*Bubulcus ibis*) and Three banded Plover *(Charadrius tricollaris)*. These species may at times venture onto the site but due to lack of open water habitat this would not be a common occurrence. During the summer months all areas of standing water within and adjacent to the proposed site could contain a number of wading and water species along with vagrants and due to the close proximity of a larger pan systems in the surrounding vicinity a number of birds will be observed flying from one destination to the other.

It is very likely that any disturbance to the area will impact the birdlife within all habitats of the property. The wetland and grassland areas in the south western corner are regarded as sensitive. It is proposed that should any disturbance occur within the property that the two most sensitive habitats are conserved and managed accordingly. It is also highly recommended that a detailed faunal monitoring system is implemented to assist in the mitigation of disturbance.

7.8.3 Reptiles

A list of reptiles that could potentially occur in the area of interest, based primarily on distribution maps, was sourced according to Branch (2001), these are listed in the Flora and Fauna Assessment Reports found under Appendix D.

The reptile populations in the area are expected to be higher, but since these animals are very sensitive to vibrations and noise, and hide easily in crevices and undergrowth, they are not easily spotted. Only one unidentified lizard was recorded on site.

7.8.4 Amphibians

Of the fifty four amphibians endemic to South Africa, 16 (30%) are found in the Grassland Biome (Passmore and Carruthers, 1995). Of these, eight (8) species (50%) are endemic to the biome. A list of 13 frog species expected to occur within the study area is presented in Appendix D.

3 frog species were identified within the Weltevreden Study Area during the 2010 field survey. No red data frog was recorded during the sampling survey.

7.8.5 Invertebrates

According to the Fauna and Flora report undertaken in 2010, in consideration of the existing vegetation it is expected that members of the Orthoptera (grasshoppers, locusts and crickets), Hemiptera (bugs, cicadas, and leaf hoppers), Lepidoptera (butterflies and moths), Coleoptera (beetles), Hymenoptera (wasps and ants) and flies (Diptera) (Picker, *et al.*, 2002) would be present on site. Species within the Chironomidae family had the highest species richness while species within the Reduviidae family had the highest species richness during the wet season.

The invertebrate species collected by Digby Wells during the dry and wet season surveys are listed in the Flora and Fauna Assessment Report found under Appendix D.

7.8.6 Fauna Species of Special Concern (SSC)

A comprehensive list of SSC that may occur in the Project area is provided in the Flora and Fauna Assessment Report found under Appendix D of this report. A habitat sensitivity map has been compiled and can be found under Appendix A as Plan 8.

7.9 Wetlands

The Wetland Assessment Reports can be found under Appendix F and Appendix G.

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, a wetland delineation was carried out to identify and classify various wetland units and assess the ecological integrity and functions provided for by the different wetland units. Three major wetland units were recorded on site, namely: valley bottom wetlands without a channel, hillslope seeps and pan/depression (Plan 9, Appendix A). The hillslope seeps were either isolated as small patches along slopes, or were linked to other wetland units. Some of the delineated hillslope seepage wetlands are situated within the proposed open pit area.

7.10 Surface Water (Hydrological)

The Surface Water Assessment Report can be found under Appendix H.

The site is located in the Inkomati Water Management Area (WMA 05) and inside the boundaries of quaternary catchment X11D (Plan 10, Appendix A). There is a defined major ridge which forms part of the primary catchment area boundary (watershed) of the greater Komati River. The proposed site is approximately 2.5 km from this watershed and occurs near the fringe of the catchment area at an elevation of 1886 meters above mean sea level (mamsl) which is also at the source of the streams that run through the area. This locality is important in terms of surface water risks and impacts, with specific regard to pollution as any polluted surface water on the site has the potential to pollute the downstream Komati River.

7.10.1 Catchment Delineation

All surface water on the proposed site drains into a farm dam located south-west of the site. The water quantity and quality of this resource could be affected by the proposed mining activity. Sub-catchments were delineated according to the effect that the mine could have on streams feeding this water resource (Plan 11, Appendix A).. The total catchment area that feeds this specific dam is 18 km^2. Two sub-catchments feeding into the dam and a third sub-catchment situated to the south-east of the proposed mining site were delineated. The third sub-catchment (it does not fall within the site boundaries) was included in the delineation as the affected catchment also falls within the site boundary. Thus mining on the proposed site could have an impact on sub-catchment three and the stream that it feeds.

7.10.2 Mean Annual Runoff

The Mean Annual Runoff (MAR) of quaternary catchment X11D is 88 mm, which is representative of a net MAR of 51.8 Mm^3. The Mean Annual Precipitation (MAP) of the catchment is 744 mm. These values represent a MAR: MAP ratio of 11.8% for the X11D quaternary catchment area. The Mean Annual Evaporation (MAE) is 1450 mm for the specific quaternary catchment (WRC, 2005).

7.10.3 Normal Dry Weather Flow

During normal dry weather seasons, the volume of flow of the X11D quaternary catchment area is normally 31.41 Mm^3/a.

7.10.4 Flood Volumes

The peak flows for the various sub-catchments delineated were assessed utilising a combination of the following Rainfall-Runoff methods (Table 7-6):

- Rational;
- Alternative Rational;
- Standard Design Flood (SDF); and
- Soil Conservation Services (SCS).

Flood peaks (m^3/s) calculated for the delineated sub-catchments are summarised in Table 7-6 for the 1:100 year.

Table 7-6: Flood Peaks - 1:100 year return period

Sub-Catchment	Rational (m^3/s)	Alternative Rational (m^3/s)	SDF (m^3/s)	SCS (m^3/s)
2 (sub1)	89.03	85.75	70.02	31.50
3 (sub2)	74.17	70.26	59.21	26.50
4 (sub3)	102.96	97.06	80.10	45.20

The results from Table 7-6 indicate that the solutions for all four methods i.e. Rational, Alternative Rational, Standard Design Flood and SCS methods are relatively close to one another for all the sub-catchments except for the SCS method. The reason for this is that the SCS method has an added advantage over the other three methods because it also takes into consideration soil and moisture conditions of a catchment prior to a design flood. It was however decided that the most conservative values should be considered and hence the 1:100 year flood results from the Rational Method were used for the determination of the water surface profiles and the flood lines.

There are no major streams in the project area, thus a 100 m buffer zone around the non-perennial streams, as well as the exclusion zone for mining or mine infrastructure placement was delineated using a Geographic Information System (GIS) software program.

It was concluded that the two sub-catchments contribute 40% of the total surface water drainage that drains into a farm dam located south-east of the site. Mining the proposed area could ultimately have a negative impact on both water quantity and quality of the dam. Less water could potentially drain into the dam when mining commences due to abstraction and dirty water might make its way to the dam in the event of a spill.

7.10.5 Surface Water Quality

A site visit was conducted in June 2014 and surface water samples were taken to update the water quality baseline from the previous sampling period which was done in 2008 (Plan 12, Appendix A). Samples were collected in pans and dams found within and surrounding the Project area. The samples were taken to an accredited laboratory to be analysed for physical and chemical water quality parameters.

The results from the 2008 and 2014 surface water samples were benchmarked against the SANS 241: 2011 drinking water guidelines. All the water quality parameters which were analysed were found to be within the SANS drinking water quality limits. The current status of water quality did not indicate any impact or any level of contamination compared to the SANS 241: 2011 drinking water quality standards.

7.10.6 Water Uses

Total number of registered water users in quaternary catchment X11D according to the Water Authorisation Registration and Management System (WARMS) database is 68 (Table 7-7), with the majority of the water users registered for irrigation (48), followed by livestock watering (09), mining (09), industry (1) and a schedule 1 user (1). The annual water volumes abstracted by the 68 users, as per the WARMS database range from 10 m^3/day (1,525,389 m^3/a), with mining being the one utilizing the most. Plan 10 (Appendix A) indicates registered water users in quaternary catchment X11D.

The majority of abstractions by the registered water users were from rivers and streams (34) followed by boreholes (16), dams (16), wetlands (2) and a spring (1).

Table 7-7: Summary of water uses in quaternary catchment X11D

Number of registered water users						
Description	**Irrigation**	**Livestock watering**	**Industry**	**Mining**	**Schedule 1**	**Total**
Number of users	48	9	1	9	1	68
Boreholes	3	6	1	5	1	16
Dams	11	1	0	4	0	16
Rivers/streams	32	2	0	0	0	34
Spring/Eye	1	0	0	0	0	1
Wetlands	1	1	0	0	0	2

7.11 Groundwater (Geohydrology)

The Geohydrology Assessment Report can be found under Appendix I.

7.11.1 Conceptual Geohydrology Model

The natural geohydrological system within the Witbank coal field consists of three superimposed aquifers namely an upper weathered aquifer, a fractured Karoo aquifer and a fractured pre-Karoo aquifer (Hodgson & Krantz, 1998).

The upper weathered aquifer consists of material weathered in situ and transported as part of the erosion process. The depth to weathering is generally between 1 m and 15 m from surface and the water level varies between 5 m and 10 m below ground level (mbgl). The flow mechanism within the weathered aquifer is porous flow. The water quality is generally good due to years of dynamic groundwater flow resulting in the leaching of soluble salts.

The fractured Karoo aquifer consists of the various lithologies of siltstone, shale, sandstone and the coal seams. The pores of the geological units are generally well cemented and the principle flow mechanism is fractured flow along secondary structures e.g. faults, bedding plane fractures etc. The intrusion of the fractured aquifer by dolerite dykes and sills has led to the formation of preferential flow paths along the contacts of these lithologies due to the formation of cooling joints. The dykes may act as permeable or semi-permeable features to impede flow across the dykes.

The fractured pre-Karoo aquifer is separated from the overlying fractured Karoo aquifer by Dwyka tillites which act as an aquiclude where present. The flow mechanism is fracture flow as can be expected from the crystalline nature of the granite rocks. The water quality is generally characterised by high fluoride levels which limits exploitation of this aquifer in combination with the general low yields, deep (expensive) drilling and the low recharge (Grobbelaar et al, 2004).

Mining of the coal seams has resulted in the introduction of an artificial aquifer system which generally dominates the groundwater flow on a local and regional scale.

7.11.2 Hydrocensus

A hydrocensus was conducted by DWA personnel within a 2km radius from the proposed project boundary during September 2008. Additional sampling and hydrocensus information were collected in May 2009 to include additional properties not accessible during the 2008 sampling run. Further fieldwork and sampling were conducted in June 2009 after it was decided to include the old Vogelstruispoort Colliery in the study for groundwater impact and risk assessment purposes. The positions of these points are shown on Plan 13 (Appendix A).

The purpose of these studies were to obtain information on the current hydrogeological baseline of the area, including water quality, water use, volumes used, site condition and the location of each site. Data was collected on the current groundwater users, location of water sources, current water quality and groundwater levels (where possible). A summary of the hydrocensus points collected during the field visits is presented in Table 7-8.

Table 7-8: Hydrocensus Information

Site Name	Latitude	Longitude	Elevation (mamsl)	Sampled (Y/N)	Collar Height (m)	Water level (mbgl)	Equipment	Use
BT1	-25.78956	30.04019	1836	Y	-	2.35	Sub. Pump	Domestic & Livestock
BT2	-25.78640	30.03960	1845	N	-	6.61	Wind pump	Domestic & Livestock
BT3	-25.78220	30.03929	1864	Y	-	-	Wind pump	Domestic
BT4	-25.78585	30.03390	1833	Y	0.33	15.41	Sub. Pump	Domestic & Livestock
ZP1	-25.76179	30.00146	1861	N	-	-	None	None
ZP2	-25.77019	30.00165	1822	N	0.35	5.39	Sub. Pump	Domestic
WN1	-25.76746	30.02581	1886	Y	-	-	Sub. Pump	Livestock
WN3	-25.76766	30.02645	1882	Y	-	-	Hand Pump	Domestic
WN4	-25.76746	30.02581	1875	Y	0.38	5.21	Sub. Pump	Livestock
WN7	-25.75434	30.03840	1855	Y	-	9.33	Sub. Pump	Domestic
ZKBH1	-25.78694	30.01083	1810	Y	0.20	2.13	Sub. Pump	Domestic and Agriculture
VPBH1	-25.78198	30.04805	1834	Y	0.28	-	Wind pump	Domestic

7.11.3 Presence of boreholes and springs

During the hydrocensus two springs were identified and both were used for domestic and livestock watering however no information regarding yield estimations were available. Information collected during the public consultation process from landowners identified a number of boreholes on and around the planned mining areas mainly used for domestic and agricultural purposes. Reported yields that were abstracted per day were between 2600 – 5000 L/d (0.03 – 0.058 L/s).

Borehole yields in the weathered aquifer are generally low, ranging from 0.025 – 0.5 L/s. Borehole yield statistics for the fractured aquifer in the Ecca sediments show that the yields vary from 0.005 L/s – 1.5 L/s with an average yield of 0.5 L/s (Hodgson & Krantz, 1998).

7.11.4 Water levels

Water levels observed during field visits and the hydrocensus varied between 2.35 – 15.41 mbgl (meters below ground level). The values of the rest of the water levels and surface elevations (topography) exhibit a Bayesian relationship with reasonable correlations as indicated on Figure 7-9. The Bayesian relationship represents the correlation between the surface topography elevation and groundwater level elevation. Based on the results

presented in Figure 7-9 it can safely be assumed the groundwater levels mimic surface topography.

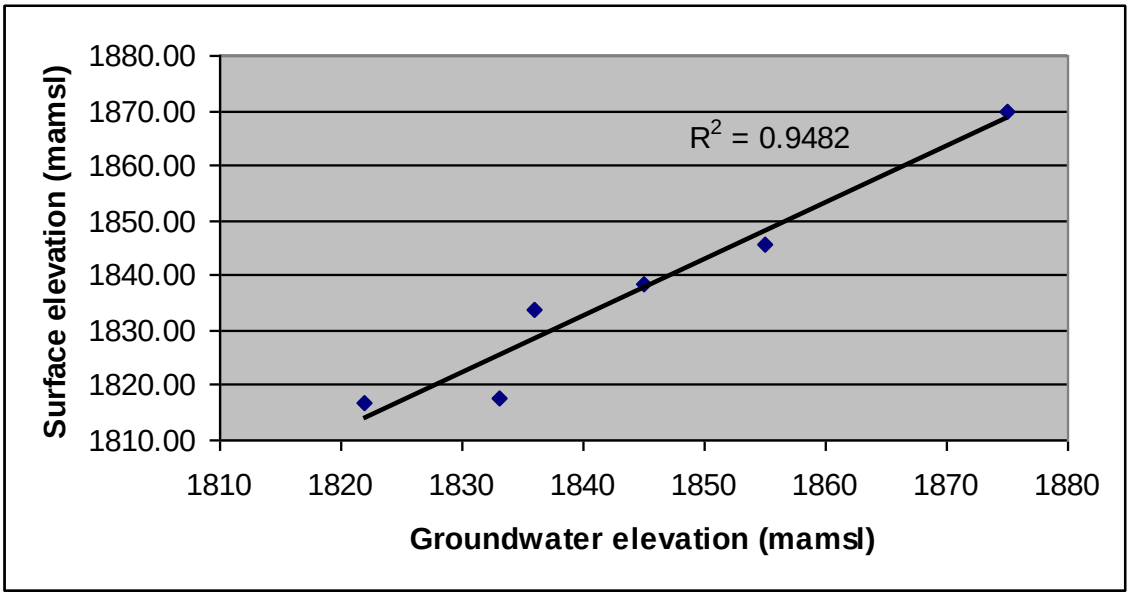

Figure 7-9: Bayesian correlation indicating reasonable relationship between groundwater levels and surface elevations

7.11.5 Flow direction and water level measurements

Rainfall that infiltrates into the weathered rock soon reaches the layer of shale underneath the weathered zone. The movement of groundwater on top of this impermeable shale layer is lateral and in the direction of the surface slope. The water may reappear on surface at fountains where the flow paths are obstructed by a barrier, such as a dolerite dyke, paleo-topographic highs in the bedrock or where the surface topography cuts into the groundwater level in the vicinity of streams.

Groundwater flow in the fractured aquifer is dictated by the geological characteristics and occurrence of structures. In the case of mined out voids, the groundwater flow will follow the floor contours of the deepest seam that is being mined, which is generally in a south westerly direction at Weltevreden.

7.11.6 Water balance

7.11.6.1 Groundwater recharge

Highly variable groundwater recharge occurs over the area but values are generally between 1 - 3 % of MAP (Hodgson & Krantz, 1998) for undisturbed areas. For Weltevreden the average recharge will be 54.46 mm/a based on an average rainfall of 768 mm/a. Recharge to the weathered aquifer drains towards regional surface water courses and less than 60% of the recharge discharge in streams. The remainder is withdrawn through evapotranspiration from the weathered aquifer, recharge to the deeper fractured rock

aquifers or abstracted through pumping. A low vertical permeability generally exists for the fractured aquifer in the Vryheid Formation and this aquifer is recharged by interflow from the weathered aquifer.

7.11.6.2 Base flow

Base flow is not a measure of the volume of groundwater discharged into a river or wetland, but it is recognised that groundwater makes a contribution to the base flow component of river flow.

The total groundwater contribution to base flow in the X11D quaternary catchment is estimated to be 45 mm/a according to the Groundwater Resource Directed Measures (GRDM) data.

7.11.6.3 Abstraction

Total abstraction from groundwater resources in the X11D quaternary catchment as estimated by GRDM is 0.02 Mm^3/a. The exploration potential for this catchment is 3 Mm^3/a thus making 2.98 Mm^3/a available for use. From the Department of Water Affairs and Forestry (DWAF) Water Use Registering and Licensing Data Base (WARMS), X11D indicate that a registered volume of 81 004 m^3/a is being abstracted mainly agricultural use.

7.11.7 Groundwater Quality

7.11.7.1 Classification

Samples were taken during the September 2008 and May 2009 hydrocensus survey and during the environmental assessment of the old Vogelstruispoort Colliery in June 2009 to obtain baseline information. Full macro analysis was done for the samples taken during the sampling runs. The categories of the water types as recorded under natural conditions (baseline status for this study) are shown in the Piper diagram (Figure 7-10).

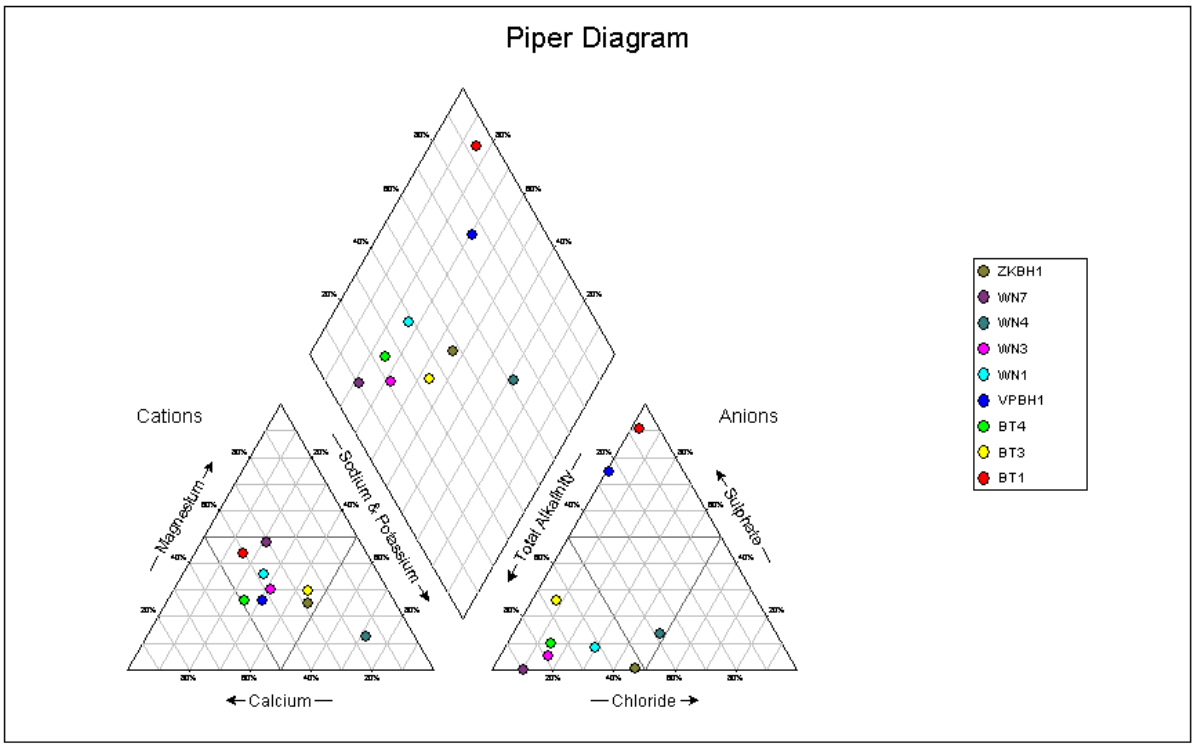

Figure 7-10: Piper Diagram from the groundwater samples taken during the hydrocensus study

Within the South African coal fields, the calcium-magnesium-bicarbonate (left quarter) of the Piper diagram and is characterised by freshly recharged water. The sodium bicarbonate dominant (bottom quarter) is typical of dynamic groundwater flow within the aquifers with the sodium replacing calcium and magnesium in solution. The sodium chloride dominant (right quarter) is associated with stagnant or slow moving groundwater with little or no recharge. The sulphate dominant (top quarter) is typically of water impacted by the oxidation of pyrites which is commonly associated with coal mining activities.

Six of the samples (ZPBH1, BT3, BT4, WN1, WN3 and WN7) fall within the calcium-magnesium-bicarbonate (left quarter) of the Piper plot and is characterised by freshly recharged water. Sample WN4 plots in the right quarter and signifies sodium chloride dominant water. Samples BT1 and VPBH1 indicates sulphate dominant water and is typical

of water impacted by the oxidation of pyrites which is commonly associated with coal mining activities.

The groundwater is of good quality and the majority of the samples plotted within the SANS 241 class 1 (acceptable) for drinking water guidelines, except for samples:

- BT 1 (pH 3.62); and
- VPBH 1 (TDS 1132 mg/l, SO_4 587 mg/l and Mn 47.6 mg/l).

7.11.7.2 Groundwater hydro-chemical footprint

The groundwater hydro-chemical footprint in terms of TDS indicate the only elevated levels were measured at VPBH 1 which is at the historical mine workings on Vogelstruispoort and further down gradient from that at BT 1, which is likely a receptor to groundwater pollution from the old Vogelstruispoort workings.

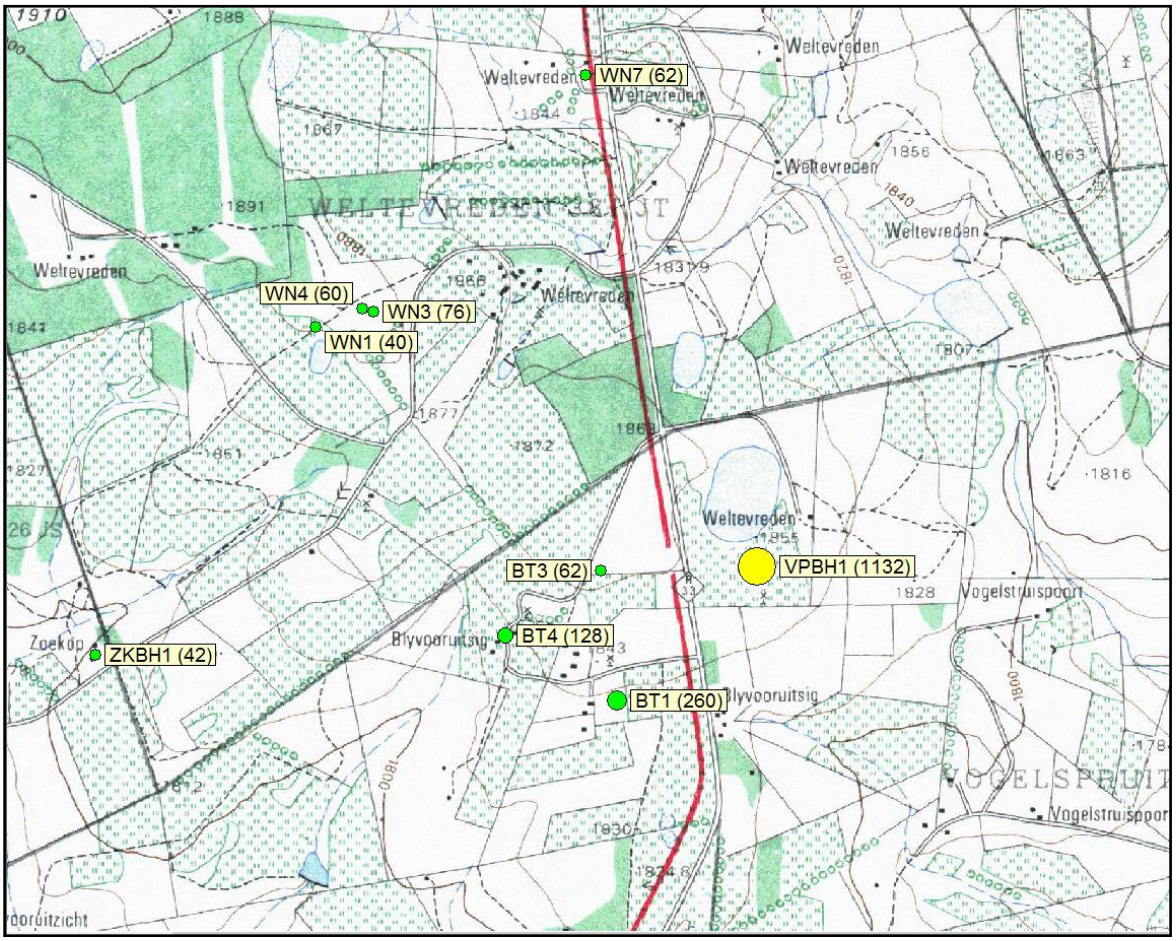

Figure 7-11: Groundwater hydro-chemical footprint (TDS mg/l)

7.11.8 Groundwater Use

Data gathered during the field visit identified 10 boreholes within a 2 km radius from the project boundary of which 3 boreholes are used for domestic and livestock watering, 4 for domestic purposes only, 2 for livestock watering and 1 was not in use.

7.12 Air Quality

The Air Quality Assessment Report can be found under Appendix J.

Air quality is an issue of concern in Mpumalanga, as it is in many other parts of South Africa. Several air pollution sources exists in Mpumalanga, ranging from veld fires to industrial processes, agriculture, mining activities, power generation, paper and pulp processing, vehicle use and domestic use of fossil fuels (MDALA, 2003). Different pollutants are associated with each activity, ranging from volatile organic compounds and heavy metals through to dust and odours. (http://www.mpu.agric.za/htm).

The dust fallout levels in the area are impacted on by the farming activities, as well as vehicle activity on gravel roads. The harvesting of maize during the dry windy season contributes substantially to air born particulates.

Dust fallout monitoring was conducted at five sites over a four month duration from October 2008 to January 2009 (Plan 14, Appendix A). Results indicated that the overall trend for dust fallout levels in the area is low.

7.13 Noise

The Noise Assessment Report can be found under Appendix K.

Noise levels were samples were taken at identified receptors within a 2km range of the Project (Plan 15, Appendix A). Current noise levels in the area can generally be regarded as normal. Noise pollution in the area is mainly caused by traffic on the R33 and N4. These roads are predominantly used by haul trucks and cars.

7.14 Blasting and Vibration

The Blasting and Vibration Assessment Report can be found under Appendix O.

The expected ground vibration and air blast levels from blasting operations required at the Weltevreden Project was calculated and considered in relation to the surrounding structures and installations. Expected levels of ground vibration and air blast are within the allowed limits but levels are such that it could be perceptible.

7.15 Socio-economic characteristics

7.15.1 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 infrastructure will have an impact on the visual aesthetic of the immediate surrounds.

7.15.2 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
- Camden Power Station – 122 km
- Duvha Power Station – 90 km
- Hendrina Power Station – 93 km
- Khusile Power Station – 130 km
- Komatipoort Power Station – 112 km
- Majuba Power Station – 180 km
- Tutuka Power Station – 202 km

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.

A traffic count was conducted on the R33 at the entrance to the site. Table 7-9 below shows the results of the traffic count.

Table 7-9: Traffic count results

Traffic Count - R33 passing entrance to the Weltevreden Project						
Time	**Cars**	**Trucks**	**Mini Buses**	**Buses**	**Bicycle**	**Total**
07:30 - 08:00	13	18	0	0	0	31
12:00 - 12:30	18	16	0	0	0	34
16:15 - 16:45	22	14	2	0	0	38
Total	**53**	**48**	**2**	**0**	**0**	**103**

The majority of use of the R33 is through passenger car and truck use. The traffic count showed that the road does carry substantial traffic during the week. This will require Northern Coal to build an intersection for access to Weltevreden. This will be to ensure the safety of road users as the haul trucks will substantially increase traffic on the R33.

7.15.3 Socio-Economic Environment of the Municipal Area

Emakhazeni Local Municipality (ELM) is located in the Nkangala District council, which has the smallest population size in the District. According to statistics SA, the population of ELM has increased from 43,007 in 2001 to 47,217 in 2011. Statistics South Africa Population growth for ELM is estimated at 0.93% of the number of households within the municipality (ELM IDP, 2014).

The pattern of overall unemployment rate in ELM has changed as compared to 2001 where we were at 30% and in 2011 we are at 25.92%. Employment opportunities are favourable in the municipality, particularly for males, about 80% of males and 66% females were employed in 2011 (ELM IDP, 2014).

Leading sectors in terms of % contribution to ELM economy is the following:

- Mining (28.7%),
- Transport (25.1%) and
- Community services (14.2%).

Contribution to Nkangala economy and ELM is at 3.5% with transport having a share of 10.2% and agriculture 6.7% to the district's relevant economic sectors.

Mining has recorded significant growth in GDP contribution in the ELM between 2001 and 2010.

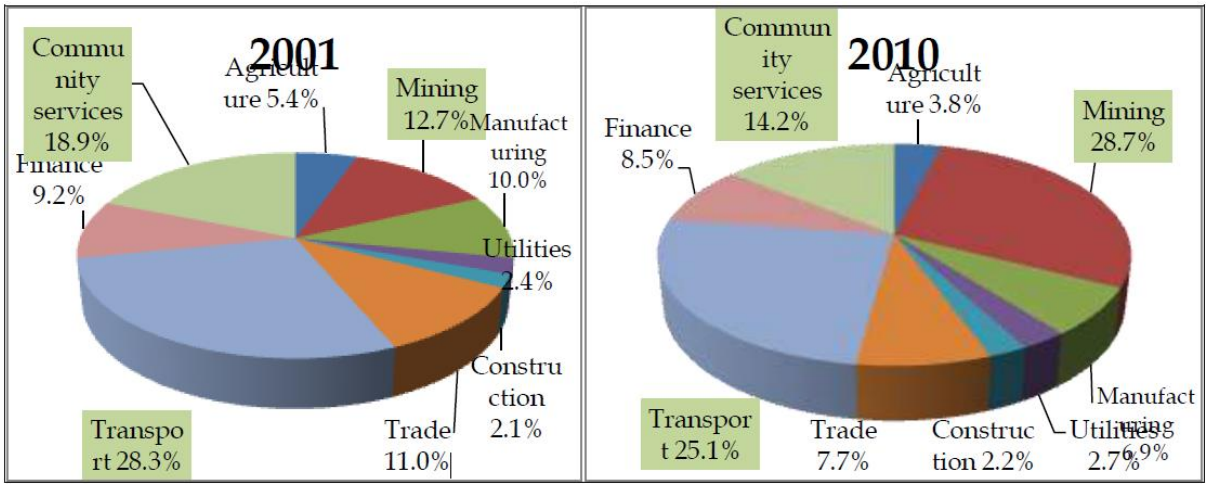

Figure 7-12: Contribution of each sector to the GDP in ELM between 2001 and 2010 (ELM IDP, 2014)

According to the ELM IDP (2014) mining is leading in terms of employment within the municipality with 22.7% followed by the trade sector at 20.6%. Even though ELM has a high Agricultural potential, the sector has shown a rapid decrease in both sectoral employment and the GDP contribution between 2001 and 2010 (ELM, IDP 2014).

7.15.4 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 ELM.

The majority of ELM households have access to safe drinking water, either piped within the dwelling or from a source outside the dwelling. There were major improvements in provision of piped water inside the dwelling between 2001 and 2011 (from 40% to 59%). Evidence suggests that provision of basic services focused attention towards lowering the number accessing piped water from the yard and those that access it from a source outside the dwelling. Not much change is observed from the other types of water sources, except for eliminating households that had unspecified water sources in 2001 (ELM IDP, 2014).

In 2001, vast majority (almost 100%) of households in the municipality either had a flushed toilet or pit latrine without ventilation. There is clear evidence of a local government campaign to replace pit latrines without ventilations with those that are ventilated to promote safer sanitation facilities. By 2011, there were still a few households using pit latrines without ventilation. Although the number of households with no toilet facility has declined between 2001 and 2011, the decline is small (ELM IDP, 2014).

In terms of fuel used for lighting purposes, approximately 72% of households used electricity in 2001 which increased to over 80% in 2011. 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, 2014).

Approximately 99% 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, 2014).

7.15.5 Socio-Economic Baseline Survey

In anticipation of potential project-induced displacement, a household survey of the community situated towards the north-east of the project area was conducted (Figure 7-13). A census, socio-economic and asset survey of all individuals and households was undertaken to:

- To determine the number and location of households in the potentially affected community to estimate the extent of physical or economic displacement as a result of the Northern Coal Weltevreden project, if any;
- To establish the baseline socio-economic conditions of the potentially affected community, which is required both for resettlement planning and subsequent monitoring purposes; and
- To detect and deter any influx of people, hoping to benefit from a possible resettlement and compensation process, into the community.

Please refer to the Socio-Economic Baseline Report under Appendix N for more detail.

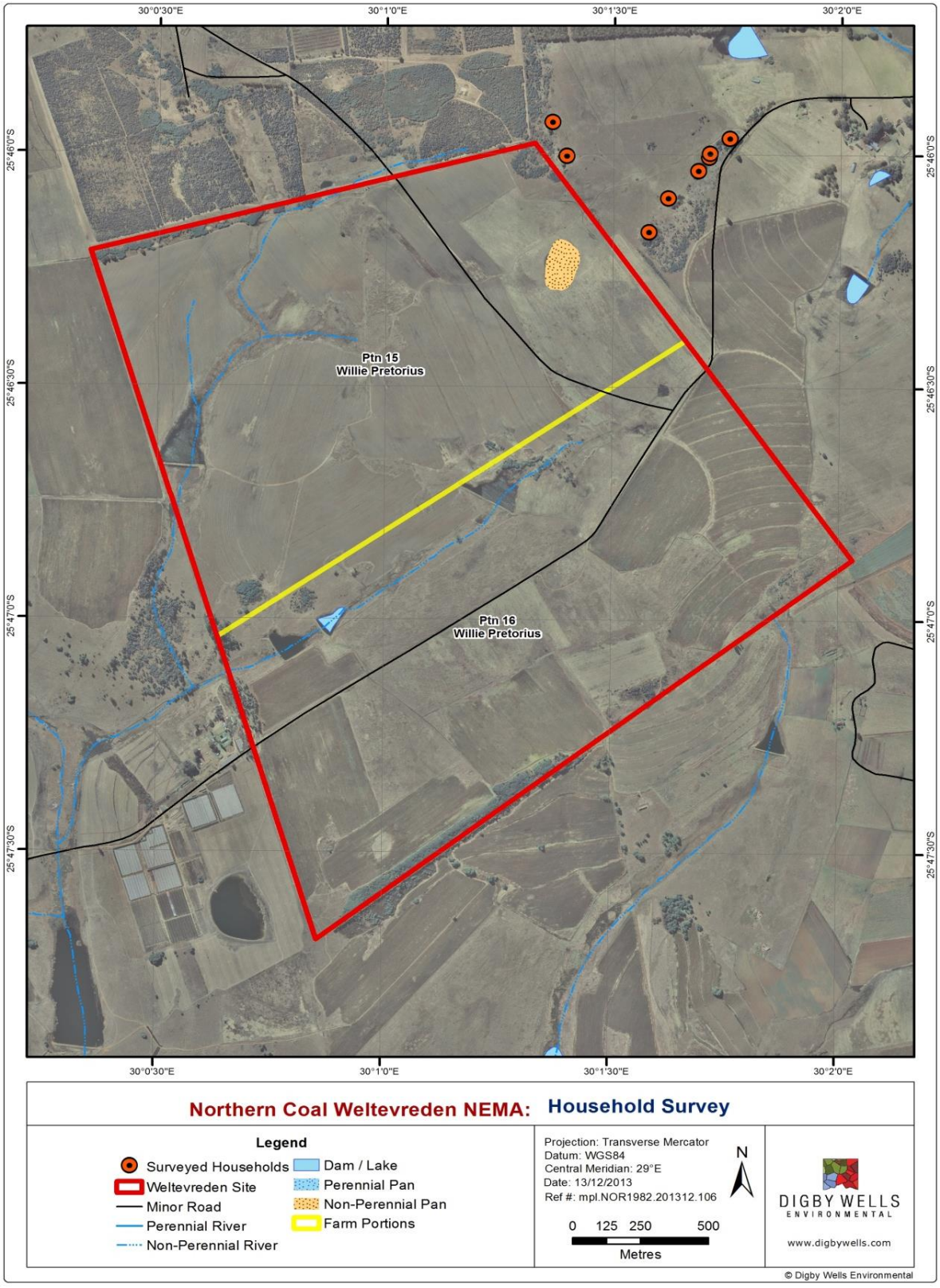

Figure 7-13: Households that were surveyed

7.15.6 Sites of Archaeological and Cultural Significance

The Heritage and Archaeological Assessments can be found under Appendix L and Appendix M. The Heritage Assessment conducted in 2014 (Appendix L) will be submitted to SAHRA for comments and recommendations.

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.

During a site visit, a historical coal mine, stone walled enclosures and a possible grave site were identified within the project area. A burial ground and historical werfs were recorded outside of the project area but within close proximity (Plan 16, Appendix A).

8 EIA Methodology

The impact assessment methodology, during the following EIA phase, for the 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 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.

Two different impact assessment rating parameters were used in the specialist studies as they were conducted over two periods:

- The first set of specialist studies were completed pre-2014 for authorisation of mining activities from the DMR; and
- The second set of specialist studies were completed in 2014, as some of the previously completed specialist studies required updating for environmental authorisation from the DEA.

It must be stressed that although different rating parameters were used between the pre-2014 studies and those conducted in 2014, the methodology applied is the same and would result in a similar significant rating for the impact.

The following specialist studies were completed pre-2014:

- Topographical and Visual Assessment;
- Fauna and Flora Assessment;
- Avifauna Assessment;
- Wetlands and Aquatic Assessments;
- Hydrological (Surface water) Assessment;
- Geohydrological (Groundwater) Assessment;
- Soil and Land Capability Assessment;
- Air Quality Assessment;
- Noise Assessment;
- Traffic Assessment;
- Vibration and Blasting Assessment; and
- Archaeological and Heritage Assessment.

Subsequently, a number of specialist studies were updated in 2014 for this EIA/EMP process. These included:

- Fauna and Flora Assessment;
- Wetlands Assessments;
- Hydrological (Surface water) Assessment; and
- Heritage Assessment.

The two impact assessment rating scales are explained in more detail in the sections below.

8.1 Impact Identification

Impact identification is performed by use of an Input-Output model which serves to guide the assessor in assessing all the potential instances of ecological and socio-economic change, pollution and resource consumption that may be associated with the activities required during the construction, operational and decommissioning phases of the Project.

Outputs may generally be described as any change to the biophysical and socio-economic environments, both positive and negative in nature, and also include the product and waste produced by the activity. Negative impacts could include gases, effluents, dust, noise, vibration, other pollution and changes to the bio-physical environment such as damage to habitats or reduction in surface water quantity. Positive impacts may include the removal of invasive vegetation, construction of infrastructure, skills transfer or benefits to the socio-economic environment. During the determination of outputs, the effect of outputs on the various components of the environment (e.g. topography, water quality, etc.) is considered.

During consultation with I&APs perceived impacts were identified. These perceived impacts will become part of the impact assessment and significance rating to differentiate between probable impacts and perceived impacts.

8.2 Impact Rating

The significance rating process for impacts follows the established impact/risk assessment formula shown in Figure 8-1.

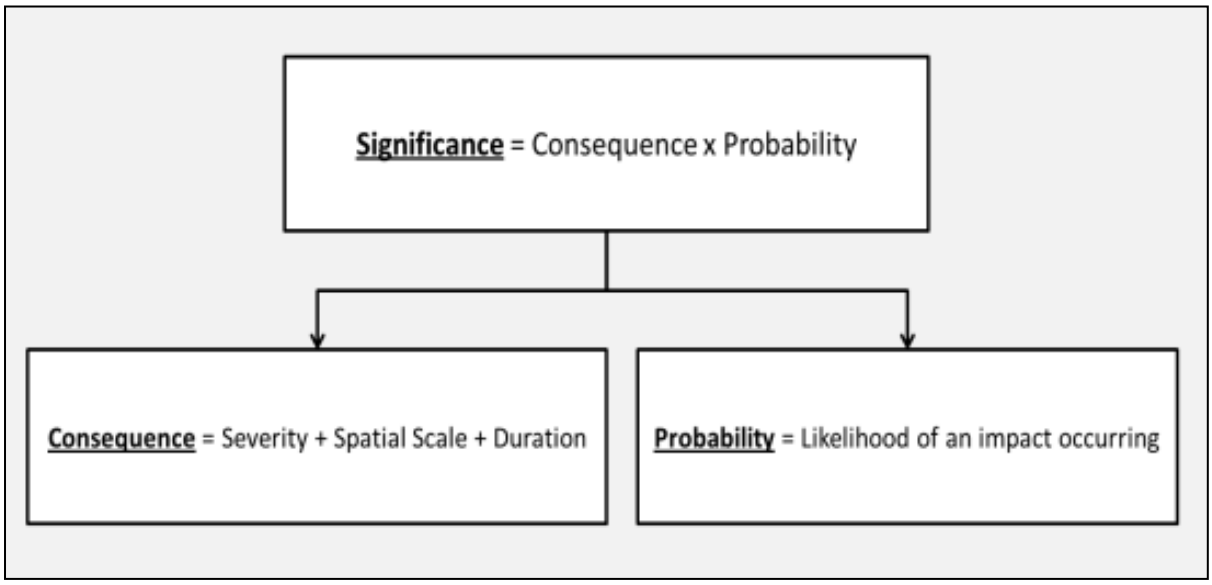

Figure 8-1: Formulae used to determine the significance of an impact for both the pre-2014 and the 2014 specialist studies

8.2.1 Pre-2014 Specialist Study Impact Rating Calculation

Firstly, a significance rating out of 75 was calculated, whereby Severity, Spatial Scale, Duration and Probability are each rated out of five using the impact assessment parameter ratings in Table 8-1 below and the formulae in Figure 8-1 above. This rating was then converted to a percentage out of a 100. The significance of an impact was then determined and categorised into one of four categories, as indicated in Table 8-2 below. Impacts are rated prior to mitigation and then again after consideration of the mitigation measures.

Table 8-1: Impact assessment parameters used for the pre-2014 studies

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
5	Very significant impact/total destruction of a highly valued species, habitat or ecosystem or extremely positive impact over baseline environmental condition.	Irreparable damage to/destruction of highly valued items of great cultural significance or complete breakdown of social order or Extremely positive impact on social, economic and cultural environment.	National/ International	Permanent/ Irreversible	Certain/ Normally happens in cases of this nature
				(more than 50 years)	(80-100% chance of happening)
4	Serious impairment of ecosystem function, or very positive impact over baseline environmental condition.	Serious social issues/Permanent damage to items of cultural significance or very positive impact on social, economic and cultural environment.	Provincial/ Regional	Long Term	Will more than likely happen
				(25 to 49 years or beyond closure)	(60-79% chance)
3	Moderate negative alteration of ecosystem functioning or Moderately positive impact over baseline environmental condition.	Moderately important social issues and/or moderately significant damage to items of cultural significance or Moderately positive impact on social, economic and cultural environment.	Regional (substantially beyond site boundary)	Medium Term	Could happen and has happened here or elsewhere
				(5-24 years)	(40-59% chance)
2	Minor effects not affecting ecosystem functioning or Slightly positive impact over baseline environmental condition.	Minor Impacts on the local population, repairable over time. Temporary impairment of the availability of items of cultural significance or Minor positive impact on social, economic and cultural environment	Local	Medium-Short Term	Has not happened yet, but could
			(beyond site boundary and affects neighbours)	(1-4 years)	(20-39% chance)

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	Social, cultural and heritage			
1	Insignificant effects on the biophysical environment or Insignificantly positive impact over baseline environmental condition.	Insignificant social issues / low-level repairable damage to commonplace structures. positive impact on social, economic and cultural environment or Insignificant positive impact on social, economic and cultural environment	Site	Short term	Conceivable, but only in a set of very specific and extreme circumstances
			(does not extend beyond site boundary)	(Less than a year)	(0-19% chance)

Table 8-2: Impact significance threshold limits used for the pre-2014 specialist studies

Significance		
High	76%- 100%	
Medium – High	51% – 75%	
Medium - Low	26% – 50%	
Low	0% - 25%	

8.2.2 2014 Specialist Study Impact Rating Calculation

Similarly, a significance rating was calculated out of 147, whereby Severity, Spatial Scale, Duration and Probability are each rated out of seven using the impact assessment parameter ratings in Table 8-3 below and the formulae in Figure 8-1 above. The significance of an impact is then determined and categorised into one of four categories, as indicated in Table 8-2 below. Impacts are rated prior to mitigation and then again after consideration of the mitigation measures.

Table 8-3: Impact assessment parameters used for the 2014 studies

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	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

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	Social / Cultural Heritage			
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

Table 8-4: Impact significance threshold limits used for the 2014 specialist studies

Significance		
High	109- 147	
Medium-High	73 - 108	
Medium-Low	36 - 72	
Low	0 - 35	

9 Impact Assessment

Impacts for the construction, operational and decommissioning phases for the proposed mine are summarised below for each specialist study. For more detail please refer to the specialist study contained in the appendices. For impact ratings and mitigation measures please refer to the EMP table contained in section 13 (Environmental Management Plan) of this report.

9.1 Topography

9.1.1 Construction Phase

During the Construction Phase, the infrastructure being constructed (i.e. creation of paved and bunded area 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 a significant impact on the topography as infrastructure will be small scale and will not be permanent. The predominant topographical disturbance will be as a result of the inception of the open cast pits, the removal of topsoil and extraction of coal will alter the topography significantly. This will involve the removal and storage of topsoil and weathered material from areas where construction will occur using open pit truck and shovel methods and the preparation of areas for Open pit mining by means of blasting rock.

9.1.2 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 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 open pit 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.

9.1.3 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 to prevent soil erosion.

9.1.4 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) 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.

9.2 Visual Impact Assessment

9.2.1 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 open pit mining by removing the topsoil and blasting. The visual impacts will be more prevalent closer to the site than further away.

9.2.2 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 open pit mining will create further visual disturbances prior to full rehabilitation of the already mined areas.

9.2.3 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.

9.2.4 Post closure

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

9.3 Soil

9.3.1 Construction Phase

Infrastructure: The construction of infrastructure will 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.

Open pit mining: The removal and stockpiling of soil during the construction phase of the open pit 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.

9.3.2 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.

9.3.3 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.

Open pit mining: During the decommissioning and closure phases the impacts on soil will generally be positive by the replacement of soil stripped prior to open pit 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.

9.1 Land Capability

9.1.1 Construction phase

Infrastructure and Open pit 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 open pit mines. The impacts will be significant but limited to areas of construction.

9.1.2 Operational phase

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

Open pit 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 where open pit mining will take place. 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 open pit mining progresses, where land capability should slowly be restored to at least a grazing land capability.

9.1.3 Decommissioning phase

Infrastructure and Open pit 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.

9.2 Natural Vegetation (Flora)

9.2.1 Construction Phase

During the construction phase, site clearing and the removal of topsoil will result in a loss of natural vegetation. Disturbance to the soil after vegetation clearing often results in the establishment of alien species that may form dense monospecific stands and result in a loss of ecosystem function. Development of the open pit will impact on the Hydromorphic Grassland and the Themeda Triandra Rocky Grassland which have very high and high habitat sensitivity respectively (Plan 8, Appendix A).

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.

Loss of very high and high sensitivity habitat is regarded as highly significant, due to the impact on biodiversity and potential loss of plant Species of Special Concern (SSC).

9.2.2 Operational Phase

In the open pit areas, the impact on flora will continue to be negative as more land is stripped. As each open pit 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.

9.2.3 Decommissioning Phase

During the decommissioning phase, the removal of infrastructure by heavy machinery could destroy natural vegetation. Profiling and contouring and the spreading of sub-soils and topsoil will assist to restore vegetation. Once again, monitoring must be undertaken to ensure that alien invasive species do not take advantage of this.

9.3 Fauna

9.3.1 Construction Phase

The preparation of mining activities will have a negative impact on the local fauna. Sites will be cleared of vegetation and topsoil and there will be an increase in noise and activity, which will result in disturbance to faunal habitat. The local fauna will be able to move into surrounding areas which will reduce the significance of this impact. Loss of very high and high sensitivity habitat is regarded as highly significant, due to the impact on biodiversity and potential loss of animal SSC.

9.3.2 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.

9.3.3 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. 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.

9.4 Wetlands

9.4.1 Construction phase

Site clearing and the removal of topsoil will result in the loss of hillslope seepage wetlands especially during open pit development. The loss of aquifer-driven hillslope seeps will impact on the hydrology of the valley bottom wetland systems. As a consequence the valley bottom wetlands may reduce in size. Although wetlands on site are regarded to be in a generally poor ecological condition, the loss of these systems will remove the potential for any opportunities to improve their ecological status at all. Heavy machinery used during the construction phase may result in spillages of diesel and hydrocarbons which can then be washed into the wetland areas. Berms surrounding the open pit areas will prevent any potential pollution from the open pit pits from being washed into the valley bottom wetlands.

Site clearing will result in the removal of the vegetation and increase the potential for siltation of the wetland areas. It is suggested that existing open areas of soil be vegetated so as to prevent 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 PCDs take place during the dry season to prevent siltation of the wetlands and to prevent the transport of pollutants and toxicants downstream.

The proposed construction of the haul road will take place within a hillslope seepage wetland. It is advised that the footprint of this impact be kept to a minimum and where possible, construction should take place as close as possible to the open pit area so as to minimise the overall footprint 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 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.

9.4.2 Operational phase

The use of trucks and machinery throughout the operational phase could result in spillages of diesel and hydrocarbons which then can 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. The quality of water released back into the wetland units should be within the DWA water quality guidelines for both domestic uses, as well as for aquatic ecosystems.

The continuous mining of the open pits will further result in a loss of wetlands and wetland dependant fauna.

9.4.3 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 will reduce. The impacts resulting in the loss of wetland units would be long term and permanent. Thus the need to avoid further loss to wetland areas should be avoided as rehabilitation to impacted wetlands is extremely difficult and costly.

Areas to be 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.

9.5 Surface Water (Hydrological) Impact Assessment

9.5.1 Construction Phase

During the construction phase of mining, the activities undertaken will impact on the surface water resources in the area in terms of their threshold limits, scale and duration.

9.5.1.1 Excavation

Initial removal of topsoil will change the surface water flow patterns and might cause siltation of the surrounding surface water bodies. The impact will be of medium to low threshold, local, and medium to short term in a case of flow changes and of medium to high impact in the case of siltation of the surface water bodies.

9.5.1.2 Haul Road Construction

The construction of haul roads might influence soil erosion which may result into siltation of the surrounding surface water bodies, this will cause medium to high, local and medium to short impact on the surface water bodies.

9.5.1.3 Construction of Offices, workshops and Change Houses

Construction of these infrastructures might disrupt the surface water flow patterns and that could influence erosion due to the increased runoff velocity. This might have a site specific, moderate and short to medium siltation impact on water resources.

9.5.1.4 Construction Pollution Control Dam and Water Diversion Berms

The design and construction of pollution control dams and other water management facilities poses a serious threat to the surface water quality in the area. If poorly designed, leakages of contaminated water might end up reporting to the surrounding water bodies. This impact is therefore highly rated as a localized to regional impact (should dirty water control not be well managed) that could cause significant pollution of the nearby streams.

However, a positive impact can be realized when the design, construction, operation and maintenance of pollution control dams is well executed and in line with GN 704 requirements for capacity. This could result from the prevention of dirty water from negatively impacting on the receiving environment. The dirty water use on site should be managed (re-use/recycle of even treatment) to prevent the existence of excess dirty water that could pose a negative risk to the environment.

Monitoring and implementation of mitigation measures must also be well managed.

9.5.2 Operational Phase

This section discusses the proposed activities for the mining operational phase that will have impacts on the surface water in the area in terms of their threshold limits, scale and duration.

9.5.2.1 Blasting

The impact from blasting relates the release of nitrates from the explosives used, if there is no storm water management measures in place, storm water runoff from the mine may contaminate the water with nitrates.

9.5.2.2 Stockpiling of Soils and Overburden

The likely impacts from stockpiles relates to soil erosion that could cause siltation of water resources and potential AMD formation from prolonged exposure of overburden to water and air. The impact associated with stockpiling of soils and overburden is therefore rated as a site specific, medium to high significance with a medium to long term duration.

9.5.2.3 Transportation of Coal

Related impacts include the siltation of the water bodies from the dust created by the trucks and these impacts, although site specific could have medium significance with a duration rating from medium to long term.

Transportation of coal from the mine by the trucks using the haul roads might have impacts on the surrounding streams, spillages of oil and diesel from the trucks may cause water

pollution if storm water runoff reports to the streams, haul roads need to be well compacted to avoid siltation from the eroded soils. This is rated as site specific, with a medium significance that has a medium to long term duration.

9.5.2.4 Hazardous Waste Storage and Removal

If hazardous waste is not stored in an isolated hard bunded park area, there might be negative impacts on water bodies should any runoff from these areas reach the receiving environment. Leakages and spillages of the hazardous waste might be carried along with the storm water runoff and ends up in the nearby streams. This impact might be severe, localized and of a medium to long term duration.

9.5.3 Decommissioning Phase

9.5.3.1 Surface Water Quantity

Positive impact is expected if the rehabilitation plan is properly implemented, water that has not been able to report to the nearby streams will now be able to find their way to the rivers or dams. Surface water flow and drainage pattern will be restored.

9.5.3.2 Surface Water Quality

The most significant impact will be mobilization of contaminants (include hazardous and hydrocarbon containing material) from the surface environment and these could find way to the surface water resources.

Another possible impact may result if the water trapped in the pit and voids to rise and decant onto the surface water bodies, this could result in contamination the surrounding water bodies.

9.6 Groundwater (Geohydrological) Impact Assessment

9.6.1 Construction phase

9.6.1.1.1 Groundwater quality

The operation of the fuel and lubricants storage facility has the potential for causing contamination of surface water due to infrastructure failure (emergency), leakage or spillages during normal operation. Included in normal operation is the potential for the incorrect disposal of spill absorbing material.

The operation of offices, ablutions and maintenance workshops has the potential for the contamination of groundwater due to incorrect disposal of domestic and hazardous wastes, incorrect handling of workshop effluent, spills and leaks.

The use of nitrate-based explosives during blasting for the establishment of the open pit areas has the potential to cause surface water pollution due to the addition of nitrates to water.

9.6.1.1.2 Groundwater quantity

The establishment of hard paved areas during infrastructure construction and haul road construction reduces the recharge of aquifers due to increased runoff.

The establishment of the open pit areas is expected to have a negative effect on the surrounding aquifers within the immediate area which can cause lowering of water levels on neighbouring boreholes.

9.6.2 Operational phase

The local aquifer systems are classified as minor aquifer systems and the regional utilisation thereof coincides with the principle land uses of grazing and to provide domestic water supply. The changes induced by mining may lead to a dewatering cone in the immediate vicinity of the mine, an increase in recharge, storage capacity (open pit workings) and deterioration in water quality.

9.6.2.1.1 Groundwater quality

The spillage of ammonium nitrate based explosives during charging of holes, misfires and incomplete combustion of explosives may lead to an increase in nitrate levels in groundwater.

The operation of the fuel and lubricants storage facility has the potential for causing contamination of groundwater due to either an infrastructure failure (emergency) or spillages during normal operation. Included in normal operation is the potential for the incorrect disposal of spill absorbing material.

AMD formation from spoil piles, exposed shale and backfilled spoils and discard in rehabilitated areas will affect groundwater quality through the acidification of groundwater and the leaching of salts and heavy metals from rock. Depending on the buffering capacity of the host rock, AMD will either result in the formation of low pH, high dissolved salt and heavy metal content water (insufficient buffering capacity) or the formation of neutral pH, high salt (including sodium) water, if high buffering capacity exists.

Polluted groundwater generated in the open pit areas are not connected to any underground mining areas and will not form part of the inter mine flow.

9.6.2.1.2 Groundwater quantity

The establishment of hard paved areas during infrastructure construction and haul road construction reduces the recharge of aquifers due to increased runoff.

The removal of vegetation during topsoil and overburden pre-stripping for haul road construction reduces the recharge of rain water to aquifers due to increased run-off.

Mining of the open pit areas has the effect of dewatering adjacent aquifers or lowering the water table.

9.6.3 Decommissioning phase

The quality of groundwater will be impacted upon by mining. The mining area might produce a seepage zone or decant as the recharge to open pit workings have increased by the disturbance of the strata. There are no large scale groundwater users in the area but poor quality groundwater emerging as seeps into the surface water environment can be seen as a negative, long term impact.

9.6.3.1.1 Groundwater quality

The long term water quality impact for coal mining is the generation of AMD water. Open pits must be rehabilitated in such a way that recharge to the backfilled pit areas are limited to an absolute minimum. This would include shaping to allow surface water to drain away from the open pit areas, compaction of materials, suitable soil cover and vegetation of the rehabilitated areas to intercept recharge.

9.6.3.1.2 Groundwater quantity

In the open pit areas water levels will rise until the decant level is reached. Water quality in the open pits is not expected to be suitable for use and these areas will be sterilised in terms of available groundwater quantity.

9.7 Air Quality Impact Assessment

9.7.1 Construction phase

Infrastructure and Open pit 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 open pit 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.

9.7.2 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.

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

9.7.3 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.

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

9.7.4 Post closure

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

9.8 Noise Impact Assessment

9.8.1 Construction phase

Infrastructure and Open pit 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 open pit 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.

9.8.2 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.

Open pit mining: The impact of the open pit mining on local noise levels will be negative, but localised to areas of activity, such as the open 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.

9.8.3 Decommissioning phase

Infrastructure and Open pit 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.

9.8.4 Post closure

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

9.9 Traffic Assessment

9.9.1 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, however, an intersection is planned and will reduce this.

9.9.2 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.

9.9.3 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.

9.9.4 Post closure

There are no foreseen impacts during this phase.

9.10 Blasting and Vibration Assessment

9.10.1 Construction phase

Minimal blasting will occur during the construction phase. Blasting will occur with the initiation and preparation of the first cut 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.

9.10.2 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 dependent on the

charge masses. Smaller charge masses will result in reduced air blasting and ground vibrations. In the event that air blasting is not controlled it may become problematic.

9.10.3 Decommissioning and post closure phase

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

10 Heritage Impacts

10.1 Methodology

10.1.1 Evaluation of Significance

The significance rating process is designed to provide a numerical rating of the cultural significance[1] of identified heritage resources. The evaluation was done as objectively as possible through a matrix developed by Digby Wells for this purpose. In addition, the methodology aims to allow ratings to be reproduced independently should it be required, provided that the same information sources are used.

A resource's importance rating is based on information obtained through review of available credible sources and representivity or uniqueness (i.e. known examples of similar resources to exist). The final significance attributed to a resource furthermore takes into account the physical integrity of the fabric of the resource. The formula used to determine significance can therefore be summarised as:

Value = Importance x Integrity

where

Importance = average sum of Aesthetic + Historic + Scientific + Social Significance

The rationale behind the heritage value matrix takes into account the fact that a heritage resource's value is a direct indication of its sensitivity to change (impacts). Value therefore needs to be determined prior to the completion of any assessment of impacts.

This matrix rates the potential, or importance, of an identified resource relative to its contribution to certain values – aesthetic, historical, scientific and social. These values are based on, and summarised from, the criteria for inclusion into the national estate as outlined in subsection 3(3) of the NHRA, listed in Table 10-1.

Table 10-1: NHRA criteria for inclusion of heritage resources into the national estate

[1] Cultural significance is defined in the NHRA as the intrinsic "aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance" of a heritage resource. These attributes are combined and reduced to four themes used in the Digby Wells significance matrix: aesthetic, historical, scientific and social.

NHRA reference	Description of defining criteria
3(1)(a)	its importance in the community, or pattern of South Africa's history;
3(1)(b)	its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
3(1)(c)	its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
3(1)(d)	its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
3(1)(e)	its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
3(1)(f)	its importance in demonstrating a high degree of creative or technical achievement at a particular period;
3(1)(g)	its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
3(1)(h)	its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
3(1)(i)	sites of significance relating to the history of slavery in South Africa.

The significance of a resource is directly related to the impact on it that could result from project-related activities, as it provides minimum accepted levels of change to the resource. SAHRA has published minimum standards that include minimum required mitigation of heritage resources. These minimum requirements are integrated into the matrix to guide both assessments of impacts and recommendations for mitigation and management of resources.

The weight assigned to the various parameters for significance in the formula, significance ratings and recommended mitigation are presented in Table 10-2 to Table 10-5.

Table 10-2: Rating options: Importance

Rating	Description / guideline
0	The resource exhibits attributes that may be considered in a particular dimension, but it is so poorly represented that it cannot or does not contribute to the resource's overall value.
1	Common, well represented throughout diverse cultural landscapes
2	Generally well represented but exhibits superior qualities in comparison to other similar examples
3	The resource exhibits attributes that are rare and uncommon within a region. It is important to specific communities.
4	Rare and uncommon, value of national importance
5	The resource exhibits attributes that are considered singular, unique and/or irreplaceable to the degree that its significance can be universally accepted.
-	Not assessed - dimension and/or attribute not considered in determining value.

Table 10-3: Rating options: Integrity

Rating	Description / guideline
0	No information potential, complete loss of meaning, Fabric completely degraded, original setting lost
1	Fabric poorly preserved, limited information, little meaning ascribed, extensive encroachment on setting
2	Fabric is preserved, some information potential (quality questionable) and meaning evident, some encroachment on setting
3	Fabric well preserved, good quality information and meaning evident, limited encroachment
4	Excellent preservation of fabric, high information potential of high quality, meaning is well established, no encroachment on setting

Table 10-4: Significance ratings

Score	Description	Rating
0-5	Resource of negligible heritage value	Negligible
6-10	Resource of low heritage value; change to resource not significant	Low
11-12	Resource of medium heritage value: project mitigation must aim to reduce negative change	Medium
13-14	Resource of medium high heritage value: heritage mitigation to reduce negative change	Medium High

Score	Description	Rating
15-17	Resource of high heritage value: resource must be partly conserved and heritage mitigation implemented to reduce negative change	High
17-20	Resource of very high heritage value: resource must be preserved/conserved and included in a management plan	Very High

Table 10-5: Recommended minimum level of required mitigation

Designation	Recommended mitigation
Negligible	Sufficiently recorded, no mitigation required
Low	Resource must be recorded before destruction, including detailed site mapping, surface sampling may be required
Medium	Mitigation of resource to include detailed recording and mapping, and limited sampling, e.g. STPs.
Medium High	Project design should aim to reduce or remove changes; Mitigation of resource to include extensive sampling and recording, e.g. test excavation, analyses, etc.
High	Project design must aim to avoid change to resource; Partly conserved, Conservation Management Plan (CMP)
Very High	Project design must change to avoid all change to resource; Conserved in entirety, CMP

10.1.2 Impact Assessment

The impact rating process is designed to provide a numerical rating of the identified heritage impacts. The significance rating follows an established impact/risk assessment formula, as shown below:

Significance = consequence of an event x probability of the event occurring

Where:

Consequence = Type of impact x (Intensity + Spatial Scale + Duration)

And:

Probability = Likelihood of an impact occurring

In the formula for calculating consequence:

***Type of impact* = +1** (for positive impacts) ***or* -1** (for negative impacts)

The weight assigned to the various parameters for positive and negative impacts in the formula is presented in Table 10-2 to Table 10-10 below.

Project-related impacts on heritage resources have taken into account the inherent value of heritage resources, described above, and only applied to resources with values above negligible. As a result, the impact assessment did not consider individual resources, but was applied to diverse resources grouped in terms of similar values.

The magnitude will then be applied to pre- and post-mitigation scenarios with the intention of removing all impacts on heritage resources. Where project related mitigation does not avoid or sufficiently reduce negative changes/impacts on heritage resources with high values, mitigation of these resources may be required. This may include alteration, restoration or demolition of structures under a permit issued by MPHRA and/or SAHRA.

Table 10-6: Rating options: Intensity

Rating	Type of impact
+/- 7	Major change to Heritage Resource with High-Very High Value
+/- 6	Moderate change to Heritage Resource with High-Very High Value
+/- 5	Minor change to Heritage Resource with High-Very High Value
+/- 4	Major change to Heritage Resource with Medium-Medium High Value
+/- 3	Moderate change to Heritage Resource with Medium - Medium High Value
+/- 2	Minor change to Heritage Resource with Medium - Medium High Value
+/- 1	No change to Heritage Resource with values medium or higher, or Any change to Heritage Resource with Low Value

Table 10-7: Rating options: Spatial scale

Value	Exposure	Description
7	International	The effect will occur across international borders
6	National	Will affect the entire country
5	Region	Heritage resources within region
4	Municipal area	Heritage resources outside project area changed
3	Local	Most or all heritage resources change
2	Limited	One or more heritage resource will be changed
1	Very Limited	Isolated aspects of individual heritage resource

Table 10-8: Rating options: Duration

Value	Probability	Description
7	Permanent	Impact will permanently alter or change the heritage resource and/or value (Complete loss of information)
6	Beyond Project Life	Impact will reduce over time after project life (Mainly renewable resources and indirect impacts)
5	Project Life	The impact will cease after project life.
4	Long Term	Impact will remain for >50% - Project Life
3	Medium Term	Impact will remain for >10% - 50% of Project Life
2	Short Term	Impact will remain for <10% of Project Life
1	Transient	Impact may be sporadic/limited duration and can occur at any time. E.g. Only during specific times of operation, and not affecting heritage value.

Table 10-9: Rating options: Probability

Value	Probability	Description
7	Certain/Definite	Happens frequently.
		The impact will occur regardless of the implementation of any preventative or corrective actions.
6	High probability	Happens often.
		It is most likely that the impact will occur.
5	Likely	Could easily happen.
		The impact may occur.
4	Probable	Could happen.
		Has occurred here or elsewhere.
3	Unlikely / Low probability	Has not happened yet but could happen once in the lifetime of the project.
		There is a possibility that the impact will occur.
2	Rare / Improbable	Conceivable, but only in extreme circumstances.
		Have not happened during lifetime of the project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures
1	Highly Unlikely /None	Expected never to happen.
		Impact will not occur.

Impacts are rated prior to mitigation and again after consideration of the proposed mitigation measures. The impact is then determined and categorised into one of eight categories, as indicated in Table 10-10 below. The relationship between the consequence, probability and significance ratings is graphically depicted in Figure 10-1 below.

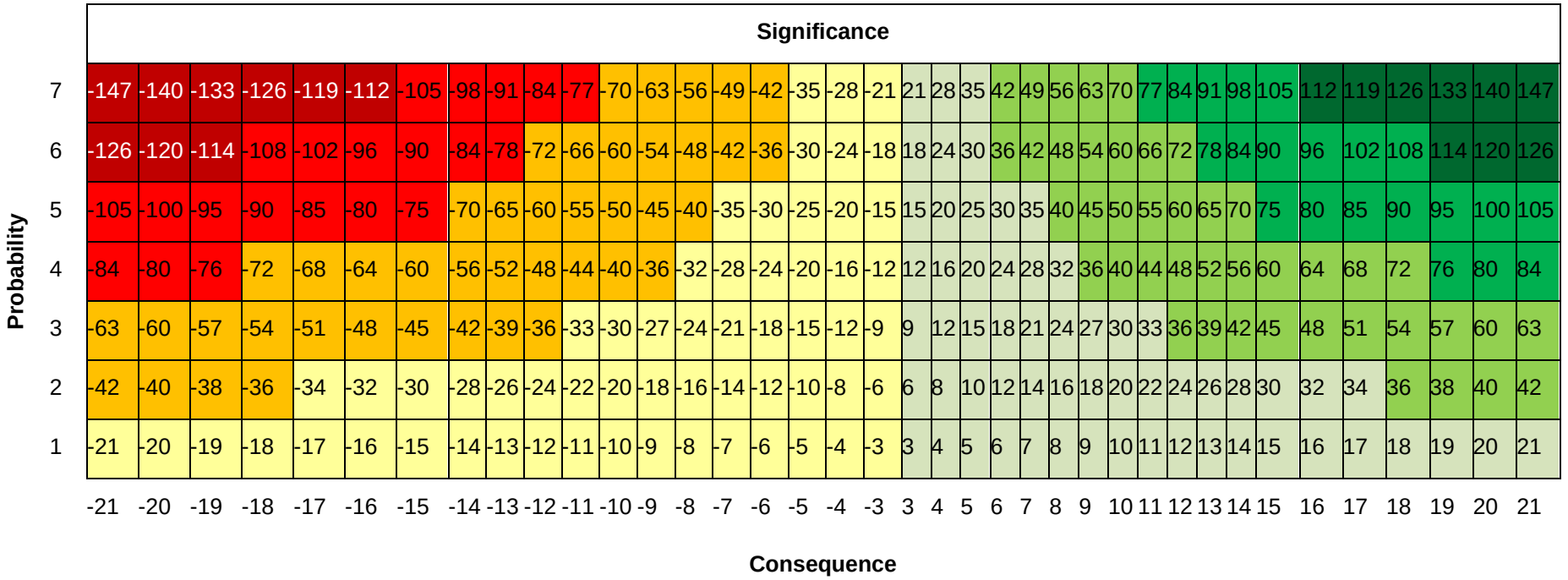

Figure 10-1: Relationship between consequence, probability and significance ratings

Table 10-10: Impact significance ratings

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

10.2 Statement of Significance

The values assigned to the identified heritage resources located within and near the project area are presented in Table 6-1. The assigned value takes into consideration criteria associated with artistic, historic, scientific and social value, as well as the integrity of the resource to determine the value.

Resource ID	Resource Type	Description	Aesthetics	Historic	Scientific	Social	Integrity	Value	Designation	Recommended Mitigation
S.34-001	Historical mine shaft	Historical coal mine shaft with two horizontal tunnels	-	3	3	-	3	9	Low	Resource must be recorded before destruction, including detailed site mapping, surface sampling may be required
S.34-002	Historical werf	Historical werf consisting of a main house in the Cape Dutch style and associated farm outbuildings	3	-	-	-	4	12	Medium	Mitigation of resource to include detailed recording and mapping, and limited sampling, e.g. STPs.
S.34-003	Historical werf	Historical werf with associated farm outbuildings	-	3	-	-	4	12	Medium	Mitigation of resource to include detailed recording and mapping, and limited sampling, e.g. STPs.
S.35-004	Stone-walled structure	Stone walled rectangular enclosure	-	1	-	-	1	1	Negligible	Sufficiently recorded, no mitigation required
S.35-005	Stone-walled structure	4x3 m rectangular stone walled structure	-	1	-	-	1	1	Negligible	Sufficiently recorded, no mitigation required
S.36-006	Burial ground	Burial ground consisting of 10 graves	-	-	-	5	4	20	Very High	Project design must change to avoid all change to resource; Conserved in entirety, CMP
S.36-007	Possible grave	Single possible grave	-	-	-	5	4	20	Very High	Project design must change to avoid all change to resource; Conserved in entirety, CMP

10.3 Impact Assessment

10.3.1 Impact Assessment: Low Value Heritage Value

Identified heritage resources designated with an overall low heritage value include the historical coal mine shaft S.34-001. Two potential impacts from the proposed project were identified and assessed (i.e. Induced and Cumulative impacts). Induced impacts will be caused by blasting during the operational phase and cumulative impacts will be caused by on-going blasting during the operational phase. The envisaged impacts to these resources is presented and summarised in the following tables (See Table 10-12 and Table 10-12).

Table 10-11: Induced impacts on low significance heritage resources

IMPACT DESCRIPTION: Induced Impacts on Heritage Resources with Low Significance				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
Dimension	**Rating**	**Motivation**		
PRE-MITIGATION				
Duration	Project Life (5)	Equal to the duration of the project life	Consequence: Slightly detrimental (-8)	Significance: Minor - negative (-48)
Extent	Limited (2)	The impact from single blasts will only affect a small portion of the mine shaft		
Intensity x type of impact	Very low - negative (-1)	Slight change to a resource with a low heritage value. Indirect impact from blasting on the mineshaft can be expected.		
Probability	Highly probable (6)	Without appropriate mitigation, the mine shaft will be impacted on due to blasting		
MITIGATION: - The mine shaft will require detailed recording, inclusive of extensive site mapping and surface collection of any surface artefacts. It is also recommended that the mine shaft be stabilized so as to not collapse				
POST-MITIGATION				
Duration	Immediate (1)	The mine shaft will only be impacted when blasting occurs	Consequence: Negligible (-3)	Significance: Negligible - negative (-6)
Extent	Very limited (1)	The impact from single blasts will only affect a very limited		

IMPACT DESCRIPTION: Induced Impacts on Heritage Resources with Low Significance				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
Dimension	**Rating**	**Motivation**		
		section of the mine shaft		
Intensity x type of impact	Very low - negative (-1)	As for pre-mitigation		
Probability	Improbable (2)	Mitigation is likely to reduce impacts on the heritage resources, as well as gain information on the mine shaft, however the heritage resource may continue to be impacted on.		

Table 10-12: Cumulative impacts on low significance heritage resources

IMPACT DESCRIPTION: Cumulative Impact on Heritage Resources with Low Significance				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
Dimension	Rating	Motivation		
PRE-MITIGATION				
Duration	Project Life (5)	Equal to the duration of the project life	Consequence: Slightly detrimental (-9)	Significance: Minor - negative (-54)
Extent	Local (3)	The entire heritage resource may be impacted on		
Intensity x type of impact	Very low - negative (-1)	The entire mine shaft may collapse due to cumulative impacts due to continuous blasting		
Probability	Highly probable (6)	Flooding within the mineshaft may have caused it to become unstable and continuous blasting may cause the shaft to collapse		
MITIGATION: - The mine shaft should be monitored before and after blasting and ongoing conservation management should be implemented.				

IMPACT DESCRIPTION: Cumulative Impact on Heritage Resources with Low Significance				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
Dimension	Rating	Motivation		
POST-MITIGATION				
Duration	Project Life (5)	Equal to the duration of the project life	Consequence: Slightly beneficial (9)	Significance: Minor - positive (45)
Extent	Limited (2)	If the mine shaft is stabilized, only small portions of the shaft will be impacted on		
Intensity x type of impact	Low - positive (2)	Recording and stabilizing the shaft will gather information about the shaft which will add value to the resource and other similar resources in the area		
Probability	Likely (5)	Mitigation is likely to reduce the impact on the mine shaft		

10.3.2 Impact Assessment: Medium Significance

Identified heritage resources designated with a medium heritage value include sites S.34-002 and S.34-003. These sites include two historical werfs located outside of the project area; however the resources will be indirectly impacted on (i.e. Induced and Cumulative Impacts). The induced impacts will be caused by blasting during the operational phase. The cumulative impacts include a visual impact during the construction of operation phase and on-going blasting during the operational phase. The envisaged impacts to these resources is presented and summarised in the Table 10-13 and Table 10-14 below.

Table 10-13: Induced Impacts on Heritage Resources with Medium Significance

IMPACT DESCRIPTION: Induced Impacts on Heritage Resources with Medium Significance				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
Dimension	Rating	Motivation		
PRE-MITIGATION				
Duration	Project Life (5)	Equal to the duration of the project life	Consequence: Slightly detrimental (-9)	Significance: Minor - negative (-54)
Extent	Limited (2)	Limited impacts will occur on		

IMPACT DESCRIPTION: Induced Impacts on Heritage Resources with Medium Significance				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
Dimension	Rating	Motivation		
		the historical werfs		
Intensity x type of impact	Low - negative (-2)	A low impact on a medium value heritage resource will occur		
Probability	Highly probable (6)	Without appropriate mitigation, impacts are highly probable as the werfs are within the zone of impact as shown by the blasting radius and view shed		
MITIGATION: - Historical werfs should be monitored before and after blasting and ongoing conservation management should be implemented.				
POST-MITIGATION				
Duration	Project Life (5)	As for pre-mitigation	Consequence: Slightly detrimental (-9)	Significance: Negligible - negative (-27)
Extent	Limited (2)	As for pre-mitigation		
Intensity x type of impact	Low - negative (-2)	As for pre-mitigation		
Probability	Unlikely (3)	It is unlikely for impacts to occur if mitigation measures are implemented		

Table 10-14: Cumulative Impact on Heritage Resources with Medium Significance

IMPACT DESCRIPTION: Cumulative Impact on Heritage Resources with Medium Significance				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
Dimension	Rating	Motivation		
PRE-MITIGATION				
Duration	Project Life (5)	Equal to the duration of the project life	Consequence: Moderately detrimental (-10)	Significance: Minor - negative (-60)
Extent	Limited (2)	Limited impacts will occur on		

IMPACT DESCRIPTION: Cumulative Impact on Heritage Resources with Medium Significance				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
Dimension	Rating	Motivation		
		the historical werfs		
Intensity x type of impact	Moderate - negative (-3)	A moderate impact on a medium value heritage resource will occur		
Probability	Highly probable (6)	Without appropriate mitigation, impacts are highly probable as the werfs are within the zone of impact as shown by the blasting radius. Long term effects from blasting may cause damage to the heritage resources		
MITIGATION: - Historical werfs should be monitored before and after blasting and ongoing conservation management should be implemented.				
POST-MITIGATION				
Duration	Project Life (5)	As for pre-mitigation	Consequence: Slightly detrimental (-9)	Significance: Negligible - negative (-27)
Extent	Limited (2)	As for pre-mitigation		
Intensity x type of impact	Low - negative (-2)	Mitigation will reduce the level of impact on the historical werfs		
Probability	Unlikely (3)	It is unlikely for impacts to occur if mitigation measures are implemented		

10.3.3 Impact Assessment: Very High Significance

Identified heritage resources designated with very high heritage value include sites S.36-006 and S.36-007. These sites include one burial ground consisting of 10 graves, and the other site is a possible grave. Three potential impacts from the proposed project were identified and assessed (i.e. Direct, Induced and Cumulative impacts). The envisaged impacts to these resources is presented and summarised in Table 10-15, Table 10-16 and Table 10-17.

Table 10-15: Direct Impacts on Heritage Resources with Very High Significance

IMPACT DESCRIPTION: Direct Impacts on Heritage Resources with Very High Significance				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
Dimension	Rating	Motivation		
PRE-MITIGATION				
Duration	Permanent (7)	If the graves are destroyed, the duration of the impact is permanent	Consequence: Highly detrimental (-17)	Significance: Moderate - negative (-102)
Extent	Local (3)	The local community will be affected with the loss of their heritage		
Intensity x type of impact	Extremely high - negative (-7)	The impact is extremely high as graves are very important to the local community		
Probability	Highly probable (6)	The graves are located within 20m of the pit areas and the probability of damage/destruction to the graves is high		
MITIGATION: - Pit 1 should be moved 100m from any burial grounds or graves - NHRA Regulation Chapter XI consultation should be conducted to formulate a management plan for the burial ground and potential graves, which will include details on controlled access to the graves. - If the pit cannot be moved, a Grave Relocation Process should be implemented				
POST-MITIGATION				
Duration	Project Life (5)	Where resources remain in situ, impacts will be limited to the project life. If burial grounds and graves are relocated, the duration of the impact will be reduced	Consequence: Moderately detrimental (-13)	Significance: Minor - negative (-39)
Extent	Local (3)	As for pre-mitigation		
Intensity x type of impact	High - negative (-5)	The intensity is rated a minor change to a resource with very high significance		
Probability	Unlikely (3)	It is unlikely for impacts to occur if mitigation measures are implemented		

Table 10-16: Induced Impacts on Heritage Resources with Very High Significance

IMPACT DESCRIPTION: Induced Impacts on Heritage Resources with Very High Significance				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
Dimension	Rating	Motivation		
PRE-MITIGATION				
Duration	Project Life (5)	Access to the graves will be impacted for the duration of the project	Consequence: Highly detrimental (-14)	Significance: Moderate - negative (-98)
Extent	Local (3)	The local community will be affected with the loss of access to their heritage		
Intensity x type of impact	Very high - negative (-6)	The impact is very high as graves are very important to the local community		
Probability	Highly probable (6)	The graves are located within 20m of the pit areas and the probability of loss of access to the graves is high		
MITIGATION: - NHRA Regulation Chapter XI consultation should be conducted to formulate a management plan for the burial ground and potential graves, which will include details on controlled access to the graves.				
POST-MITIGATION				
Duration	Project Life (5)	Where resources remain in situ, impacts will be limited to the project life. If burial grounds and graves are relocated, the duration of the impact will be reduced	Consequence: Moderately detrimental (-12)	Significance: Minor - negative (-36)
Extent	Limited (2)	While access will be controlled, the impacts will be limited		
Intensity x type of impact	High - negative (-5)	The intensity is rated a minor change to a resource with very high significance		
Probability	Unlikely (3)	It is unlikely for impacts to occur if mitigation measures are implemented		

Table 10-17: Cumulative Impacts on Heritage Resources with Very High Significance

IMPACT DESCRIPTION: Cumulative Impacts on Heritage Resources with Very High Significance				
Predicted for project phase:	Pre-construction	Construction	Operation	Decommissioning
Dimension	Rating	Motivation		
PRE-MITIGATION				
Duration	Project Life (5)	Cumulative impacts from blasting may cause damage to the grave in the long-term	Consequence: Highly detrimental (-14)	Significance: Moderate - negative (-98)
Extent	Local (3)	The local community will be affected with the loss of access to their heritage		
Intensity x type of impact	Very high - negative (-6)	The impact is very high as graves are very important to the local community		
Probability	Highly probable (6)	The graves are located within 20m of the pit areas and the probability of a cumulative impact due to blasting to the graves is high		
MITIGATION: - A CMP for the graves should be implemented including NHRA Regulations Chapter XI consultation with bona fide Next-of-Kin				
POST-MITIGATION				
Duration	Project Life (5)	Where resources remain in situ, impacts will be limited to the project life. If burial grounds and graves are relocated, the duration of the impact will be reduced	Consequence: Moderately detrimental (-11)	Significance: Minor - negative (-33)
Extent	Very Limited (1)	If mitigations measures are implemented, only very limited aspects of the burial grounds and graves will be impacted		
Intensity x type of impact	High - negative (-5)	The intensity is rated a minor change to a resource with very high significance		
Probability	Unlikely (3)	It is unlikely for impacts to occur if mitigation measures are implemented		

11 Social Impacts

Social impacts can be defined as the consequences of any action that changes the way a community lives, works, relates to one another, organises themselves and functions as individuals and members of society. Socio-economic impacts raised during the MPRDA process are highlighted in Table 11-1 below.

Table 11-1: Socio-economic impacts raised by I&APs during the MPRDA process

Aspect	Phase	Effect/Impact	Significance & Severity (before mitigation)	Mitigatory Measures
Regional & local Socio-Economic Environment	Pre-construction Phase, Construction Phase & Operational Phase	The mine's SLP will be integrated into the Emakhazeni IDP through serving on the local LED Management Committee and assist in implementing LED projects and/or programmes identified in the IDPs, in partnership with local government, business and affected communities.	Positive (medium)	No mitigation required (Enhancement/ optimisation of positive impact i.e. Effective implemetation of LED)
Regional & local Socio-Economic Environment	Construction Phase & Operational Phase	The proposed operation on Weltevreden 381 JT will likely influence development opportunities within the Emakhazeni Local Municipality contributing towards the local economy through the continuation of a number of employment and income generating opportunities for local suppliers and other beneficiaries in the area and a demand for services from nearby towns.	Positive (medium)	No mitigation required (Enhancement/ optimisation of positive impact i.e. Effective implemetation of SLP and LED)
Community and Employees	Construction Phase & Operational Phase	A Sustainable Development (SD) Plan has been prepared by Northern Coal to provide a framework for initiatives that promote the sustainability of employee households, as well as that of the host community, described in more detail in the SLP Report.	Positive (medium)	No mitigation required (Enhancement/ optimisation of positive impact i.e. Effective implemetation of SLP and SD)
Community	Construction Phase & Operational Phase	Northern Coal, in consultation with the Municipality has identified the upgrade of the Umneli Primary School as its LED Project. The mine will be responsible for the upgrade of the current facilities, as well as the purchase of facilities and equipment (i.e. sports and laboratory equipment). The mine will purchase required learning materials.	Positive (medium)	No mitigation required (Enhancement/ optimisation of positive impact i.e. Effective implemetation of LED)
Employees	Construction Phase & Operational Phase	The Weltevreden SLP will seek to improve the conditions of health, nutrition and accommodation of it employees, as required by the Mining Charter and the MPRDA.	Positive (medium)	No mitigation required (Enhancement/ optimisation of positive impact i.e. Effective implemetation of SLP)
Employees & Community	Construction Phase & Operational Phase	Appropriate levels of Historically Disadvantages South Africans (HDSA) and local procurement will be met from the outset of the operation.	Positive (medium)	No mitigation required (Enhancement/ optimisation of positive impact i.e. Effective implemetation of SLP tagets)
Community	Construction Phase & Operational Phase	There may be a lack of skills and capacity amongst targeted individuals and communities who have been earmarked to benefit from Weltevreden's LED projects. Target communities may be at risk of being bypassed by livelihood and development opportunities that are created, due to vested interests by certain parties involved in the SLP processes.	Negative (medium)	Fair training and employment opportunities must be offered to all affected parties in terms of the relevant SLP and LED processess, followed by effective monitoring and management

Aspect	Phase	Effect/Impact	Significance & Severity (before mitigation)	Mitigatory Measures
Community	Construction Phase & Operational Phase	Open pit 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.	Negative (medium)	If agricultural land will be directly affected, a full social impact assessment may be required. Dust suppression and noise mitigation measures need to be implemented in terms of the plans described in the EIA/EMP
Economic Viability	Construction Phase, Operational Phase Decommissioning & Closure	The projected annual capital that would be available for Broad Based Black Economic Empowerment via Northern Coal's Trust is 1.5 million per year, for the life of the Weltevreden Mine. The proposed operation will continue for a period of eight years, after which the further viability of the mine will be re-assessed.	Positive (medium)	No mitigation required (Enhancement/ optimisation of positive impact with regards to BEE empowerment targets)
Employees	Decommissioning & Closure	Retrenchment will be necessary during the decommissioning and closure phases.	Negative (medium-high)	Retrenchement processess must be implemented in compliance with relevant legislative requirements and applicable SLP and LED targets, followed by effective monitoring and management

12 Cumulative Impacts

Cumulative effects are caused by the accumulation and interaction of multiple stresses affecting the parts and the functions of ecosystems. Of particular concern is the knowledge that ecological systems sometimes change abruptly and unexpectedly in response to apparently small incremental stresses. For purposes of this report, cumulative impacts have been defined as “the changes to the environment caused by an activity in combination with other past, present, and reasonably foreseeable human activities”.

12.1 Cumulative impacts on Topography and Visual aspects

Currently there are no mining activities in the immediate vicinity of the proposed Weltevreden project, however, there are a number of companies applying for prospecting and in the area. Should these companies be granted authorisation to mine, it is likely that the landscape will be altered from an agricultural and grassland landscape to a mining and industrial landscape. Should these mines be developed, the likely consequence is a compounding negative effect on the visual aesthetics and topographic functioning of the area.

12.2 Cumulative Impacts on Biodiversity (flora and fauna)

The Grassland biome has the highest biodiversity in South Africa after the Fynbos biome (Driver *et al*, 2004). Mpumalanga falls under the Grassland Biome. This study area is currently dominated by maize fields and alien plants infestation; however, undisturbed,

relatively pristine grassland and wetland habitat does exist to the south and east. Agricultural and mining activities in the region have led to habitat fragmentation (Driver et al 2004) and therefore any further loss of natural habitat is viewed as detrimental to biodiversity functioning in this particular region. The greatest threat to fauna species within this area is the loss of natural habitat, as a direct result of agricultural or mining activities. In an area such as Mpumalanga further habitat loss is critical as bird species are under increasing pressure from mining activities.

12.3 Cumulative Impacts on Soil

Open pit coal mining involves the removal and stockpiling of topsoil which leads to mixing of soil types and horizons, soil compaction, as well as changes to soil structure and fertility, ultimately resulting in the increased erodibility and loss of topsoil to wind and water erosion. Similarly, unsustainable agricultural practices can lead to a reduction in soil fertility and the compaction of soil layers. The risk of soil contamination by both activities is correspondingly high, as vehicles and equipment used in agriculture or mining spills hydrocarbons and lubricants.

The cumulative impact on soils in the study area can increase even more should new industrial, commercial and mining operations commence in the area. The impacts will be far ranging, resulting in soil erosion, siltation of local streams, loss of arable areas and the lack of sufficient topsoil for effective rehabilitation of open pit areas.

12.4 Cumulative Impacts on Wetlands

Due to the inappropriate management of water resources in the Komati River catchment, the PES has been moderately modified. A major anticipated impact on the greater wetland catchment is water contamination from mining activities. It is imperative that water contamination is avoided at all costs, in valley bottom systems specifically; as these link up to the greater stream network and may cause further degradation to the catchment. Misuse of water resources due to mining has been observed in the Olifants catchment, where water quality has undergone severe degradation.

The cumulative impact of the proposed open pit mine is regarded as moderate, as the study area is not regarded as particularly significant from an ecological perspective. Owing to a history or poor land management, the natural habitat on site has been transformed.

12.5 Cumulative Impacts on Surface Water

The area is considered to be water scarce and farmers rely heavily on seasonal rains. With coal mining being a growing industry in the area, all coal mines and associated infrastructure will require water which may pose a threat to the quantity and the quality of the natural water resources in the area. It is thus essential that effective mitigation measures are in place at all mines to reduce the impact on surface water quality and quantity in the region. Therefore, more effort needs to be undertaken to minimise any negative impacts on the main river flowing through the area.

12.6 Cumulative Impacts on Groundwater

The cumulative impacts due to the proposed mining could be of a quantitative and qualitative nature. The aquifers within the region are classified as minor aquifer systems and their main function is a domestic water supply source as well as supplying base flow to the surface water environment. This will result in a positive impact locally and could see the importance of groundwater increasing as a potential source within the catchment. However, the water quality within the workings could be good or deteriorate depending on the geochemical characteristics of the material. This could in turn result in surface water users being put under pressure should the decant water quality lead to the deterioration of surface water resources in the catchment. The cumulative impact on the catchment will have to be taken into account for mining, agriculture and the remainder of the current surface and groundwater uses in the Komati River Catchment.

12.7 Cumulative Impacts on Ambient Air Quality

All the activities included in the proposed mining project together with the activities occurring in the surrounding area will contribute to the possible cumulative impact on air quality in the area.

Table 12-1: Estimated cumulative dust deposition

Cumulative Dust deposition mg/m2/day							
Mitigation at receptor level		**0% Mitigation**		**50% Mitigation**		**90% Mitigation**	
Receptor	**Avg**	**PC**	**Cumulative**	**PC**	**Cumulative**	**PC**	**Cumulative**
NOC 1	189.54	13.37	202.91	11.09	200.63	10.2	199.74
NOC2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NOC3	255.55	578.96	835.51	264.57	520.12	87.47	323.02
NOC4	329.79	29.36	359.16	20.33	350.18	14.38	344.17
NOC5	175.99	51.79	227.78	33.2	209.19	18.34	194.33

PC = Process Contribution

From the above table it can be concluded that Sample point NOC3 will experience the greatest cumulative impact as a result of all the proposed activities that will occur during the proposed mining project. This is due to this receptor been located on the proposed mining site. Unfortunately no data was available for the sampling period October 2008 to March 2009 for NOC2 to determine the cumulative impact at this position. Through mitigation cumulative impacts can be reduced.

12.8 Cumulative Impacts on Ambient Noise Levels

Cumulative impacts should be considered for the overall improvement of ambient noise levels. The proposed Weltevreden project is considered a causative source of noise pollution that will contribute to the increase of the ambient noise levels in the area, particularly due to the blasting activities, which can be heard for kilometres.

Presently noise generated in the area is predominantly caused by agricultural activities such as tractors used for ploughing and combine harvesters used for the harvesting of maize. The cumulative impact of the agricultural activities has a significance rating of 20/100 (which is of a low significance), because it only occurs at specific times of the year and occurs during the day. If the proposed mining activities on the farm of Weltevreden portions 15 and 16 take place the overall significance of the cumulative impacts of the project will have a significance rating of 50/100 (which is of a medium-high significance) due to most of the mining activities being continuous of nature and operating during day and night times. Even though the blasting will cause high noise levels at times of event, it will be of an impulsive nature and will not influence ambient noise levels on a continuous basis. In future the increase of mining activities due to more mines starting up in the area will contribute to the cumulative impacts on ambient noise levels. The cumulative impacts caused by the increased mining activities in the area will have a significance rating of 75/100 (which is of a high significance) due to increased blasting activities that only takes place during daylight hours as well as an increase of mining vehicles operating continuously during day and night time.

Ambient noise levels from the proposed Weltevreden project area should be monitored on a regular basis to determine potential sources of noise, increases and decreases in noise levels, and determine the level of mitigation required. Once the material from the proposed Weltevreden project area have been mined, processed and decommissioned, overall ambient levels will decrease and the cumulative impact in the area could improve.

13 Environmental Management Plan

13.1 EMP Table

Table 13-1 provides a description of the appropriate mitigation and management options for the environmental impacts anticipated during each mining phase (i.e. construction phase, operational and decommissioning and closure phases).

Table 13-1: Environmental Management Plan

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
1	Removal of topsoil	Topography	Removal of topsoil and weathered material from construction areas results in a disturbance of the natural functioning of the topography, the result of this disturbance causes impacts on surface and ground water flows as well as visual aesthetics. Where slope percentages are altered there is the potential to increase soil erode ability. These impacts are discussed in their separate sections.	The mitigation of topography will be undertaken during decommissioning and will be incorporated in the closure plan.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-high	Medium-high
		Soils	Loss of the original spatial distribution of soil types and natural soil horizon sequences.	The areas to be stripped will be restricted to the areas of disturbance as show in the conceptual mine plan (Plan 3, Appendix A).	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-high	Medium-high
		Soils	Loss of soil fertility, original soil depth and volume, as well as natural soil functioning.	Different soil types and horizons should be stripped up to the recommended depth and stockpiled separately for use during rehabilitation according to the soil utilisation guide.. Topsoil stockpile heights and slopes need to be indicated to prevent erosion. Topsoil stockpiles must not exceed a height of 3m and a slope of 1:3 (18.5 degrees from the horizontal). Initial topsoil stockpiled must be used in rehabilitation as soon as possible. All topsoil stockpiles must be vegetated as soon as possible to prevent loss of resource. Topsoil must only be used for rehabilitation purposes.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-high	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
		Soils	Compaction of soil due to movement of heavy construction vehicles.	Construction vehicles will be restricted to areas for topsoil stripping. Topsoil stockpiles must be protected from vehicle movement that may result in compaction and loss of soil structure.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-high	Medium-low
		Land capability	Land capability will be reduced in areas stripped of topsoil, due to loss of soil fertility, original soil depth and volume, as well as natural soil functioning and soil compaction.	During construction soils that are stripped must be stockpile according to horizon. Topsoil must be stockpile separately for final rehabilitation purposes. Stockpiles should be vegetated to minimize soil loss. Topsoil stockpile heights and slopes need to be indicated to prevent erosion. Topsoil stockpiles must not exceed a height of 3m and a slope of 1:3. Initial topsoil stockpiled must be used in rehabilitation as soon as possible. All topsoil stockpiles must be vegetated as soon as possible to prevent loss of resource. Topsoil must only be used for rehabilitation purposes.	Engineer and environmental co-ordinator	Construction until closure	Medium-high	Medium-low
		Land use	Change of current land uses to mining. Very severe in areas occupied by agriculture.	The areas of disturbance will be restricted in accordance with the conceptual mine plan (Plan 3, Appendix A).	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-high	Medium-low
		Sensitive landscape (Wetlands)	Sedimentation of the water resources due to erosion of the overburden during periods of high rainfall. Topsoil and overburden stripping and vegetation removal reduces recharge of shallow aquifers that feed	Removal of vegetation during stripping and construction activities will be minimized to reduce the erosion potential and footprint of disturbed area. Topsoil will only be removed off areas proposed for immediate mining. Wetland soils of soil types Ka and Lo1 should be separated and	Environmental co-ordinator	Throughout construction phase	Medium-high	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			hillslope wetlands, reducing flow in water resources. This activity will increase the erosion potential of the area.	stored correctly for rehab efforts. Disturbance to vegetation and sensitive landscapes will be restricted to the conceptual mine plan (Plan 3, Appendix A)				
		Air Quality	The stripping of topsoil, exposing subsoil will impact on the dust fallout levels as well as the PM10 levels	The removal of vegetation will be minimized during stripping to reduce the effects of dust pollution as a result of exposed soil. Dust suppression must take place. Dust monitoring must be undertaken in accordance to the monitoring programme provided in Section 16 of the EIA Report. Topsoil stockpiles for more than two days should be kept moist and topsoil stock piles for more than a year should be planted and water to sustain biological components as well as prevent dust emissions. Cover all trucks hauling soil. The limit value for the 24 hour average for PM10 is 75 ug/m³ and this may not be exceeded 4 times within a year. The limit value for the yearly average for PM10 is 40ug/m³	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-low	Medium-low
		Noise	Construction activities, including the movement of machines will affect noise levels in the area negatively	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Berms will be at an angle of 37 degrees with a height of approximately 1.5m. Noise monitoring must be undertaken in accordance with Section 14.5 of the EIA Report. Switching off equipment when not in use. Construction activities will be limited to daytime hours. Mining-related machine and vehicles must be serviced on a regular basis	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.				
		Visual	The removal of soil from the construction area will result in the alteration of the project site and thus a probable visual disturbance.	The areas of vegetation removal and stripping will be restricted to the areas of disturbance as show in the conceptual mine plan (Plan 3, Appendix A).	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-low	Medium-low
		Natural vegetation	Removal of topsoil will lead to the removal of vegetation that is binding the soil and this activity will increase the erosion potential of the area.	Removal of vegetation during stripping will be minimized to reduce the erosion potential. Topsoil will only be removed off areas proposed for immediate mining as in accordance to the conceptual mine plan (Plan 3, Appendix A).	Environmental co-coordinator	Throughout construction phase	Medium-high	Medium-high
		Natural vegetation	Removal of topsoil and vegetation for site clearing could lead to a loss of Species of Special Concern (SSC)	Plant SSC that may occur within the proposed infrastructure and opencast pit areas should be conserved and relocated. A permit should be obtained from the provincial authorities in order to remove the plant SSC.	Environmental co-coordinator	Throughout construction phase	Medium-high	Low
		Fauna (mammals, birds, amphibians, reptiles, insects)	Topsoil removal results in the destruction of natural habitats for animals	Removal of vegetation during stripping will be minimized to reduce the erosion potential. Topsoil will only be removed off areas proposed for immediate mining as in accordance with the conceptual mine plan (Plan 3, Appendix A). All soils should be stored and managed as mentioned in 1.2 -1.3 for rehabilitation to create natural habitats for animals	Environmental co-coordinator	Throughout construction phase	Medium-high	Medium-high
		Surface water	Potential localised flooding due to increase in surface run-off quantity and changes to surface water flow dynamics during the process of vegetation and topsoil	The period for removing vegetation and topsoil should be targeted for the dry season. Where construction takes place during the wet season, the period should be minimized to reduce the effects of increased run-off as a result of exposed soil. Clean	Environmental co-coordinator	Throughout the construction phase	Medium-high	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			removal.	and dirty catchment separation canals and berms should be installed prior to the commencement of construction. This will prevent the siltation of runoff and subsequent negative impact on the water resources and catchment as a whole.				
		Surface water	Siltation as a result of dust created during topsoil removal, transportation and storage. Erosion of the stockpiles and excavated areas. Contamination of surface water by dirty water from the stockpiles and overburden dug out during the construction phase.	Siltation of surface water resources will be minimized by road wetting. The areas excavated should be have berms that are vegetated to separate dirty and clean water systems while enhancing the maximization of clean and minimization of dirty areas and water systems respectively, and as an erosion control measure. The stockpiles must be vegetated to prevent erosion and subsequent siltation of clean and dirty water streams as well as surface water resources. Upslope diversion and down slope silt containment structures will be constructed. Monitoring of surface water resource pre-mining and during construction must be implemented to be used during operation, decommissioning and post-closure as per the monitoring programme included in Section 14.2 of the EIA Report. All applicable DWAF Best Practice Guidelines must be complied with.	Environmental co-coordinator	Throughout the construction phase	High	Medium-high
	Storage of topsoil	Surface water	Storage of topsoil will change the surface water flow dynamics of the area.	Topsoil and subsoil should be stockpiled within a designated area and not distributed across the site. Such soil can be used for berm construction.	Environmental co-coordinator	Throughout the construction phase	Medium-high	medium -low
		Groundwater	Removal of vegetation and topsoil decreases the recharge of aquifers	The removal of topsoil and vegetation must be restricted to the areas indicated on the conceptual mine plan (Plan 3, Appendix A).	Environmental co-coordinator	Throughout construction phase	Medium-low	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
2	Construction of haul roads		Haul roads to be constructed will be 8m wide with berms constructed on both sides. Berms will be at an angle of 37 degrees with a height of approximately 1.5m. Mitre drains with a width 800mm will be placed at 100m intervals. Silt traps (silt curtains) will be placed within 300m of any rivers or streams. After topsoil is removed, a 600mm think, non-carbaceous clean sandstone base will be layered, followed by a 400mm latent topping. Roads will be treated with a dust suppression chemical (e.g. dust-a-side) and berms vegetated with long grass mix (e.g. tef / eragrostis / smuts vinger).					
		Topography	The construction of a haul road results in a disturbance of the natural functioning of the topography, the result of this disturbance causes impacts on surface and ground water flows as well as visual aesthetics. Where slope percentages are altered there is the potential to increase soil erode ability. These impacts are discussed in their separate sections.	The mitigation of topography will be undertaken during decommissioning and will be incorporated in the closure plan.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium - low	Medium - low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
		Soils	Compaction of soils due to operation and movement of construction equipment used during haul road construction.	Construction vehicles will be restricted to areas for topsoil stripping. Topsoil stockpiles must be protected from vehicle movement that may result in compaction and loss of soil structure.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium - low	Medium-low
		Land capability	Loss of land capability in haul road areas due to soil compaction.	Construction equipment must be restricted to areas allocated for haul road construction to limit the extent of soil compaction.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium - low	Medium-low
		Land use	Change of current land uses to haul road. Very severe in areas occupied by agriculture.	All construction activities with regards to the haul road must be limited to the designated haul road route.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium - low	Medium-low
		Sensitive landscape (Wetlands)	Reduction on surface water quantity due to reduction in catchment size reduces the amount of surface water reporting to wetland areas, reducing their size and function. Hardening of surfaces will limit seepage areas and hard and steep surfaces will increase the velocity of runoff.	All construction activities will be planned and managed to ensure that there will not be a dramatic reduction in catchment size. Efforts will be made to limit the construction of haul roads in wetland areas. Haul roads will be low in gradient to limit reduce runoff velocity limiting erodibility of open surfaces.	Environmental co-ordinator	Throughout construction phase	Medium-high	Medium-low
		Air Quality	The removal of vegetation, movement of machines on haul roads will generate dust, more specifically particulate matter (PM10)	Road surfaces, for example the access road, will be sprayed and treated with water and a dust binding agent. Haul roads will be treated as required. The limit value for the 24 hour average for PM10 is 75 ug/m^3 and this may not be exceeded 4 times within a year. The limit value for the yearly average for PM10 is 40ug/m^3	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium - low	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
		Noise	Construction activities, including the movement of machines will affect noise levels in the area negatively	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Berms will be at an angle of 37 degrees with a height of approximately 1.5m. Noise monitoring must be undertaken in accordance to Section 14.5 of the EIA Report. Switching off equipment when not in use. Construction activities will be limited to daytime hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium - low	Low
		Natural vegetation	When the haul road is constructed, vegetation will be removed.	The clearing of vegetation will be restricted to the area designated for the haul road construction. One meter area on each side of the haul road can be clear for safety reasons. No vegetation outside of this designated construction area must be removed.	environmental co-coordinator	Throughout construction phase	Medium-high	Medium-low
		Fauna (mammals, birds, amphibians, reptiles, insects)	removal of vegetation will destroy the natural habitats of animals	The clearing of vegetation will be restricted to the area designated for the haul road construction. One meter area on each side of the haul road can be clear for safety reasons to see approaching fauna. No vegetation outside of this designated construction area must be removed. All construction vehicles must adhere to speed limits.	environmental co-coordinator	Throughout construction phase	Medium-high	Medium-low
		Surface water	Siltation as a result of dust created during topsoil removal, transportation and storage during the construction of the haul	A hydrocarbon management system will be implemented. Dust suppression needs to be undertaken. Berms need to be constructed to separate clean and dirty water.	environmental co-coordinator	Throughout the construction phase	Medium-high	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			road. Contamination of surface water by dirty water as a result of hydrocarbons and dust.					
		Surface water	The removal of vegetation increases the erodibility of soils which implies a higher silt loading of water running over exposed soil. If not contained, the water is transported off-site and leads to the siltation of rivers downstream.	The removal of vegetation will be minimized to reduce the effects of possible silt loading from exposed soil. Erosion control measures such as contour banks will be constructed in areas prone to erosion.	environmental co-coordinator	Throughout the construction phase	Medium-high	Medium-low
		Surface water	Removal of vegetation and implementation of road erosion control measures alters surface water flow dynamics	Removal of vegetation will be minimized during upgrading and widening of haul roads and erosion control measures will be planned and managed accordingly.	environmental co-coordinator	Throughout the construction phase	High	Medium-high
3	Construction of hydrocarbon storage facility		The hydrocarbon storage facility will consist of a bunded, ventilated portable container with a capacity of approximately 27m³. The bunded area shall be fully concreted, 150mm thick with a 1m³ sump at the one end.					
		Soils	Potential contamination of soil due to hydrocarbon spillage and leaks.	A hydrocarbon management system will be introduced on site to ensure that potential soil contamination is minimized. Management system will include storage of flammable liquids and chemicals procedure (including MSDS); Hazardous materials spill procedure; and emergency response procedure.	Environmental co-ordinator	Throughout construction phase	Medium - low	Low
		Land capability	Reduction in land capability due to soil contamination by hydrocarbon spillage and	In the event of hydrocarbon spillage or leaks, the contaminated soil must be dealt with in accordance to the hydrocarbon management system	Specialist contractor	When required	Low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			leaks.	and the waste management plan.				
		Sensitive landscape (Wetlands)	Potential pollution of surface water resources due to hydrocarbon spillage and leaks may impact negatively on wetland functioning	A hydrocarbon management system will be introduced on site to ensure that potential pollution of the water resource will be minimized	Environmental co-coordinator	Throughout construction phase	Medium - low	Medium - low
		Noise	Construction activities, including the movement of machines will affect noise levels in the area negatively	Noise barriers to be erected near the noise source, between the noise source and receptors; noise barriers will consist of berms. Berms will be at an angle of 37 degrees with a height of approximately 1.5m; Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers Switching off equipment when not in use; Construction activities will be limited to daytime hours A Noise Monitoring Programme should be implemented during this phase	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Low	Low
		Natural vegetation	The construction of the facility will require the removal of vegetation	The area of vegetation clearing must be restricted to the dimensions of the proposed required clearing as indicated in engineering drawings that are completed prior to construction.	Environmental co-ordinator	Throughout construction phase	Medium - low	Medium - low
		Fauna (mammals, birds, amphibians, reptiles, insects)	Removal of vegetation will destroy the natural habitats of animals	The area of vegetation clearing must be restricted to the dimensions of the proposed required clearing as indicated in engineering drawings that are completed prior to construction.	Environmental co-ordinator	Throughout construction phase	Medium - low	Medium - low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
		Surface water	Hydrocarbon contamination from diesel spillages during the setup of fuel bays and from leaks of trucks filling up.	A hard park area with bunding must be created for the placement of fuel bay and to contain any diesel spillages from trucks filling up. An oil trap and separator should be set up at the lowest point of the hard park to separate any oil/diesel from the runoff emanating from the hard park area.	Environmental co-ordinator	Throughout the construction phase	High	Medium - low
		Surface water	Siltation as a result of dust created during topsoil removal, transportation and storage. Erosion of the stockpiles and excavated areas. Contamination of surface water by dirty water and hydrocarbons from oil and diesel spillages.	Siltation of surface water resources will be minimized by covering trucks transporting overburden and topsoil to stockpile areas, road wetting must be implemented. The areas excavated should be have berms that are vegetated to separate dirty and clean water systems while enhancing the maximization of clean and minimization of dirty areas and water systems respectively, and as an erosion control measure. The stockpiles must be vegetated to prevent erosion and subsequent siltation of clean and dirty water streams as well as surface water resources. Upslope diversion and down slope silt containment structures will be constructed. Monitoring of surface water resource pre-mining and during construction must be implemented to be used during operation, decommissioning and post-closure. The trucks and heavy mining machinery will be fitted with leak trays to capture any spillages that could result in hydrocarbon contamination.	Environmental co-ordinator	Throughout the construction phase	Low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
4	Construction of offices and change houses		The change house will be a 8m x 25m face brick structure with an IBR roof. Offices will also be face brick with an IBR roof and a size of 12m x 15m.					
		Soils	Compaction of soil in areas for office and change house construction.	Areas used for construction of offices and change houses will be restricted to the areas designated for infrastructure development	Design and planning engineers	Prior to construction	Medium - low	Medium-low
		Land capability	Loss of land capability in areas used for office and change house construction due to soil compaction.	Areas used for construction of offices and change houses will be restricted to the areas designated for infrastructure development	Design and planning engineers	Prior to construction	Medium - low	Medium-low
		Land use	Change of current land uses to built environment. Very severe in areas occupied by agriculture.	Areas used for construction of offices and change houses will be restricted to the areas designated for infrastructure development	Design and planning engineers	Prior to construction	Medium - low	Medium-low
		Sensitive landscape (Wetlands)	Reduction on surface water quantity due to reduction in catchment size reduces the amount of surface water reporting to wetland areas, reducing their size and function. Hardening of surfaces will limit seepage areas.	All construction activities will be planned and managed to ensure that there will not be a dramatic reduction in catchment size and water reporting to the wetland. Permeable materials to be used i.e. permeable pavements, gardens can be constructed to be below pavement levels and a stormwater runoff programme implemented to minimize loss of water.	Environmental co-ordinator	Throughout construction phase	Medium-high	Medium-low
		Noise	Construction activities, including the movement of machines will affect noise levels in the area negatively	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Berms will be at an angle of 37 degrees with a height of approximately 1.5m. Noise monitoring must be undertaken in accordance to Section 14.5 of the EIA Report. Switching off equipment	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				when not in use. Construction activities will be limited to daytime hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.				
		Natural vegetation	Construction of offices and change house will lead to clearing of vegetation	Removal of vegetation due to construction of house should only be restricted to the area where the change houses will be built to avoid excess removal of vegetation	Environmental co-ordinator	Throughout construction phase	Medium-high	Medium-low
		Fauna (mammals, birds, amphibians, reptiles, insects)	Construction of offices and change house will lead to clearing of vegetation and destroying the natural habitats of animals	All infrastructure must be restricted to areas that have already been disturbed by agriculture	Environmental co-ordinator	Throughout construction phase	Medium-high	Medium-low
		Visual	Infrastructure present on site will create a visual disturbance and alter the visual aesthetic of the site.	All reflective surfaces will be painted with natural tones. Where possible, infrastructure should be placed where it will have a minimal visual disturbance. Down lighting will be utilized to decrease light pollution in the evenings.	Environmental co-ordinator	Throughout construction phase	Low	Low
5	Construction of pollution control dams		Two 8000m³ will be constructed. Each PCD will be lined with a 2mm HDIE liner. The feed drainage will have a silt trap. Both dams will be 40m x 50m x 4m in size.					
		Topography	The construction of the pollution control dams will impact the functioning of topography due to overburden being utilized	The mitigation of topography is performed in the post mining topographical plan.	Environmental co-ordinator	Throughout construction phase	Medium - low	Medium - low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			to alter the site to make it suitable to the establishment of the activity.					
		Soils	Compaction of soil in areas for pollution control dam construction.	Areas used for construction of the pollution control dams will be restricted to the areas designated areas.	Design and planning engineers	Prior to construction	Medium - low	Medium-low
		Land capability	Loss of land capability in area used for pollution control dam construction due to soil compaction.	Areas used for construction of the pollution control dams will be restricted to the areas designated areas.	Design and planning engineers	Prior to construction	Medium - low	Medium-low
		Sensitive landscape (Wetlands)	Reduction in surface and groundwater quality due to dirty water in the pollution control dams as well as potential pollution of surface water resources due the incorrect handling of dirty water may impact negatively on wetland functioning and water quality.	A waste water management system will be introduced on site to ensure that potential pollution of the water resource will be minimized. Water will be recycled for use for mining operations and not released back into the system dirty.	Environmental co-ordinator	Throughout the construction phase	Medium - low	Medium - low
		Air Quality	The excavation of overburden and movement of material will generate dust and will impact on PM10 levels	Areas to be excavated should be sprayed with water to minimize dust. Cover hauls trucks hauling excavated material. The limit value for the 24 hour average for PM10 is 75 ug/m3 and this may not be exceeded 4 times within a year. The limit value for the yearly average for PM10 is 40ug/m3	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Low	Low
		Noise	Construction activities, including the movement of machines will affect noise levels in the area negatively	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Berms will be at an angle of 37 degrees with a height of approximately 1.5m. Noise monitoring must be undertaken	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				in accordance to Section 14.5 of the EIA Report. Switching off equipment when not in use. Construction activities will be limited to daytime hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.				
		Natural vegetation	construction of pollution control dams could lead to removal of vegetation on site	Pollution control dams must not be constructed within the wetland areas.	Environmental co-ordinator	Throughout construction phase	Medium - low	Medium-low
		Visual	Infrastructure present on site will create a visual disturbance and alter the visual aesthetic of the site.	The use of screens and fast growing indigenous vegetation can be utilized to decrease the visual disturbance. The mitigation of visual impacts will be performed once the site is rehabilitated.	Environmental co-ordinator	Throughout construction phase	Low	Low
		Fauna (mammals, birds, amphibians, reptiles, insects)	Habitat loss of animals due to vegetation removal	Pollution control dams must be constructed as close as possible to the proposed mining area as show on the conceptual mine plan (Plan 3, Appendix A). Pit 2 pollution control dam must be constructed 200m from the edge of the dam. All pollution control dams must be fenced to prevent animal access.	Environmental co-ordinator	Throughout construction phase	Medium - low	Medium-low
		Surface water	Decrease of catchment size and surface water volume registering at the nearby streams during the construction of the water pollution control dams.	Minimum number of dams will be built, and their sizes will be optimised so as to have smaller size dams and catch as much dirty water as possible through utilization of the water continuously for road wetting.	Environmental co-ordinator	Throughout the construction phase	High	Medium-high

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
		Surface water	Prevention of surface water resources pollution by dirty water through the construction of water pollution control dams.	The construction of the PCDs on site will be undertaken in accordance with the requirements of the DWAF: Best Practice Guideline A4: Pollution Control Dams (August 2007). Water pollution control dams needs to be well designed and properly maintained to prevent any leakages or spillages into dirty water into clean water systems	Environmental co-ordinator	Throughout the construction phase	High	Medium-low
		Groundwater	Incorrect construction or poor design will lead to groundwater impacts during the operational phase.	The construction of the PCDs on site will be undertaken in accordance with the requirements of the DWAF: Best Practice Guideline A4: Pollution Control Dams (August 2007). Ensure design includes lining (HDPE), ensure an approval WULA is in place prior to construction, groundwater monitoring must be implemented before construction is initiated in accordance to Section 16 of the EIA Report. Water quality must be in limits of the SANS 241:2005 Drinking water standards.	Engineer and environmental co-ordinator.	Throughout the construction phase	Medium-low	Low
6	Construction of storm water diversion berms		Berms will be at an angle of 37 degrees with a height of approximately 0.5m. Berms vegetated with long grass mix (e.g. tef / eragrostis / smuts vinger).					
		Sensitive landscape (Wetlands)	Loss of water from the natural system due to the channeling of water away from seepage areas and water resources as well as pollution of the diverted clean water by mining activities	Berms will be constructed to divert it around the mine workings with the intention of directing the water into the natural drainage system downstream of the workings. Channels will be constructed to limit impacts and loss of quality of water being diverted.	Environmental co-ordinator	Throughout the construction phase	Medium-high	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
		Natural vegetation	Loss of vegetation due to construction of storm water and diversion berms.	Construction of storm water and diversion berms should be limited to designated areas	Environmental co-ordinator	Throughout construction phase	Medium - low	Medium-low
		Fauna (mammals, birds, amphibians, reptiles, insects)	Loss of habitat due to construction of storm water and diversion berms.	Construction of storm water and diversion berms should be limited to designated areas	Environmental co-ordinator	Throughout construction phase	Medium - low	Medium-low
	Construction of water management facilities (canals etc.)	Surface water	Alteration of surface water flow dynamics during construction of water management facilities such as dirty water diversion and containment facilities around stockpiles and temporary storage facilities.	The construction stormwater management measures will be undertaken in accordance with the requirements of the DWAF: Best Practice Guideline G1: Stormwater Management (August 2006). T he principle of separating clean and dirty water streams while minimizing the dirty area and maximizing the clean areas highly applicable. Localising the dirty water trenches around the stockpiles and implementing continues pumping mechanisms to remove the dirty water and store it in a PCD which should be lined to prevent further negative environmental impacts.	Environmental co-ordinator	Throughout the construction phase	Medium-high	Medium-low
		Surface water	Storm water diversions will alter the flow dynamics of surface water thereby reducing the amount of runoff reporting to the catchment. The dirty area should be maximized where possible.	The clean catchment should be maximized as much as possible. The natural drainage line should be maintained to reduce the impact on surface water flow dynamics.	Environmental co-ordinator	Throughout the construction phase	High	Medium-low
7	Construction of portable crusher plant		The crusher structure will be a galvanized steel structure with open-grid flooring and handrails. It					

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			will be 8m high and consist of 2 levels, assessable via a modular staircase. The crusher, of the double roll variety will be mounted within this structure.					
		Sensitive landscape (Wetlands)	Reduction of surface water quantity due to reduction in catchment size reduces the amount of surface water reporting to wetland areas, reducing their size and function. Hardening of surfaces will limit seepage areas.	All construction activities will be planned and managed to ensure that there will not be a dramatic reduction in catchment size. Permeable materials to be used i.e. permeable pavements and a stormwater runoff programme implemented to minimize loss of water and prevent erodibility of open areas.	Environmental co-ordinator	Throughout the construction phase	Medium-high	Medium-low
		Noise	Construction activities, including the movement of machines will affect noise levels in the area negatively	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Berms will be at an angle of 37 degrees with a height of approximately 2.5m. Noise monitoring must be undertaken in accordance to Section 14.5 of the EIA Report. Switching off equipment when not in use. Construction activities will be limited to daytime hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Low	Low
		Natural vegetation	loss of vegetation due to construction of portable crasher	Removal of vegetation due to construction of must be restricted to the area where the crusher will be built to avoid excess removal of vegetation	Environmental co-ordinator	Throughout construction phase	Medium - low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
		Fauna (mammals, birds, amphibians, reptiles, insects)	loss of habitat due to construction of portable crasher	All infrastructure must be restricted to areas that have already been disturbed by agriculture	Environmental co-ordinator	Throughout construction phase	Medium - low	Low
		Visual	Infrastructure present on site will create a visual disturbance and alter the visual aesthetic of the site.	All reflective surfaces should be painted with natural tones. Where possible, infrastructure should be placed where it will have a minimal visual disturbance. Down lighting should be utilised to decrease light pollution in the evenings.	Environmental co-ordinator	Throughout construction phase	Low	Low
		Surface water	Crusher construction will result in reduction of catchment size and alteration of flow dynamics.	The crusher area must be isolated by means of bunding, be placed on a hard park area with drains channeling dirty water to the appropriate pollution control facilities. The drains should be fitted with silt and oil traps and workshop area should be constructed away from the surface water bodies.	Environmental co-ordinator	Throughout construction phase	Low	Low
8	Construction of a workshop		The workshop will be a bolted?, galvanized steel structure with a concrete floor of approximately 30m x 12m x 9m in size.					
		Soils	Compaction of soil in areas for workshop construction.	Areas used for construction of the workshop will be restricted to the areas designated areas.	Design and planning engineers	Prior to construction	Medium - low	Medium-low
		Land capability	Loss of land capability in areas used for workshop construction due to soil compaction.	Areas used for construction of the workshop will be restricted to the areas designated areas.	Design and planning engineers	Prior to construction	Medium - low	Medium-low
		Land use	Change of current land uses to built environment. Very severe in areas	Areas used for construction of the workshop will be restricted to the areas designated areas.	Design and planning engineers	Prior to construction	Medium - low	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			occupied by agriculture.					
		Sensitive landscape (Wetlands)	Reduction on surface water quantity due to reduction in catchment size reduces the amount of surface water reporting to wetland areas, reducing their size and function. Hardening of surfaces will limit seepage areas.	All construction activities will be planned and managed to ensure that there will not be a dramatic reduction in catchment size. Permeable materials to be used i.e. permeable pavements and a stormwater runoff programme implemented to minimize loss of water.	Environmental co-ordinator	Throughout the construction phase	Medium-high	Medium-low
		Noise	Construction activities, including the movement of machines will affect noise levels in the area negatively	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Berms will be at an angle of 37 degrees with a height of approximately 2.5m. Noise monitoring must be undertaken in accordance to Section 14.5 of the EIA Report. Switching off equipment when not in use. Construction activities will be limited to daytime hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Low	Low
		Natural vegetation	Loss of vegetation due to construction of workshop	Construction will be restricted to areas designated for infrastructure construction	Environmental co-ordinator	Throughout construction phase	Medium - low	Low
		Fauna (mammals, birds, amphibians, reptiles, insects)	Loss of habitat due to construction of workshop	Construction will be restricted to areas designated for infrastructure construction	Environmental co-ordinator	Throughout construction phase	Medium - low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
		Visual	Infrastructure present on site will create a visual disturbance and alter the visual aesthetic of the site.	All reflective surfaces should be painted with natural tones. Where possible, infrastructure should be placed where it will have a minimal visual disturbance. Down lighting should be utilised to decrease light pollution in the evenings.	Environmental co-ordinator	Throughout construction phase	Low	Low
		Surface water	Workshop construction will result in reduction of catchment size and alteration of flow dynamics.	The workshop area must be isolated by means of bunding, be placed on a hard park area with drains channeling dirty water to the appropriate pollution control facilities. The drains should be fitted with silt and oil traps and workshop area should be constructed away from the surface water bodies.	Environmental co-ordinator	Throughout the construction phase	Medium-high	Medium-low
9	Placement 11KV electrical line	Natural vegetation	Vegetation will be removed.	Vegetation clearing must be minimized to the required servitude for such a powerline which between a width of 16m in total to a maximum area of 22m in total	environmental co-coordinator	Throughout construction phase	Medium-high	Medium-low
		Surface water	The placing of pylons will result in the removal of vegetation and soils and thus alteration of the catchment flow dynamics. Natural drainage lines may also be altered	Pylons should not be placed close to surface water bodies especially where there is a natural drainage line.	Environmental co-ordinator/ Mine engineer	During installation	Medium-low	Low
10	Blasting	Topography	Blasting of rock results in a disturbance of the natural functioning of the topography, the result of this disturbance causes impacts on surface and ground water flows as well as visual aesthetics.	The mitigation of topography will be undertaken during decommissioning and will be incorporated in the closure plan.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-high	Medium-high
		Air Quality	Blasting and excavating activities to establish initial	Dust fall out during blasting will need to be monitored.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium - low	Medium - low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			cut will generate dust	Monitoring weather conditions when blasting especially during the dry season, will minimize the impact of the dust cloud formed from an air blast, by allowing the contractor to know whether the conditions are favorable to perform a blast. The limit value for the 24 hour average for PM10 is 75 ug/m3 and this may not be exceeded 4 times within a year. The limit value for the yearly average for PM10 is 40ug/m3				
		Noise	Blasting during boxcut establishment will cause noise and vibration	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Berms will be at an angle of 37 degrees with a height of approximately 5m. Noise monitoring must be undertaken in accordance to Section 14.5 of the EIA Report. Construction activities will be limited to daytime hours. Blasting is generally intermittent and should be limited to daylight hours when ambient noise levels are highest. The use of millisecond delays between rows of blast holes in a given blasting pattern to reduce the amount of explosive charge detonated at any given instant is recommended; Reduction of the powder factor, that is, use of less explosive per cubic yard of overburden; Restriction of blasting to daylight hours are mitigation measures that should be followed (Sengupta, M.1993). Workers to be required to be trained in safety and to wear personal	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-high	Medium-high

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				protective equipment e.g. ear plugs.				
		Visual	Dust as well as the voids caused by blasting has a visual disturbance to surrounding areas.	The mitigation of visual impacts will be performed once the site is rehabilitated.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium - low	Medium - low
		Surface water	Dust associated with blasting could result in siltation of the surface water bodies	Dust suppression measure must be put in place.	Environmental co-ordinator/ Mine engineer	During installation	Medium-low	Low
		Groundwater	Possible nitrate contamination due to miss fires of ammonium nitrate explosives.	A blasting programme must be developed prior to the initiation of blasting. All blasting holes must be properly lined and charged to ensure detonation.	Environmental co-ordinator	Throughout construction phase	Medium-low	Low
		Air blasting	Blasting activities will result in fly rock which may impact structures close to blasting activities	A minimum of 30 blast hole diameters in length with a stemming aggregate of 10% blast hole diameter must be implemented to control fly rock. Blast planning must be undertaken to ensure effective initiation and detonation. Timing and down hole accessories must be according to accepted standard practice.	Mining engineer	Throughout construction phase	Medium-high	Medium-low
		Vibration	Blasting activities will result in ground vibration that may result in structural damage to surrounding infrastructure	The use of 280kg from a 165 mm diameter blast hole single charge will be used for blasting to minimize the extent of ground vibration experienced. A structural survey must be conducted of structures that could be impacted on by vibration before blasting is undertaken. Seismographs must be implemented prior to construction as in terms of section 14.6 of the EIA.	Mining engineer	Throughout construction phase	Medium-high	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
11	Development of initial open cast cuts	Topography	The establishment of initial open pit cut and access ramps results in a disturbance of the natural functioning of the topography, the result of this disturbance causes impacts on surface and ground water flows as well as visual aesthetics. Where slope percentages are altered there is the potential to increase soil erode ability. These impacts are discussed in their separate sections.	The mitigation of topography will be undertaken during decommissioning and will be incorporated in the closure plan.	Environmental co-ordinator	Throughout construction phase	Medium-high	Medium-high
		Sensitive landscape (Wetlands)	Establishment of open pit areas dewaters surrounding aquifers	All construction activities will be planned and managed to ensure that there will not be a dramatic reduction in catchment size and water reporting to the wetland. Open pit establishment will dewater the surrounding aquifers and the impacts will be unavoidable, because of this mitigation will not be possible.	Environmental co-ordinator	Throughout construction phase	High	High
		Noise	Construction activities, including the movement of machines will affect noise levels in the area negatively	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Berms will be at an angle of 37 degrees with a height of approximately 1.5m. Noise monitoring must be undertaken in accordance to Section 14.5 of the EIA Report. Switching off equipment when not in use. Construction activities will be limited to daytime hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				mechanisms are effective e.g. installing exhaust mufflers.				
		Air Quality	The excavation of overburden and movement of material will generate dust and will impact on PM10 levels	Pre-wet areas to be excavated to minimize dust. The limit value for the 24 hour average for PM10 is 75 ug/m3 and this may not be exceeded 4 times within a year. The limit value for the yearly average for PM10 is 40ug/m3	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-low	Medium-low
		Natural vegetation	Vegetation will be cleared and removed during the development of open pit	The removal of vegetation must be restricted to the area of the initial cuts. The removal of vegetation must only progress as mining progresses and not be done in advance.	Environmental co-ordinator	Throughout construction phase	Medium-high	Medium-low
		Natural vegetation	Removal of topsoil and vegetation for site clearing could lead to a loss of Species of Special Concern (SSC)	Plant SSC that may occur within the proposed infrastructure and opencast pit areas should be conserved and relocated. A permit should be obtained from the provincial authorities in order to remove the plant SSC.	Environmental co-ordinator / Botanist	Throughout construction phase	Medium-high	Low
		Fauna (mammals, birds, amphibians, reptiles, insects)	Habitats will be destroyed during the development of open pit	The removal of vegetation must be restricted to the area of the initial cuts. The removal of vegetation must only progress as mining progresses and not be done in advance. All mining areas must be fenced off to prevent animal access	Environmental co-ordinator	Throughout construction phase	Medium-high	Medium-low
		Visual	The void created by the initial open cut will result in a large visual disturbance.	The use of screens and fast growing indigenous vegetation can be utilised to decrease the visual disturbance. The mitigation of visual impacts will be performed once the site is	Environmental co-ordinator	Throughout construction phase	Medium-low	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				rehabilitated.				
		Surface water	Reduction in baseflow and in catchment area size and a change in flow dynamics due to dewatering of surrounding aquifer caused by pumping out of water to ensure dry mine sites.	Separation of clean and dirty water must be undertaken. Clean water areas must be maximized. Reuse of inpit/dirty water needs to be maximized.	Engineer and environmental co-ordinator	Throughout entire phase	Medium-high	Medium-low
		Groundwater	Establishment of open pit pit dewaters surrounding aquifers	During the establishment of the open pit areas the surrounding aquifers will dewater and no mitigation measures are possible. Where such dewatering causes the drying up of boreholes used for domestic, stock-watering and other uses, alternative supplies of water must be provided on a case-by-case basis.	Environmental co-ordinator/ Mine engineer	Throughout construction phase	Medium-high	Medium-low
12	Stockpiling of soil and overburden from initial cuts	Soils	Loss of soil fertility and natural soil functioning due to mixing of soil types.	Different soil types and horizons should be stripped up to the recommended depth and stockpiled separately for use during rehabilitation according to the soil utilisation guide. Topsoil stockpile heights and slopes need to be indicated to prevent erosion. Topsoil stockpiles must not exceed a height of 3m and a slope of 1:3 (18.5 degrees from the horizontal). Initial topsoil stockpiled must be used in rehabilitation as soon as possible. All topsoil stockpiles must be vegetated as soon as possible to prevent loss of resource. Topsoil must only be used for rehabilitation purposes.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-high	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
		Soils	Compaction of soil during stockpiling.	Heights of different stockpiles should be restricted according to the heights recommended in the soil utilisation guide.	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-high	Medium-low
		Sensitive landscape (Wetlands)	Sedimentation of the water resources due to erosion of the stockpiles during periods of high rainfall.	Soil and overburden stockpiles will be vegetated to prevent erosion as well as berms constructed down slope of the piles to trap debris. The berms will also allow for infiltration of water minimizing loss of water.	Environmental co-ordinator	Throughout construction phase	Medium-low	Medium-low
		Air Quality	Windblown soil and coal dust from the stock piles will impact on the dust fallout levels	Stockpiles to be kept moist when necessary without causing water erosion. The limit value for the 24 hour average for PM10 is 75 ug/m3 and the limit value may not be exceeded 4 times within a year. The limit value for the yearly average for PM10 is 40ug/m3	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Low	Low
		Noise	Movement of Haul trucks will generate noise	Noise barriers to be erected near the noise source, between the noise source and receptors; Berms will be at an angle of 37 degrees with a height of approximately 3.5m. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers; Switching off equipment when not in use; Construction activities will be limited to daytime hours A Noise Monitoring Programme should be implemented during this phase	Engineer and environmental co-ordinator. Contractor	Throughout construction phase	Medium-low	Low
		Natural	Movement of trucks will create dust that could lead	Soil and overburden stockpiles will be vegetated as soon as possible.	Environmental co-ordinator	Throughout construction phase	Medium-low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
		vegetation	to the closure of stomata's	Dust suppression must be undertaken.				
		Fauna (mammals, birds, amphibians, reptiles, insects)	Compaction of soil during stockpiling could lead due habitat loss.	Soil and overburden stockpiles must be vegetated as soon as possible.	Environmental co-ordinator	Throughout construction phase	Medium-low	Low
		Topography	Results in a disturbance of the natural functioning of the topography, the result of this disturbance causes impacts on surface and ground water flows as well as visual aesthetics. Where slope percentages are altered there is the potential to increase soil erode ability. These impacts are discussed in their separate sections.	The mitigation of topography will be undertaken during decommissioning and will be incorporated in the closure plan.	Environmental co-ordinator	Throughout construction phase	Medium-low	Medium-low
		Visual	Stockpiles have impacts on the surrounds, due to their height and uncharacteristic nature compared to the surrounding area.	The mitigation of visual impacts will be performed once the site is rehabilitated.	Environmental co-ordinator	Throughout construction phase	Medium-low	Medium-low
13	Transportation of coal	Soils	Potential contamination of soil due to spillage of coal during transport.	All coal haulage trucks must be covered.	Environmental co-ordinator	Throughout operational phase	Low	Low
		Air Quality	Potential windblown coal dust during transport	Trucks transporting coal will be covered with a tarpaulin to prevent coal spillage.	Environmental co-coordinator/contractor	Throughout operational phase	Low	Low
		Noise	movement of Haul trucks will generate noise	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Noise monitoring must be undertaken in accordance to Section 16 of the EIA Report. Switching off equipment	Environmental co-coordinator/contractor	Throughout operational phase	Low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				when not in use. Operational activities will be limited to daytime hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.				
		Natural environment	Coal dust could cause detrimental effects on the growth of plants	All coal haulage trucks must be covered.	Environmental co-ordinator	Throughout operational phase	Medium-low	Low
		Surface water	Dust created during the conveyance of coal will lead to siltation of the water resources.	Cover of trucks transporting the coal.	Contractor and environmental coordinator.	throughout the operation phase.	Medium-low	Low
		Traffic and safety	The transportation of coal will result in increased traffic on local and regional roads. This will also increase the safety risk of road users.	Speed limits must be implemented on site. Safe access to the site must be established. All traffic incidents all roads must be reported to management.	Contractor and mining engineer.	throughout the life of mine	Medium-high	Medium-high
14	Use and maintenance of haul roads	Soils	Compaction of soils due to movement of mining vehicles and equipment on haul roads.	Mining vehicles and equipment must be restricted to haul roads and areas in which mining activities are been undertaken.	Mine manager and transport contractor. Environmental manager.	Throughout operational phase and during rehabilitation.	Medium-low	Medium-low
		Land capability	Loss of land capability in haul road areas due to soil compaction.	Mining vehicles and equipment must be restricted to haul roads and areas in which mining activities are been undertaken.	Mine manager and transport contractor. Environmental manager.	Throughout operational phase and during rehabilitation.	Medium-low	Medium-low
		Noise	Noise generated by the Haul trucks using the haul roads, the water browser applying dust suppression to the haul road as well as the machinery responsible for maintaining the haul roads	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Noise monitoring must be undertaken in accordance to Section 14.5 of the EIA Report. Switching off equipment when not in use. Construction activities will be limited to daytime hours. Mining-related machine and vehicles	Environmental manager / contractor	Throughout operational phase	Medium-low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.				
		Air Quality	Machinery and Haul trucks moving on Haul roads will impact on the dust fallout levels as well as the level of particulate matter	Road surfaces, for example the access road, will be sprayed and treated with water and a dust binding agent. Water will be applied to Haul roads three times daily, except during periods of rainfall.	Environmental manager / contractor	Throughout operational phase	Medium-low	Low
		Natural environment	dust emitted from the haul roads could cause blockage to stomata's	Coal haulage trucks must be covered. Dust suppression must be undertaken.	Environmental co-ordinator	Throughout operational phase	Medium-low	Low
		Fauna (mammals, birds, reptiles, insects)	accidental death of animals caused by trucks	Speed limits must be implemented and must be adhered to.	Environmental co-ordinator	Throughout operational phase	Medium-low	Low
	Upgrade & widening of haul road	Surface water	The removal of vegetation increases the erodibility of soils which implies a higher silt loading of water running over exposed soil. If not contained, the water is transported off-site and leads to the siltation of rivers downstream.	The removal of vegetation will be minimised to reduce the effects of possible silt loading from exposed soil. Erosion control measures such as contour banks will be constructed in areas prone to erosion.	Environmental co-ordinator	Throughout operational phase	Medium-high	Medium-low
	Upgrade & widening of haul road	Surface water	Removal of vegetation and implementation of road erosion control measures alters surface water flow dynamics	Removal of vegetation will be minimised during upgrading and widening of haul roads and erosion control measures will be planned and managed accordingly.	Environmental co-ordinator	Throughout operational phase	High	Medium-high
	Vehicular movement along the haul road	Surface water	There is a risk of surface water through the washing away by rain of spills of hydrocarbons, chemicals and coal being spilled by trucks and mining equipment	A hydrocarbon management system will be implemented. Hydrocarbons and chemicals will be transported, loaded, and stored in accordance with legislation and SANS codes.	Environmental co-ordinator	Throughout operational phase	High	Medium-high

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
15	Domestic and industrial waste storage and removal	Soils	Potential contamination of soil due to incorrect handling of industrial wastes.	Appropriate waste management plan must be implemented. In the event of soil contamination must be dealt with in accordance to the waste management plan.	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Low	Low
		Land capability	Reduction in land capability due to soil contamination due to incorrect handling of industrial wastes.	Appropriate waste management system must be implemented. In the event of soil contamination must be dealt with in accordance to the waste management system.	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Low	Low
		Sensitive landscape (Wetlands)	Potential pollution of surface water resources due to pollutant and toxicant spillage and leaks may impact negatively the water resources.	Waste management will be ongoing throughout the life of the mine. This will ensure that the potential pollution of the water resources due to the incorrect handling of industrial and domestic wastes and sewerage will be minimised avoiding impacts to the water resource.	Environmental co-ordinator	Throughout operational phase	Medium-low	Medium-low
		Natural environment	Potential contamination of soil due to incorrect handling of industrial wastes could have negative impacts on the growth of the plants..	Appropriate waste management system must be implemented and adhered to. In the event of soil contamination, the contaminated soil must be handled as waste and must be removed off-site.	Environmental co-ordinator	Throughout operational phase	Medium-low	Low
		Fauna (mammals, birds, reptiles, insects)	incorrect handling of chemicals could cause death to animals	Appropriate waste management system must be implemented and adhered to. In the event of soil contamination, the contaminated soil must be handled as waste and must be removed off-site.	Environmental co-ordinator	Throughout operational phase	Medium-low	Low
		Groundwater	If domestic and industrial waste is not properly stored or removed, there is a risk of leaching of contaminated water into the groundwater	Waste management plan will be prepared in accordance with best practice and applicable guidelines which must be implemented and adhered to.	Environmental co-ordinator	Throughout operational phase	Medium-low	Low
		Surface water	Incorrect storage and handling of chemicals could cause the	Storage facilities with bunding must be constructed on a hard park area. An emergency spillage protocol must	Environmental co-ordinator	Throughout operational phase	Medium-high	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			deterioration of water quality	be developed and accessible.				
16	Hazardous waste storage and removal	Soils	Potential contamination of soil due to incorrect handling of hazardous wastes.	Appropriate waste management plan must be implemented. In the event of soil contamination must be dealt with in accordance to the waste management plan.	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Low	Low
		Land capability	Reduction in land capability due to soil contamination due to incorrect handling of hazardous wastes.	Appropriate waste management plan must be implemented. In the event of soil contamination must be dealt with in accordance to the waste management plan.	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Low	Low
		Sensitive landscape (Wetlands)	Potential pollution of surface water resources due to the incorrect handling of hazardous, industrial and domestic wastes and sewerage may impact negatively the water resources.	Waste management will be ongoing throughout the life of the mine. This will ensure that the potential pollution of the water resources due to the incorrect handling of hazardous wastes will be minimised in an attempt to prevent impact to water quality.	Environmental co-ordinator	Throughout operational phase	Medium-low	Medium-low
		Natural environment	Potential wilting and eventual death of vegetation due to leakage of fuels and lubricants	A hydrocarbon management system and waste management system must be implemented and adhered to throughout the life of the mine. This will ensure that the potential pollution of the water to natural vegetation due to the incorrect handling of hazardous wastes will be minimised	Environmental co-ordinator	Throughout operational phase	Medium-low	Low
		Fauna (mammals, birds, reptiles, insects)	incorrect handling of hazardous, industrial and domestic wastes and sewerage may impact negatively on the animal's diet	A hydrocarbon management system and waste management system must be implemented and adhered to throughout the life of the mine. This will ensure that the potential pollution of the water to natural vegetation due to the incorrect handling of hazardous wastes will be minimised	Environmental co-ordinator	Throughout operational phase	Medium-low	Low
		Groundwater	Potential for groundwater contamination due to the incorrect handling and	Waste management plan should be prepared in accordance with best practice and applicable guidelines	Environmental co-ordinator	Throughout operational phase	Medium-low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			disposal of hazardous waste	and must be implemented and adhered to.				
		Surface water	Risk of contamination of the surrounding surface water resources from improper storage, and removal of domestic, industrial and hazardous waste.	Waste management plan will be prepared and implemented in accordance with national guidelines.	Environmental co-ordinator	Throughout operational phase	Medium-high	Medium-low
17	Operation of portable ablutions/change house	Soils	Potential contamination of soil due to incorrect handling of sewage.	Appropriate waste management plan must be implemented. In the event of soil contamination must be dealt with in accordance to the waste management plan.	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Low	Low
		Land capability	Reduction in land capability due to soil contamination due to incorrect handling of sewage.	Appropriate waste management plan must be implemented. In the event of soil contamination must be dealt with in accordance to the waste management plan.	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Low	Low
		Sensitive landscape (Wetlands)	Potential pollution of surface water resources due to the incorrect handling of domestic wastes and sewerage may impact negatively the water resources.	Waste management will be ongoing throughout the life of the mine. This will ensure that the potential pollution of the water resources due to the incorrect handling of sewerage will be minimised to prevent impacts to water quality.	Environmental co-ordinator	Throughout operational phase	Medium-low	Medium-low
		Groundwater	Potential for the contamination of ground water due to incorrect sewerage handling.	Plans will be put in place to ensure proper servicing and maintenance of the potable ablution facilities. Documentation must be made available from the contractor on the location for the disposing of the sewage as well as certificates for the collecting, handling, transportation and disposing of sewage.	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Low	Low
	Service and maintenance of portable ablution facilities	Surface water	Potential for the contamination of surface water due to incorrect sewerage handling.	It will be ensure proper servicing and maintenance of the potable ablution facilities is undertaken.	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Medium-high	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
	Water use	Surface water	Decrease in imported (potable) water demand through re-cycling and re-use of in-pit water for the mine operations.	Water recycling will be undertaken in accordance with the DWAF Best Practice Guidelines H3 Water Re-use and Reclamation to maximise the reuse of dirty water.	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Medium-low	Low
18	Operation of fuel depot	Soils	Potential contamination of soil due to hydrocarbon spillage and leaks.	A hydrocarbon management system will be introduced on site to ensure that potential contamination of soils will be minimised. In the event of spillage, the contaminated soil must be removed off-site or rehabilitated where possible. The management system will include storage of flammable liquids and chemicals procedure (including MSDS); Hazardous materials spill procedure; and emergency response procedure.	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Low	Low
		Land capability	Reduction in land capability due to soil contamination due to hydrocarbon spillage and leaks.	A hydrocarbon management system will be introduced on site to ensure that potential contamination of soils will be minimised	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Low	Low
		Sensitive landscape (Wetlands)	Potential pollution of surface water resources due to hydrocarbon spillage and leaks may impact negatively the water resources.	A hydrocarbon management system will be introduced on site to ensure that potential pollution of the water resource will be minimised to prevent impacts to water quality.	Environmental co-ordinator	Throughout operational phase	Medium-low	Medium-low
		Air Quality	Potential impact on the ambient air quality due to leaks that may cause the Volatile organic compounds (VOC's) to escape into the atmosphere	A hydrocarbon management system will be introduced on site to ensure that potential pollution of the atmosphere will be minimised	Environmental manager and specialist contractor.	Throughout operational phase	Low	Low
		Natural environment	Potential wilting and eventual death of vegetation due to leakage of fuels and lubricants	Hydrocarbon management system must be implemented and adhered to throughout the life of the mine. This will ensure that the potential pollution of the water to natural vegetation	Environmental co-ordinator	Throughout operational phase	Medium-low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				due to the incorrect handling of hazardous wastes will be minimised				
		Fauna (mammals, birds, reptiles, insects)	incorrect handling of hazardous, industrial and domestic wastes and sewerage may impact negatively on the animal's diet	Hydrocarbon management system must be implemented and adhered to throughout the life of the mine. This will ensure that the potential pollution of the water to natural vegetation due to the incorrect handling of hazardous wastes will be minimised	Environmental co-ordinator	Throughout operational phase	Medium-low	Low
		Groundwater	Potential for the contamination of ground water due to possible leaks and spills resulting from poor servicing and maintenance of the hydrocarbon storage facilities.	The hydrocarbon storage facility must be bunded to withhold a capacity of a 110 % of the total volume stored within. Dispensing of fuels must occur on a hard park area. The refuelling nozzel must either be place within the bunded area or a drip tray must be provided. Soil contamination must be dealt with in accordance to the hydrocarbon management system. Groundwater monitoring must be undertaken in accordance to Section 16 of the EIA Report. Borehole must be drilled downstream of the hydrocarbon facility and needs to be monitored for hydrocarbon contamination.	Environmental co-ordinator	Throughout operational phase	Medium-low	Low
		Surface water	Hydrocarbon contamination from diesel spillages during the setup of fuel bays and from leaks of trucks filling up.	A hard park area with bunding must be created for the placement of a fuel bay and to contain any diesel spillages from trucks filling up. A oil trap should be set up at the lowest point of the hard park to separate any oil/diesel from the runoff emanating from the hard park area.	Environmental co-ordinator	Throughout operational phase	Medium-high	Medium-low
19	Operation of pollution control dam and storm water management systems	Sensitive landscape (Wetlands)	Potential pollution of surface water resources due to dirty water spillage and leaks may impact negatively the water resources, impacting on	Water management will be ongoing throughout the life of the mine. This will ensure that the potential pollution of the water resources due to the incorrect handling of dirty water and wastes will be minimised. All	Environmental co-ordinator	Throughout operational phase	Medium-low	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			ecological functioning and water quality.	applicable DWAF Best Practice Guidelines must be complied with and in particular, the operation of the PCDs on site will be undertaken in accordance with the requirements of the DWAF: Best Practice Guideline A4: Pollution Control Dams (August 2007).				
		Surface water	Prevention of surface water resources pollution by dirty water during maintenance and cleaning of water pollution control dams.	Water pollution control dams needs to be well designed and properly maintained to prevent any leakages or spillages into dirty water into clean water systems. The operation of the PCDs on site will be undertaken in accordance with the requirements of the DWAF: Best Practice Guideline A4: Pollution Control Dams (August 2007).	Environmental co-ordinator	Throughout operational phase	Medium-high	Medium-high
		Surface water	The excessive re-cycling of water for use in the mining processes further deteriorates the quality of water	Recycled water will be diluted to meet the quality and quantity demands. All applicable DWAF Best Practice Guidelines for water management must be complied with and in particular, the DWAF: Best Practice Guideline H3: Water Reuse and Reclamation (June 2006).	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Medium-high	Medium-low
		Groundwater	Potential of contamination of groundwater due to leakages or spillages of polluted water from the pollution control dam	The pollution control dam will be adequately designed and built to specification. It will also be monitored to ensure quick leak detection. Water will be reused and operational level kept within 0.8m freeboard. All applicable DWAF Best Practice Guidelines must be complied with and in particular, the operation of the PCDs on site will be undertaken in accordance with the requirements of the DWAF: Best Practice Guideline A4: Pollution Control Dams (August 2007).	Engineer and environmental coordinator		Medium-high	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
20	Removal of overburden and backfilling	Sensitive landscape (Wetlands)	Sedimentation of the water resources due to erosion of the overburden during periods of high rainfall. Topsoil and overburden stripping and vegetation removal reduces recharge of shallow aquifers that feed hillslope wetlands, reducing flow in water resources.	Removal of vegetation during stripping will be minimised to reduce the footprint area and ultimately the erosion potential. Topsoil will only be removed off areas proposed for immediate mining.	Environmental co-ordinator	Throughout operational phase	Medium-high	Medium-low
		Air Quality	the activities regarding the removal of overburden and backfilling will generate dust and impact on the dust fallout levels, as well as the levels of particulate matter (PM10)	When backfilling during earthmoving operations, dedicate a water truck or large hose to backfilling equipment and operations and apply water as needed; or, cover or enclose stationary backfill material; if needed, mix backfill soil with water prior to moving. Empty loader buckets slowly and minimize their drop heights. Immediately after backfilling, apply soil stabilization compounds to form a crust.	Environmental manager and specialist contractor.	Throughout operational phase	Medium-low	Low
		Noise	Mining machinery responsible for the removal of overburden and backfilling will generate noise	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Noise monitoring must be undertaken in accordance to Section 14.5 of the EIA Report. Switching off equipment when not in use. Operational activities will be limited to daytime hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.	Environmental manager and specialist contractor.	Throughout operational phase	Low	Low
		Natural environment	dust generated during mining activities could suppress the growth of the	Dust suppression must be undertaken	Environmental co-ordinator	Throughout operational phase	Medium-low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			plants by closing stomata's					
		Topography	Results in a disturbance of the natural functioning of the topography, the result of this disturbance causes impacts on surface and ground water flows as well as visual aesthetics. Where slope percentages are altered there is the potential to increase soil erode ability. These impacts are discussed in their separate sections.	The mitigation of topography will be undertaken during decommissioning and will be incorporated in the closure plan.	Environmental co-ordinator	Throughout operational phase	Medium-low	Medium-low
	Stockpiling of overburden	Surface water	Acid mine drainage formation from prolonged exposure of the overburden excavated from the initial boxcut to rain and air. AMD impacts surface water quality on a national/international scale since the stream passing through the proposed mining area is international.	Where there is water accumulation in trenches and other areas, a continuous pumping system must be implemented to avoid prolonged exposure of the water to air and in contact with the pyretic material. Various methods will be implemented which will be utilised to minimise the severity of AMD including the lining of the in-pit sump to which the water will be pumped.	Environmental co-ordinator	Throughout operational phase	Medium-high	Medium-low
		Groundwater	Dewatering- During the excavation of overburden from the opencast areas, aquifers could be intercepted. This could lead to the dewatering of surrounding aquifers and impact on groundwater users.	The dewatering of aquifers during the operational phase is implicit in the types of mining involved and cannot be prevented. Alternative supplies of water will be provided on a case-by-case basis.	Engineer and environmental coordinator	Throughout operational phase	Medium-high	Medium-low
21	Mining process removal of coal	Sensitive landscape (Wetlands)	Recharge of shallow aquifers that feed hillslope wetlands, reducing flow in water resources.	All operation activities will be planned and managed to ensure that there will not be a dramatic reduction in catchment size and water reporting	Environmental coordinator	Throughout operational phase	High	High

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			Establishment of opencast areas dewaters surrounding aquifers	to the wetland. Opencast establishment will dewater the surrounding aquifers and the impacts will be unavoidable, because of this mitigation will not be possible. Offset mitigation may be suggested for the cumulative loss of wetland areas. Mining activities should not take place within the allocated buffer zones.				
		Air Quality	The removal of coal will generate coal dust	Apply dust suppression techniques e.g. wetting during the removal of coal	Environmental manager and specialist contractor.	Throughout operational phase	Medium-low	Medium-low
		Noise	The plant used during the removal of coal will generate noise	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Noise monitoring must be undertaken in accordance to Section 14.5 of the EIA Report. Switching off equipment when not in use. Operational activities will be limited to daytime hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.	Environmental manager and specialist contractor.	Throughout operational phase	Medium-low	Low
		Topography	The removal of coal will result in a decrease in the elevation of topography, thus causing impacts to surface water runoff.	The mitigation of topography will be undertaken during decommissioning and will be incorporated in the closure plan.	Environmental co-ordinator	Throughout operational phase	Medium-low	Medium-low
		Surface water	Acid mine drainage formation from prolonged exposure of the overburden excavated from the initial boxcut to rain and air. AMD impacts surface water quality on a national/international	Where there is water accumulation in trenches and other areas, a continuous pumping system must be implemented to avoid prolonged exposure of the water to air and in contact with the pyretic material. Various methods will be implemented which will be utilised to minimise the	Environmental co-ordinator	Throughout operational phase	Medium-high	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			scale since the stream passing through the proposed mining area is international.	severity of AMD including the lining of the in-pit sump to which the water will be pumped.				
		Surface water	As more areas are excavated for the removal of coal catchment will be further decreased. The conveyance of coal could result in siltation and deterioration of water quality from chemicals used during blasting. Diesel spillages from the transportation of coal can negatively impact on water quality.	On-going rehabilitation must be implemented in order to restore the lost catchments. Coal conveyance must be with covered trucks or conveyor belt. Truck must be fitted with diesel leak collection trays.	Environmental co-ordinator	Throughout operational phase	High	Medium-high
		Surface water	Altered surface water flow dynamics - The removal of overburden and mining of coal will reduce the catchment size, thereby decreasing the amount of water reporting to surface streams on and off site.	Opencast mining will not be done beyond the 1:100 year floodline. Mining activities will comply with the mining plan.	Environmental co-ordinator	Throughout operational phase	High	Medium-high
		Groundwater	Acid mine drainage - There is a risk of the formation of AMD when stockpiling and exposing the overburden and coal excavated from the opencast areas to rain. Exposed coal can also form AMD. AMD impacts groundwater quality on a regional scale.	All mine water generated will be kept within a dirty water system r. Material with a higher likelihood of acidification must be placed in parts of the pit where flooding is possible.	Environmental coordinator	Throughout operational phase	Medium-high	Medium-low
22	Crushing of coal	Noise	The crushing activities will generate noise	Noise barrier will need to be erected near the crusher, between the crusher and the receptors in the form of a berm.	Environmental manager and specialist contractor.	Throughout operational phase	Medium-low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
		Air Quality	The crushing activities will generate dust which impacts on the dust fallout levels and particulate matter levels (PM10)	The crusher should be house in enclosure and water should be applied to the crushed ore	Environmental manager and specialist contractor.	Throughout operational phase	Low	Low
		Surface water	Dust resulting from the coal crushing could result in siltation of the water resources. Dirty water associated with the coal beneficiation could negatively impact on the water quality.	The coal crushing plant should be covered and dust suppression measures must be installed. The water associated with the coal crushing plant must be directed to a pollution control facility which is in line with GN R704 requirements of capacity.	Environmental manager and specialist contractor.	Throughout operational phase	High	Medium-high
23	ROM coal Stockpile	Soils	Potential contamination of soil by AMD from ROM coal stockpiles.	Berms must be created below the piles to trap coal particles and runoff from the coal stockpile	Environmental manager	Prior to operational phase	Low	Low
		Land capability	Reduction in land capability due to soil contamination by AMD from ROM coal stockpiles.	Berms must be created below the piles to trap coal particles and runoff from the coal stockpile	Environmental manager	Prior to operational phase	Low	Low
		Sensitive landscape (Wetlands)	Potential pollution of surface water resources due to the runoff from the stockpiles may impact negatively on the water resources.	Berms created below the piles to trap coal particles and runoff from the coal stockpile minimising impacts to water quality as well as minimising loss of water.	Environmental co-ordinator	Throughout operational phase	Medium-low	Medium-low
		Air Quality	Potential impact on ambient air quality due to windblown dust particles from stock piles	Spray stockpiles with water	Environmental manager and specialist contractor.	Prior to operational phase	Low	Low
		Topography	Results in a disturbance of the natural functioning of the topography, the result of this disturbance causes impacts on surface and ground water flows as well as visual aesthetics. Where slope percentages are altered there is the	The mitigation of topography will be undertaken during decommissioning and will be incorporated in the closure plan.	Environmental manager	Throughout operational phase	Medium-low	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			potential to increase soil erode ability. These impacts are discussed in their separate sections.					
		Surface water	water around the coal stockpile is deemed contaminated and if not contained could result in water quality deterioration. The dirty water contained should be re-used/recycled to prevent overflow and spillage. Prolonged exposure of the dirty water to air could spark AMD generation.	Water from the ROM coal stockpile should be channelled to Pollution control facilities designed and constructed according to GN 704 requirements of capacity during operation. Re-use of the water must be implemented for dust suppression and as coal washing water. All applicable DWAF Best Practice Guidelines for surface water management must be complied with and in particular Water management measures should be undertaken in accordance with the requirements of the DWAF: Best Practice Guideline A5: Water Management for Surface Mines (July 2008).	Environmental manager and specialist contractor.	Throughout the operational phase and beyond.	High	Medium-high
		Groundwater	There is a risk of the formation of AMD when stockpiling and exposing the overburden and coal excavated from the opencast areas to rain. Exposed coal can also form AMD. AMD impacts groundwater quality on a regional scale.	Intercept all seepage from stockpiles. Monitor downstream groundwater quality to ensure no contamination is taking place in accordance to Section 14.3 of the EIA Report. Water quality must be within the limits of SANS 241:2005 Drink water standards. All applicable DWAF Best Practice Guidelines for groundwater management must be complied with and in particular Water management measures should be undertaken in accordance with the requirements of the DWAF: Best Practice Guideline A5: Water Management for Surface Mines (July 2008).	Environmental coordinator	Throughout the operational phase and beyond.	Medium-high	Medium-low
24	Maintenance of equipment	Soils	Potential contamination of soil due to hydrocarbon spillage and leaks.	A hydrocarbon management system will be introduced on site to ensure that potential contamination of soils will be minimised. In the event of	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				spillage, the contaminated soil must be removed off-site or rehabilitated where possible. The management system will include storage of flammable liquids and chemicals procedure (including MSDS); Hazardous materials spill procedure; and emergency response procedure.				
		Land capability	Reduction in land capability due to soil contamination due to hydrocarbon spillage and leaks.	A hydrocarbon management system will be introduced on site to ensure that potential contamination of soils will be minimised. In the event of spillage, the contaminated soil must be removed off-site or rehabilitated where possible. The management system will include storage of flammable liquids and chemicals procedure (including MSDS); Hazardous materials spill procedure; and emergency response procedure.	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Low	Low
		Sensitive landscape (Wetlands)	Potential pollution of surface water resources due to pollutant and toxicant spillage and leaks may impact negatively the water resources.	An equipment management system will be introduced and operated for the life of mine. This will ensure the proper maintenance of all equipment to prevent the potential pollution of the water resource	Environmental coordinator	Throughout operational phase	Medium-low	Medium-low
		Surface water	the maintenance of equipment could result in diesel and oil spillages. If not captured the associated water could negatively impact on water resources	Wash bays and maintenance/mechanical workshop areas must be bunded and placed on a hard park area. The associated water must go through an oil trap prior to being sent to pollution control facilities. All applicable DWAF Best Practice Guidelines for surface water management must be complied with and in particular Water management measures should be undertaken in accordance with the requirements of the DWAF: Best Practice Guideline A5: Water Management for Surface Mines (July 2008).	Environmental manager and specialist contractor.	Throughout life of mine and in the event of spillage.	Medium-high	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
25	Rehabilitation as mining progresses	Soils	Replacement of soil as part of rehabilitation. Positive impact.	During rehabilitation, topsoil will be replaced in consolidated blocks and to the recommended depth. Topsoil must be replaced at a minimum depth of 300mm. In areas demarcated as moderate agricultural potential topsoil must be replaced between a depth of 600mm to 900mm and for grazing 300mm to 600mm. Quality testing on soil used for rehabilitation must be undertaken to determine fertility and acidity.	Environmental manager	During rehabilitation	Medium-high	Medium-high
			Compaction of soil during replacement.	Soil compaction will be minimize by dumping sufficient soil per square unit to allow a once-off levelling on top, which will prevent compaction lower down in the soil profile.	Environmental manager	During rehabilitation	Medium-low	Medium-low
		Land capability	Restoration of land capability as part of soil replacement and rehabilitation. Positive impact.	During rehabilitation, topsoil will be replaced in consolidated blocks and to the recommended depth. Topsoil must be replaced at a minimum depth of 300mm. In areas demarcated as moderate agricultural potential topsoil must be replaced between a depth of 600mm to 900mm and for grazing 300mm to 600mm. Quality testing on soil used for rehabilitation must be undertaken to determine fertility and acidity.	Environmental manager	During rehabilitation	Medium-low	Medium-low
		Land use	Gradual return of land use from mining to pre-mining land uses. Positive impact.	Rehabilitation must to be of a minimum of grazing land use..	Environmental manager	During rehabilitation	Medium-low	Medium-low
		Sensitive landscape (Wetlands)	Catchment area will be restored to near original size. Wetland areas will be resorted and surface and sub-surface flow dynamics restoration and ecological functioning of	Increase in catchment area and restoration of wetland soil profiles which will restore surface and sub-surface flow dynamics. Thus restoring ecological services	Environmental co-ordinator	Throughout operational phase	Medium-low	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			the wetland replaced					
		Air Quality	Replacement and compaction of soil will positively impact on dust fallout levels	Soil compaction will be minimize dust fallout levels due to the compacted soil particles not being vulnerable to being swept up by wind.	Environmental manager	During rehabilitation	Medium-low	Low
		Natural environment	rehabilitation will improve the growth of natural vegetation and limit the erosion	once topsoil has been place on the area seeding must be undertaken as soon as possible with grasses such as A standard seed-mix is 5 kg/ha of Smuts finger grass (Digitaria eriantha), 5 kg/ha of Rhodes grass (Chloris gayana) and 5 kg/ha of teff (Eragrostis tef). A second option is 10 kg/ha of love grass (Eragrostis curvula) and 5 kg/ha of teff. Any alien invasive species that establish themselves in rehabilitated areas must be removed. If compaction of the areas occur they must be ripped to encourage plant growth. Rehabilitated areas must be monitored and maintaining to prevent soil erosion as stipulated in the rehabilitation plan that is compiled as part of the closure plan for the mine.	Environmental co-ordinator	During rehabilitation	Medium-low	Low
		Fauna (mammals, birds, reptiles, insects)	rehabilitation could increase the natural habitat and thereby increase the animals influx back to their habitats	The rehabilitation plan must be adhered to as mining progresses to ensure the creation of habitats.	Environmental co-ordinator	During rehabilitation	Medium-low	Low
		Surface water	Decant - There is a possibility of water affected by AMD to decant from in-pit areas to surface water. The AMD could be transported off site and will affect surface water quality on an international scale.	When designing and mining opencast areas, the final decant point will, as far as possible, be kept above the level of spoil replacement. This is done in an effort to ensure that replaced spoils are completely flooded when groundwater levels recover to reduce the contact of spoils with air in an effort to reduce	Environmental co-ordinator	throughout the life of mine	High	Medium-high

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				oxidation. During rehabilitation, the contouring of the surface will be such as to avoid ponding of water on rehabilitated surface to reduce the infiltration of water into areas where spoils have been replaced and which are prone to AMD. Water entering the pit during the operational phase should be pumped out as rapidly as possible to minimise its contact with AMD generating material. This water should be treated and either used on site, or discharged if quality is such that it meets discharge permit conditions. All applicable DWAF Best Practice Guidelines for surface water management must be complied with and in particular Water management measures should be undertaken in accordance with the requirements of the DWAF: Best Practice Guideline A5: Water Management for Surface Mines (July 2008).				
		Surface water	Rehabilitation by means of backfilling will result in the alteration of flow dynamics and natural drainage lines. If topsoil is not vegetated this could result in soil erosion and subsequent siltation of the water resources.	It is important to ensure that natural drainage lines are restored during the rehabilitation process. The topsoil cover must be vegetated to prevent soil erosion and siltation. All applicable DWAF Best Practice Guidelines for surface water management must be complied with and in particular Water management measures should be undertaken in accordance with the requirements of the DWAF: Best Practice Guideline A5: Water Management for Surface Mines (July 2008).	Environmental co-ordinator	During rehabilitation	Medium-high	Medium-low
26	Removal of all infrastructure	Soils	Compaction of soil due to movement of heavy vehicles using during removal of infrastructure.	Heavy vehicles should be restricted to roads and areas where infrastructure is to be removed.	Environmental manager and contractor	Throughout decommissioning phase	Medium-low	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
		Sensitive landscape (Wetlands)	Potential pollution of surface water resources due to the removal of management facilities from spills and leaks may impact negatively on the water resources.	Decommissioning to take place during the dry season or during periods of low rainfall. Vehicles to make use of existing roads. All mining vehicles to be maintained to prevent spillages and leaks into the water resources. Prevent vehicles/activities from impacting on areas previously unexpected.	Environmental co-ordinator	Throughout decommissioning phase	Medium-low Positive	Medium-low
		Noise	Construction activities, including the movement of machines will affect noise levels in the area negatively	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Noise monitoring must be undertaken in accordance to Section 14.5 of the EIA Report. Switching off equipment when not in use. Decommissioning activities will be limited to daytime hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.	Environmental manager and / or contractor	Throughout decommissioning phase	Low	Low
		Natural environment	heavy trucks could destroy the vegetation	Heavy vehicles will be restricted to areas where infrastructure is to be removed.	Environmental co-ordinator	Throughout decommissioning phase	Low	Low
		Fauna (mammals, birds, reptiles, insects)	Potential destruction of small mammals' habitats when infrastructures are removed.	Heavy vehicles will be restricted to areas where infrastructure is to be removed.	Environmental co-ordinator	Throughout decommissioning phase	Low	Low
		Visual	The removal of infrastructure will improve the visual aesthetic of the area.	Ensure all infrastructure is removed from the project site and that disturbed areas are rehabilitated and vegetated.	Environmental co-ordinator	Throughout decommissioning phase	Medium-low Positive	Medium-low
	Increased vehicle and heavy machinery movement to dismantle and remove	Surface water	Hydrocarbon pollution from petrol and diesel spillages from vehicles and heavy machinery. Siltation of surface water resources from dust	All vehicles must be fitted with leak trays to contain potential spills of hydrocarbons and other chemicals. The trucks must be covered when carrying material that can create dust. The roads need to be wet to	Environmental co-ordinator	Throughout decommissioning phase	Medium-low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
	infrastructure		created when moving soils. Accidental spillages of chemicals.	prevent dust formation. The transportation, loading and storage of hydrocarbons and chemicals should be in accordance with legislation and SANS codes.				
27	Filling of final void	Sensitive landscape (Wetlands)	Restoration and rehabilitation of sub-surface and surface flow dynamics. This is only achieved if soils are separately correctly and managed and the original soil profile is restored.	The soil profile will be rehabilitated to allow for restoration of sub-surface flow dynamics. Soils not to be excessively compacted which will prevent sub-surface flow and filtration of water. Topography to be restored to the original form to restore surface flow dynamics.	Environmental co-ordinator	Throughout decommissioning phase	Medium-high	Medium-high Positive
		Air Quality	the activities regarding the backfilling of the final void will generate dust and impact on the dust fallout levels, as well as the levels of particulate matter (PM10)	When filling of final void , dedicate a water truck or large hose the filling equipment and operations and apply water as needed; or, cover or enclose stationary backfill material; if needed, mix backfill soil with water prior to moving. Empty loader buckets slowly and minimize their drop heights. Immediately after backfilling, apply soil stabilization compounds to form a crust.	Environmental manager and / or contractor	Throughout decommissioning phase	Medium-low	Low
		Noise	Construction activities, including the movement of machines will affect noise levels in the area negatively	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Noise monitoring must be undertaken in accordance to Section 16 of the EIA Report. Switching off equipment when not in use. Decommissioning activities will be limited to daytime hours. Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.	Environmental manager and / or contractor	Throughout decommissioning phase	Low	Low
		Visual	Replacement of overburden and top soil	Ensure final replacement of overburden and top soil follows the	Environmental co-ordinator	Throughout decommissioning phase	Medium-low Positive	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			will improve the visual aesthetic of the project site, thus decreasing the visual impact.	original topography prior to disturbance.				
		Surface water	Dust from transporting of and during back filling (of final void) with the stored stockpile, Alteration of the free drainage system (natural flow of water). There might be impacts created by the presence of PCD if not maintained there could be loss of capacity from siltation and subsequent overflow to the receiving environment where surface water resources can be impacted upon.	Dust formation should be prevented by covering the trucks carrying the overburden to fill the opencast void, the roads must be wet as well. The filling of the void must be controlled to maintain the correct slopes so as to prevent the alteration of a free drainage system, where there was initially a natural drainage line. The water from the PCD should be either re-cycled for use in process (beneficiation of coal), or treated to levels that can be discharged to a municipal system or nearby rivers (this must be a registered water activity). Decommissioning activities must be conducted in accordance with DWAF best Practice Guidelines: A5 Water Management Aspects for Mine Closure (December 2008).	Environmental co-ordinator	Throughout decommissioning phase	Medium-high	Medium-low
		Groundwater	Increase in recharge	Slope all areas to be free draining and re-vegetate. Decommissioning activities must be conducted in accordance with DWAF best Practice Guidelines: A5 Water Management Aspects for Mine Closure (December 2008).			Medium-high Positive	Medium-low
28	Spreading of sub-soils and topsoil	Soils	Positive impact. Replacement of soil as part of rehabilitation.	During rehabilitation, topsoil will be replaced in consolidated blocks and to the recommended depths. Topsoil must be replaced at minimum depths of 600 - 900 mm in areas demarcated as moderate agricultural potential and grazing 300mm to 600mm. Quality testing on soil used for rehabilitation must be undertaken to determine fertility and acidity.	Environmental manager	During rehabilitation	Medium-high Positive	Medium-high

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			Compaction of soil during spreading.	Soil compaction will be minimize by dumping sufficient soil per square unit to allow a once-off levelling on top, which will prevent compaction lower down in the soil profile.	Environmental manager	During rehabilitation	Medium-low	Medium-low
		Land capability	Positive impact. Restoration of land capability as part of soil replacement and rehabilitation.	During rehabilitation, topsoil will be replaced in consolidated blocks and to the recommended depth. Topsoil must be replaced at a minimum depth of 300mm. In areas demarcated as moderate agricultural potential topsoil must be replaced between a depth of 600mm to 900mm and for grazing 300mm to 600mm. Quality testing on soil used for rehabilitation must be undertaken to determine fertility and acidity.	Environmental manager	During rehabilitation	Medium-low Positive	Medium-low
		Land use	Positive impact. Gradual return of land use from mining to proportional arable and grazing pre-mining land uses.	Areas of disturbance will be rehabilitated proportionate to pre-mining land use, for example moderate agricultural potential and grazing.	Environmental manager	During rehabilitation	Medium-low Positive	Medium-low
		Sensitive landscape (Wetlands)	Restoration and rehabilitation of sub-surface and surface flow dynamics. This is only achieved if soils are separately correctly and managed and the original soil profile is restored.	The soil profile will be maintained to allow for restoration of sub-surface and surface flow dynamics. The topography should be rehabilitated to or as close as possible to the original form to restore surface flow dynamics as well as ecological functioning of the wetland units.	Environmental co-ordinator	Throughout decommissioning phase	Medium-high Positive	Medium-high
		Noise	Construction activities, including the movement of machines will affect noise levels in the area negatively	Noise barriers must be constructed to attenuate noise levels in the form of berms around the point of source. Noise monitoring must be undertaken in accordance to Section 14.5 of the EIA Report. Switching off equipment when not in use. Decommissioning activities will be limited to daytime hours. Mining-related machine and vehicles	Environmental manager and / or contractor	Throughout decommissioning phase	Low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g. installing exhaust mufflers.				
		Air Quality	The spreading of sub soils and topsoil's will disturb the soil particles. The disturbed particles could be picked up and transported by the wind as dust	When spreading the soils, pre-wet surface soils in the operation area; stabilize surface soil with the use of water or dust palliative to form a crust on soil immediately following spreading.	Environmental manager and / or contractor	Throughout decommissioning phase	Low	Low
		Natural environment	spreading of sub-soil and topsoil would restore the vegetation	during rehabilitation, topsoil will be placed according to the recommended soil profiles and specifications as stated in the rehabilitation plan which is part of the mine closure plan	Environmental co-ordinator	Throughout decommissioning phase	Low	Low
		Visual	Replacement of overburden and top soil will improve the visual aesthetic of the project site, thus decreasing the visual impact.	Ensure final replacement of overburden and top soil follows the original topography prior to disturbance.	Environmental co-ordinator	Throughout decommissioning phase	Medium-low Positive	Medium-low
		Fauna (mammals, birds, reptiles, insects)	spreading of sub-soil and topsoil would restore the vegetation and the habitats of animals	during rehabilitation, topsoil will be placed according to the recommended soil profiles and specifications as stated in the rehabilitation plan which is part of the mine closure plan	Environmental co-ordinator	Throughout decommissioning phase	Low Positive	Low
		Surface water	Siltation from dust, hydrocarbon contamination form petrol and diesel spillages and accidental spillages from other chemicals.	Road wetting, hydrocarbon and other chemicals management systems in accordance with SANS codes.	Environmental co-ordinator	Throughout decommissioning phase	Low	Low
		Groundwater	Backfilling and compacting overburden and soil will prevent infiltration and the	Ensure that rehabilitation is done properly in accordance to the rehabilitation plan as part of the mine closure plan.	Engineer and environmental coordinator	Throughout decommissioning phase	Medium-low	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			formation of AMD					
29	Re-vegetation of disturbed areas	Soils	Positive impact. Vegetation stabilises soil particles and promotes cohesion, preventing soil erosion.	Vegetation must be replaced as soon as possible after topsoil replacement using area specific species in order to prevent soil erosion.	Environmental Manager	During rehabilitation	Medium-high Positive	Medium-high
		Land capability	Positive impact. Vegetation stabilises soil particles and promotes cohesion, contributing to the restoration of pre-mining land capability.	Vegetation must be replaced as soon as possible after topsoil replacement using area specific species in order to prevent soil erosion.	Environmental Manager	During rehabilitation	Medium-low Positive	Medium-low
		Sensitive landscape (Wetlands)	The erosion potential of vegetated areas is reduced as well as runoff potential reduced. This will allow for infiltration of the vegetated areas, contribution to sub-surface flow dynamics.	Surface water velocity is reduced which will allow the water to infiltrate into the soil profile and the wetland soil will enhance the quality of available water for the system and limit erosion of the re-vegetated areas.	Environmental co-ordinator	Throughout decommissioning phase	Medium-high	Medium-high
		Air Quality	Vegetation stabilises soil particles and promotes cohesion.	Which prevents soil erosion and consequently preventing windblown dust particles.	Environmental manager and / or contractor	Throughout decommissioning phase	Medium-low	Medium-low
		Natural environment	re-vegetating areas will improve the natural environment	once topsoil has been place on the area seeding must be undertaken as soon as possible with grasses such as a standard seed-mix of 5 kg/ha of Smuts finger grass (Digitaria eriantha), 5 kg/ha of Rhodes grass (Chloris gayana) and 5 kg/ha of teff (Eragrostis tef). A second option is 10 kg/ha of love grass (Eragrostis curvula) and 5 kg/ha of teff. Any alien invasive species that establish themselves in rehabilitated areas must be removed. If compaction of the areas occurs they must be ripped to encourage plant growth. Rehabilitated areas must be	Environmental co-ordinator	During rehabilitation	Medium-low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				monitored and maintaining to prevent soil erosion as stipulated in the rehabilitation plan that is compiled as part of the closure plan for the mine.				
		Fauna (mammals, birds, reptiles, insects)	re-vegetating areas will improve the natural habitats	The rehabilitation plan must be adhered to as mining progresses to ensure the creation of habitats.	Environmental co-ordinator	During rehabilitation	Medium-low	Low
		Visual	Re-vegetation of mining areas will improve the visual aesthetic of the project site, thus decreasing the visual impact.	Ensure vegetation utilised for rehabilitation is indigenous to the area.	Environmental co-ordinator	During rehabilitation	Medium-low Positive	Medium-low
		Surface water	Re-establishment of the original (pre-mining) catchment and drainage characteristics of the mine site.	Based on the initial profile of soil pre-mining, the backfilling process much aim to achieve the same profile, the backfilled area must be vegetated and continuously monitored.	Environmental co-ordinator	During rehabilitation	Medium-low Positive	Low
30	Profiling and contouring of the area to preserve natural drainage lines	Soils	Positive impact. Restoration of natural drainage lines will prevent water logging and consequent subsidence of replaced soil.	No mitigation required.	Environmental Manager	During rehabilitation	Medium-high Positive	Medium-high
		Land capability	Positive impact. Prevention of water logging and subsidence maximises the long-term land capability.	No mitigation required.	Environmental Manager	During rehabilitation	Medium-low Positive	Medium-low
		Sensitive landscape (Wetlands)	Restoration and rehabilitation of drainage lines, seepage areas to restore the original surface flow dynamics.	Contours will be created to match the original contour profiles for the area. This will attempt to recreate surface flow dynamics and seepage areas for wetlands	Environmental co-ordinator	Throughout decommissioning phase	Medium-high Positive	Medium-high
		Noise	Machinery active during these activities will generate noise	Mining-related machine and vehicles must be serviced on a regular basis to ensure noise suppression mechanisms are effective e.g.	Environmental manager and / or contractor	Throughout decommissioning phase	Low	Low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
				installing exhaust mufflers; Switching off equipment when not in use; Decommissioning activities will be limited to daytime hours A Noise Monitoring Programme should be implemented during this phase				
		Natural environment	contouring of the area will prevent soil erosion and water run-offs	Contours must be created to match the original contour profiles for the area. Alien plants will be removed.	Environmental co-ordinator	During rehabilitation	Medium-low	Low
		Fauna (mammals, birds, reptiles, insects)	contouring of the area will prevent soil erosion and water run-offs	Contours will be created to match the original contour profiles for the area.	Environmental co-ordinator	During rehabilitation	Medium-low	Low
		Visual	The profiling of the area will improve the visual aesthetic of the project site, thus decreasing the visual impact.	Ensure profiling follows the original topography prior to disturbance.	Environmental co-ordinator	During rehabilitation	Medium-low Positive	Medium-low
		Surface water	Where natural drainage lines are restored there will be a positive gain in the catchment	Contours should be matched to those pre-mining.	Environmental co-ordinator	During rehabilitation	Medium-low Positive	Low
		Topography	Topographical contours and drainage line will be restored.	Contours will be created to match the original contour profiles for the area.	Environmental co-ordinator	During rehabilitation	Medium-low Positive	Low
31	Environmental monitoring of decommissioning activities	Sensitive landscape (Wetlands)	An aquatic bio monitoring programme will monitor potential impacts to the immediate aquatic surface ecosystem and where needed, corrective action taken and rehabilitation measures implemented.	This will allow for the determination of spatial and temporal trends regarding the integrity of the system. This will identify any long term impact to the system. The bio monitoring programme should be initiated before mining commences and is described according to the DWAF Best Practice Guidelines (G3: Water Monitoring).	Environmental co-ordinator	Throughout decommissioning phase	Medium-low Positive	Medium-high
		Air Quality	A Dust fallout monitoring programme will monitor dust fallout levels during	the monitoring programme will assess whether the rehabilitation methods are effective in reducing	Environmental manager and / or contractor	Throughout decommissioning phase	Medium-low	Medium-low

Activity		Activity and Impact Description		Mitigation	Responsible Person	Frequency/ Duration	Significance Rating	
No	Description	Affected environment	Impact	Management/Mitigation Measure			Before Mitigation	After Mitigation
			the decommissioning phase .	dust fallout levels caused by the mining activities				
		Noise	A noise monitoring programme will monitor ambient noise levels during the decommissioning phase .	the monitoring programme will assess whether the noise levels caused by the operational phase have reduced, as well as assess whether the decommissioning phase is impacting on the ambient noise levels.	Environmental manager and / or contractor	Throughout decommissioning phase	Medium-low	Medium-low
		Natural environment	Monitoring will increase the natural vegetation	an alien invasive species management programme must be implemented. In the event of signs initial erosion, erosion prevention methods must be implemented.	Environmental co-ordinator	During rehabilitation	Medium-low	Low
		Fauna (mammals, birds, reptiles, insects)	Monitoring will increase the natural habitats of animals	an alien invasive species management programme must be implemented. In the event of signs initial erosion, erosion prevention methods must be implemented.	Environmental co-ordinator	During rehabilitation	Medium-low	Low
		Surface water	monitoring will detect any negative impacts on surface water resources.	Monitoring will enable implementation of mitigation measures where surface water impacts are detected. Surface water monitoring must be conducted in accordance with DWAF best Practice Guidelines: A5 Water Management Aspects for Mine Closure (December 2008).	Environmental co-ordinator	during and after rehabilitation	Medium-low	Medium-low
		Groundwater	Failure to manage contaminated groundwater, uncontrolled decant of poor quality water	Ensure planning is adequate, ensure funds for monitoring post closure, initiate water containment or treatment as final options. Groundwater monitoring must be conducted in accordance with DWAF best Practice Guidelines: A5 Water Management Aspects for Mine Closure (December 2008).	Engineer and environmental coordinator	During rehabilitation phase	Medium-high	Medium-low

13.2 Heritage Mitigation Measures

The ultimate goal of heritage resources management is to 'promote good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so that it may be bequeathed to future generations', stipulated in the Preamble to the National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA).

Proposed mitigation and management measures must therefore comply with the General Principles contained in Section 5 of the NHRA. Proposals need to take into account all relevant cultural values and indigenous knowledge systems, material or cultural heritage value and involve the least possible alteration or loss of it. In addition, recommendations need to promote the use and enjoyment of, and access to, heritage resources, in a way consistent with their cultural significance and conservation needs and contribute to social and economic development. Mitigation measures must also safeguard the options of present and future generations with regards to heritage resources: requiring comprehensive research, documentation and recording.

To comply with these General Principles, mitigation measures are divided into two categories: Project-related mitigation and mitigation of sites/heritage resources. Depending on the value of a resource (field rating/grading) certain prescribed site mitigation measures must then be implemented.

Project-related mitigation aims to ensure conservation of heritage resources by avoiding or reducing impacts. Project-related mitigation may include:

- Implementation of feasible mitigation measures related to the Project design and planning to avoid negative changes to resources; or
- Site preservation that is essentially a no-development recommendation.

Mitigation of heritage resources may be necessary where Project-related mitigation will not conserve or preserve heritage resources, thus resulting in partial or complete changes (including destruction) to a resource. Such resources need to be mitigated to ensure that they are fully recorded, documented and researched before any negative change occurs. This may require mitigation such as:

- Intensive detailed recording of sites through various non-intrusive techniques to create a documentary record of the site;
- Intrusive recording and sampling such as Shovel Test Pits (STPs) and excavations, relocation (usually burial grounds and graves, but sites may be relocated), restoration and alteration. Any form of intrusive mitigation is a regulated permitted activity for which permits need to be issued by the relevant heritage authorities. Such mitigation may result in a reassessment of the value of a resource that could require conservation measures to be implemented. Alternatively, an application for a destruction permit may be made if the resource has been sufficiently sampled; and

- Where resources have negligible significance the specialist may recommend that no further mitigation is required and the site may be destroyed.

13.2.1 Project Mitigation Measures

Project related mitigation is limited to the adjustment of planned infrastructure footprints and routes, as far as is feasible, to avoid any impacts identified heritage resources and preserve them *in situ*. As the proposed pit locations are dependent on the distribution of the natural resources, project related mitigations may be limited in affectivity, in which case heritage related mitigation measures must be considered. A buffer of 100 m around the burial ground and potential grave is recommended to ensure no direct impacts on the heritage resources.

13.2.2 Heritage Related Mitigation

Heritage related mitigations aim to remove and/or reduce negative impacts to identified heritage resources. The following general recommendations should be implemented to mitigate impacts on any sub-surface and un-identified heritage resources:

- Chance find Procedures (CFP) be developed and integrated into the EMP in the event of accidental exposure of heritage resources during project related activities.

13.2.3 Site Specific Recommendations

13.2.3.1 Identified Heritage Resources: Low Significance

- The mine shaft should be investigated and mapped to determine the impact from the proposed pit and PCD correctly ;
- Once investigated, the mine shaft should be stabilized to ensure the heritage resource is conserved;
- Detailed recording of the historical mine shaft to ensure preservation through record;
- Establish and enforce a Conservation Management Plan (CMP) to accommodate for the systematic monitoring of *in situ* heritage resources with clearly defined management plans and actions.
- The CMP should include periodic monitoring of the mine shaft after each blasting occurrence and details actions to mitigate negative impacts.

13.2.3.2 Identified Heritage Resources: Medium significance

- Status Quo reports of the historical werfs should be completed to fully record the state of all structures related to the werfs; and
- Establish and enforce a CMP to accommodate for the systematic monitoring of the werfs after blasting occurs with clearly defined management plans and actions.
    - The CMP should include periodic monitoring of the structures within each werf after each blasting occurrence and details actions to mitigate negative impacts.

13.2.3.3 Identified Heritage Resources: High significance

- Clearly demarcate and make visible identified *in situ* burial grounds and graves to minimise the potential for accidental damage during construction and operation phases;
- A CMP must be implemented if in situ preservation of the burial grounds and graves is deemed feasible;
  - The CMP must include NHRA Regulations Chapter XI consultation to formulate a management plan for the burial ground and possible grave, which will include details on controlled access to the graves.
- Where *in situ* preservation of burial grounds and graves are not deemed feasible, the remains must be relocated in line with the principles outlined in Chapter IX and XI of the NHRA regulations.

13.3 Emergency Response Plan

13.3.1 Objectives

In the event of an emergency, an emergency response plan must be consulted. This plan will be drawn up and placed around the mine where it will be easily viewed. The plan will contain evacuation routes and a list of emergency numbers. It is advisable that the mine tests the emergency response plan by running training and simulations, to identify any weaknesses.

Emergencies that have been listed here include: accidents, fires, hydrocarbon spillages and flooding.

If the emergency has potential to affect surrounding communities, they will be alerted via alarm signals or contacted in person. The surrounding community will be informed prior to mining taking place, of the potential dangers and emergencies that exist, and the actions to be taken in such emergencies.

Communication is vital in an emergency and thus communication devices, such as mobile phones, radio's, pagers or telephones, must be available around the mine. A checklist of emergency response participants must be consulted and the relevant units notified. In this case, many of the emergency services will be sourced from Belfast, Carolina and Middelburg, the nearest towns.

The checklist includes:

- fire department;
- police;
- emergency health services such as ambulances, paramedic teams, poisons centres;
- hospitals, both local and for evacuation for specialist care;
- public health authorities;
- environmental agencies, especially those responsible for air, water and waste issues;
- other industrial facilities in the locality with emergency response facilities;
- public works and highway departments, port and airport authorities; and
- public information authorities and media organisations.

13.3.2 Emergency situations

The following is a list of potential emergencies that could occur:

13.3.2.1 Accidents

In the case of a medical accident or problem, a first aid kit will be available on the mine.

A checklist of emergency response participants must be consulted and the relevant units notified. In this case, many of the emergency services will be sourced from the nearest main town, Middelburg.

13.3.2.2 Fire

Veld fires and fires resulting from other sources must be handled with extreme caution. Fire extinguishers will be placed around the mine.

Procedure:

- The alarm will be activated to alert occupants of the mine in the event of a fire;
- In the event of a small fire the fire extinguishers placed around the mine should be used to contain and extinguish the fire;
- In the event of a large fire, the local area council's fire department will be consulted; and
- All staff will receive training in response to a fire emergency on site.

13.3.2.3 Hydrocarbon spillage

Hydrocarbons such as diesel, petrol, and oil will be kept on site as fuel for the mine machinery. In the event of a spillage, procedures must be put into place to ensure that there are minimal impacts to the surrounding environment.

Procedure:

- In the event of a small spillage, the soil will be excavated and treated;
- In the event of a large spillage, adequate emergency equipment for spill containment or collection such as additional supplies of booms and absorbent materials will be available and if required, a specialised clean-up crew will be called in to decontaminate the area; and
- After a major spill water quality samples of any water sources utilised within 500m from the spill will be monitored for hydrocarbons for the next three months on a monthly basis and further remediation recommended based on the results thereof.

13.3.2.4 Flooding

There is potential for flooding during the rainy season, but particularly November to January when severe thunderstorms can occur. This could result in a large volume of water flowing downstream and could cause major damage to equipment and endanger the lives of employees on site. Heavy rainfall could also cause the pollution control dam to overflow and could flood mine workings. If this water leaves the sites is will enter water resources on site and cause contamination. Procedures must be put in place to ensure that there is a quick response to these events and damage is kept to a minimum.

Procedure:

- DWAF's flood warning system should be reviewed annually;
- The use of emergency pumps will occur if the water floods the pits, where it may be exposed to contamination; and
- Mine management should be made aware of any such event so they can take appropriate action to ensure production losses are kept to a minimum.

13.3.3 Implementation

All emergency response procedures will be implemented on the initiation of the construction stage. All employees of the Northern Coal Weltevreden mining operation will be trained in these procedures as part of the mine induction process. Northern Coal will ensure that all emergency numbers are located in various locations around the site and these locations are known to all employees for easy accessibility in the event of an emergency.

14 Monitoring Programmes

14.1 Air Quality

14.1.1 Objectives

A baseline dust assessment was performed from October 2008 to June 2009, which was included in the EIA/EMP. The proposed air quality monitoring programme will allow for the monitoring of dust fallout of which the dust fallout will be analyzed for its weight characteristics and will go through a 30 element ICP scan. The monitoring programme will

also allow for the monitoring of particulate matter smaller than 10 micrometers (PM10). A PM10 sampler will be used to take 24hr readings (once monthly at every relevant receptor) which can then be compared with the 24hr limit standards for PM10 according to the National Environmental Management Air Quality Act no 39 of 2004 (NEMAQA). After a period of 12 months the annual average can then be compared with the annual average limit according to NEMAQA.

The primary aim of the dust monitoring programme is to measure the impact of the proposed mining operation on the dust levels especially PM10 levels which pose a health risk. The objective is to ensure that no receptors are significantly impacted, and if impacts do occur to alert management to this fact for them to action additional mitigation measures.

14.1.2 Positioning of samplers

The positions of the samplers (dust fallout as well as PM10) are essential to the interpretation of the results, and needs to take into account the surrounding sensitive receptors, historical directional wind data for the area, and topographical features that may affect the wind direction.

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 as well as the PM10 sampler is pinpointed taking into consideration the position of various sensitive receptors. For the single dust fallout samplers, the buckets are filled with distilled water and left out on site for a period of 30 days (+/- 3 days); according to SANS:1929; from there the buckets will be transported to a reputable Laboratory for analysis. As for the PM10 sampler, the sampler is left at each relevant receptor point for a period of 24 hrs once monthly throughout the life of mine.

Table 14-1 represents the relevant receptors where monitoring is to take place.

Table 14-1: Receptor points where dust fallout and PM10 monitoring is to take place

ID	X	Y	Owner	Reason
WD1	30.034179	-25.766317	Mrs Lotter	Sensitive Receptor
WD2	30.045977	-25.790865	Mr Potgieter	Sensitive Receptor
WD3	30.038270	-25.789001	Mr Kotze	Sensitive Receptor
WD4	29.999710	-25.760430	Mr Viljoen	Sensitive Receptor
WD5	29.992647	-25.782140	Mr Gerrits	Sensitive Receptor
WD6	30.011520	-25.788673	Mr Pretorius	Downwind, Sensitive Receptor

14.1.3 Frequency

The air quality monitoring programme should initiate as soon as construction commences, the buckets should be changed on a monthly basis and the PM10 monitor should monitor PM10 levels for a 24hr period at each receptor once monthly at each receptor. The monitoring programme should continue throughout the life of mine.

Incident reports will be submitted to the mine as well as to the relevant competent authority upon receipt of results exceedances. In case of no exceedance this will be confirmed.

14.1.4 Methodology

All dust fall out samples will be taken in accordance to the SANS 1929:2005 guidelines until the air quality regulations for South Africa have been finalised, after which all sampling will be done according to these guidelines. The 24hr PM10 samples will be taken in accordance with the SANS 1929:2005 guidelines, but will be assessed according to the air quality standards of the NEMAQA (Act 39 of 2004)

14.1.5 Sample Submission

All the samples must be submitted to a reputable SANAS accredited laboratory with a quality management plan.

14.1.6 Analysis

For dust fallout analysis, the analysis of samples should take place within one week of collection to ensure the accuracy of the results. The sample bucket lids should not be removed at any stage after the lid has been placed on the bucket at the site until the samples have reached the laboratory. The PM10 measurements will be read off the data logger as soon as the PM10 meter measured for a 24hr period. The constituents to be analysed for are displayed in Table 14-2.

Table 14-2: Constituents to be analysed for:

Relevant Fall-out Per Bucket	Total Fall-out Per Bucket	PM10 (24hr analysis)
mg/m²/day	mg	µg/m^3

14.1.7 Data interpretation

To assess the results, the collected dust 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. The filter is then sent through a 30 element ICP scan. As for the PM10 levels, they are assessed according to the ambient air quality standards of the NEMAQA (Act. 39 of 2004)

14.1.7.1 South African Fallout Dust Classification

Table 14-3: Fallout dust classification as per the standards set by the Department of Environmental Affairs and Tourism (DEAT)

S.A. Classification (DEAT)	mg/m²/day
Slight	<250
Moderate	251 – 500
Heavy	501 – 1200
Very heavy	>1200

Table 14-4: PM10 levels according to the ambient air quality standards (NEMAQA)

24hr Average (µg/m^3) The 24hr limit may not be exceeded by more then 3 times in a year	Annual Average (µg/m^3)
180	60

Table 14-5: Four-band scale evaluation criteria for dust deposition (After SANS 1929: 2004)

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 14-6: Target, action and alert thresholds for dust deposition (After SANS 1929: 2004)

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.

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.

Units are monitored monthly, the results are then analysed and placed into various graphs and tables that best indicate the dust fallout situation on site.

14.1.8 Reporting

A report is then compiled every three months detailing all findings and includes a full assessment of the results along with conclusions and recommendations for future monitoring on site. These reports should highlight any negative impacts on the air quality due to the mining operations as well as determine the sources of the impacts. The reports will discuss possible actions which can be used to mitigate any negative impacts. Relevant results will be graphed so that trends may be visually observed.

14.1.9 Duration

The programme will be implemented on a monthly basis for the life of the mine. This will only be altered if the sampling data indicates that either more or less sampling is to take place. The programme will be reviewed on an annual basis.

14.2 Surface Water (Hydrological)

An environmental monitoring programme has to be put in place for the assessment and management of impacts on the environment that could result from the mining activities.

14.2.1 Objectives

To monitor any possible pollution from the mine operations through continuous measurement of water quality

14.2.2 Frequency

- Sampling will be conducted on a monthly basis during the first year to establish seasonal trends; and
- After the first year of mining, sampling will be conducted quarterly.

14.2.3 Monitoring Locations

Surface water monitoring locations are shown on Plan 12 (Appendix A) and should form part of the monitoring programme.

14.2.4 Monitoring Data Handling

Water quality will be the main item that will be monitored by the surface water monitoring programme. Fluctuations in water quality will assist in identifying and informing reviews of management plans and mitigation measures. Samples will be submitted to a reputable laboratory for water quality analysis. A full analysis report on the quality of the water will be submitted to the mine management on an annual basis.

14.3 Groundwater Monitoring Programme

Groundwater management strategies for most mining and industrial activities are limited and emphasis falls on prevention of pollution rather than the treatment thereof. Early detection of contamination is the key to react and manage any possible sources of pollution effectively. This will assist in identifying potential future impacts from mining operations on the groundwater environments.

14.3.1 Water Level

Groundwater levels must be recorded on quarterly basis using an electrical contact tape or pressure transducer, to detect any changes or trends in groundwater flow direction.

14.3.2 Sampling Method and Preservation

When sampling boreholes the following procedures should be followed:

- One litre plastic bottles, with a plastic cap and no liner within the cap are required for most sampling exercises. Glass bottles are required if organic constituents are to be tested for. Sample bottles should be marked clearly with the borehole name, date of sampling, water level depth and the sampler's name;
- Water levels (mbgl) should be measured prior to taking the sample, using a dip metre;

- Each borehole to be sampled should be purged (to ensure sampling of the aquifer and not stagnant water in the casing) using a submersible pump or in the event of a small diameter borehole, a clean disposable polyethylene bailer. At least three borehole volumes of water should be removed through purging; or through continuous water quality monitoring, until the electrical conductivity value stabilizes;
- Metal samples must be filtered in the field to remove clay suspensions;
- Samples should be kept cool in a cooler box in the field and kept cool prior to being submitted to the laboratory; and
- The pH and EC meter used for field measurements should be calibrated daily using standard solutions obtained from the instrument supplier.

The constituents to be analysed for is listed in Table 14-7.

Table 14-7: Monitoring sampling analysis

Physical	Cations	Anions	Metals
pH	Calcium (Ca)	Chloride (Cl)	Aluminium (Al)
Electrical conductivity (EC)	Magnesium (Mg)	Sulphate (SO_4)	Antimony (Sb)
Total dissolved solids (TDS)	Sodium (Na)	Nitrate (NO_3–N)	Iron (Fe)
Suspended solids (SS)	Potassium (K)	Phosphate (PO_4-P)	Lead (Pb)
Total Alkalinity		Fluoride (F)	Manganese (Mn)
Ca-Mg-Hardness			Zinc (Zn)

14.3.3 Monitoring Frequency

Groundwater is a slow-moving medium and drastic changes in the groundwater composition are not normally encountered within days. Groundwater monitoring should be conducted quarterly.

Samples should be collected by an independent groundwater consultant, using best practice guidelines and should be analysed by a SANAS accredited laboratory.

Groundwater levels must be recorded on a quarterly basis to within an accuracy of 0.1m using an electrical contact tape, float mechanism or pressure transducer, to detect any changes or trends in groundwater levels.

14.3.4 Sampling Locations

The main objectives in positioning the monitoring boreholes are to:

- Monitoring of groundwater migrating away from the pit area; and
- Monitoring the lowering of the water table and the radius of influence.

Plan 13 (Appendix A) indicates groundwater monitoring points.

Additional borehole monitoring points could be selected and/or drilled during the construction phase if required.

14.3.5 Data Management

In any project, good hydrogeological decisions require good information developed from raw data. The production of good, relevant and timely information is the key to achieve qualified long-term and short-term plans. For the minimisation of groundwater contamination it is necessary to utilize all relevant groundwater data.

Digby Wells has compiled an Excel-based database during the course of this investigation and it is recommended that Northern Coal utilises this database and continuously update and manage it as new data becomes available.

Monitoring results will be captured in an electronic database as soon as results become available allowing:

- Data presentation in tabular format;
- Time-series graphs with comparison abilities;
- Graphical presentation of statistics;
- Presentation of data, statistics and performance on diagrams and maps; and
- Comparison and compliance to legal and best practice water quality standards.

14.3.6 Reporting

Based on the recorded water quality data, the data management functions as described above will be carried out and reported to mine management on a monthly basis. The contents of the report should include the monthly water monitoring results and trends at surface points, as well as comments on the effectiveness of the mitigation measures and monitoring program.

Reporting to the authorities, should be as specified in the permitting/licensing conditions.

Any accidental release of pollutants or possible polluting substances should be reported to the relevant authorities as specified in the permitting conditions.

14.4 Aquatic Monitoring

To directly measure, assess and report on the current health status and long term trends of the state of the aquatic ecosystem associated with the activities assessed in the study area, the establishment of an aquatic monitoring programme is recommended. An additional purpose of a monitoring program can be to facilitate activities by obtaining and monitoring compliance of for water user licenses. These licenses relate to the legal requirement of water users to adhere to Source Directed Control (SDC) measures which are related to established Resource Quality Objectives according the aquatic reserve for catchments (National Water Act (Act 36, 1998)).

To ensure that the futures Resource Quality Objectives, to be designated for the catchment, are attained, it is recommended that a responsibility-driven approach towards the management of the aquatic ecosystem associated with the study area be followed. The purpose for such a monitoring strategy will be to examine the long-term environmental trends of the aquatic resources associated with the mining activities in a practical and achievable manner.

The proposed indices for the monitoring strategy include IHI, IHAS, SASS5, FAII, RVI and basic in situ water chemistry. In addition to this, toxicant screening should also be implemented and where toxicants are identified definitive analysis carried out. The frequency for such a monitoring programme should be implemented bi-annually during the construction and operation phase of the project, and then annually after closure of the mine until rehabilitation of the area is satisfactory. Thereafter, any non-compliance with the Resource Quality Objectives should be identified and mitigated accordingly.

In the unlikely event of any pollution event occurring it is strongly suggested that a Pollution Action Plan be implemented and the frequency of the monitoring strategy should be adjusted accordingly. This will help to identify the source of the event and mitigation can be formulated accordingly. It is strongly recommended that an assessment of the aquatic ecosystem be conducted as soon as possible after such an event. This will help to identify the magnitude and severity of such an event on the health of the aquatic ecosystem. A follow-up survey should be conducted approximately two months after the event to determine the effectiveness of the applied mitigation measures.

14.5 Noise

It is recommended that the monitoring plan be implemented to monitor the noise levels generated by the mining activities, to ensure the levels remain are below the SANS 10103:2008 noise limits. Components to be included in the proposed monitoring plan are discussed below:

Baseline noise monitoring is to be conducted on a quarterly basis for a period of twelve months. A report must be compiled quarterly and submitted to management to ascertain compliance with the required standards. Mine management should be advised of any significant increase in the ambient sound level as operations continue. The measurement points must take into account noise sensitive receptors, such as farmsteads, schools, hospitals, churches etc. Only sensitive areas within a radius of two kilometres from the mining activities should be taken into account. The reason for the two kilometre buffer zone is because according to the Concawe method (SANS 10357) of calculating noise propagation, the specific noise levels produced by the heavy earth moving equipment and haul trucks that operate continuously will not impact beyond two kilometres. At each measurement point the ambient noise level will be sampled in terms of the following parameters:

The A-weighted equivalent sound pressure level (LAeq) for duration not less than 30 minutes per monitoring point.

Measurements to be taken during both daytime (06:00 to 22:00) and the night time (22:00 to 06:00).

Requirements:

The blasting schedule for the proposed project is required to ensure that the measurements done throughout the year can incorporate the noise levels generated by the blasting activities.

Noise sampling points used in the noise assessment (Appendix K) are shown on Plan 15 (Appendix A). Future noise monitoring should take place at these points in order to allow a comparison with baseline noise information.

14.6 Blasting and Vibration

It is recommended that a process of monitoring the blasting operations must be applied for all blasting to be done in the mine operation. This process should be to ensure that levels are within limits at all times. Early monitoring will also give indications of what ground vibrations levels are recorded at what distances and help with being proactive on the levels observed. It is proposed that at least four seismographs be placed at the positions as indicated in the Blasting Assessment (Appendix O)

15 Closure Framework and Costing

15.1 Closure objectives

Mine closure is an ongoing programme designed to restore the physical, chemical and biological quality or potential of air, land and water regimes disturbed by mining to a state acceptable to the regulators and to post mining land users. The activities associated with mine closure are designed to prevent or minimise adverse long term environmental impacts, and to create a self-sustaining natural ecosystem or alternate land use based on an agreed set of objectives. The objective of mine closure is to obtain legal (government) and community agreement that the condition of the closed operation meets the requirements of those entities, whereupon the companies' legal liability is terminated.

Closure will include some form of rehabilitation. Rehabilitation can be divided into two different streams, namely concurrent rehabilitation and final rehabilitation. Concurrent rehabilitation must be carried out along with the operations on the coal mine, and will decrease the final liability that the mine will carry at the time of closure. This concurrent rehabilitation will be carried out within the context of the EMP. Final rehabilitation will be carried out once the mine goes into its closure phase. This final rehabilitation will be carried out within the context of the closure plan (Bailie, 2006).

The closure plan should be modified and adapted as the mining project continues and more knowledge is generated about the mine environment and the impacts of the project. Consequently a more detailed closure plan will be developed as more information is available.

A coal mine will obtain a closure certificate only once it can prove that rehabilitation is satisfactory, and that if any residual pollution effects exist they can be adequately managed. It is recommended that, whatever form of rehabilitation is used, a post-closure monitoring programme is implemented before the mine applies for closure (this should be for a period of 5 years, or until the long term trends of the impacts are understood). The institution of this monitoring programme will enable the mine to identify and rectify any residual pollution impacts.

The overall closure objectives for the Weltevreden project are as follows:

- Return land, mined by open pit methods, to a land capability similar to that which existed prior to mining and that the management level required to utilise the rehabilitated land is within the means of the farmer who uses it;
- Ensure that as little water as possible seeps out of the various sections of the mine and where this is unavoidable, to ensure that the water is contained or treated if the volume is significant and if it does not meet statutory water quality requirements;
- Remove all mine infrastructure that cannot be used by a subsequent land owner or a third party. Where buildings can be used by a third party, arrangements will be made to ensure their long term sustainable use;
- Clean up all coal stockpiles and loading areas and rehabilitate these to at least a grazing capability;
- Follow a process of closure that is progressive and integrated into the short and long term mine plans and that will assess the closure impacts proactively at regular intervals throughout project life;
- Implement progressive rehabilitation measures, beginning during the construction phase wherever possible;
- Leave a safe and stable environment for both humans and animals and make their condition sustainable;
- To prevent any soil and surface/groundwater contamination by managing all water on site;
- Comply with local and national regulatory requirements;
- Form active partnerships with local communities to take care of management of the land after mining, where possible; and
- To maintain and monitor all rehabilitated areas following re-vegetation or capping and, if monitoring shows that the objectives have been met, making an application for closure.

15.2 Rehabilitation plan

The mining method that will be undertaken to remove the coal seam will be truck and shovel roll over method at an average strip ratio of 5:1. Roll over mining or strip mining is

undertaken by creating an initial cut or strip which is mined out. When mining moves forward to the second strip, the overburden from the second strip is backfilled into the initial cut. The overburden from the initial cut is used to backfill the final cut. An estimated 187.51ha will be disturbed. 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. Pit 1 will be done first; the direction of mining will be from the south-west towards the north-east as depicted by the arrow in Plan 3 (Appendix A). As mining progresses in a north-easterly direction, the overburden from each new strip must be used to back-fill the previously mined void. This must be done until the last strip is mined out. Then the overburden from the first strip must be transported and filled into the last void. This will apply to Pit 2 and Pit 3. As each strip is filled, the soils must be replaced in horizons and re-vegetated. This concurrent rehabilitation must be carried out along with the operations on the mine, and will decrease the final liability that the mine will carry at the time of closure. Rehabilitation at closure will involve the removal of infrastructure and final rehabilitation of the mined out areas as per the closure plan.

Thus rehabilitation must be an ongoing process throughout the life of the mine, until finally the entire area is rehabilitated when mining concludes.

15.2.1 Action Points

- Rehabilitate strips as they are filled;
- Rehabilitate soils;
- Re-vegetate strips;
- Shape mined out area to retain natural functioning of topography;
- Prevent soil erosion;
- Remove all mine infrastructure as per the closure plan;
- Clean up all coal stockpiles and loading areas and rehabilitate these to at least a grazing capability.
- Implement progressive rehabilitation measures, beginning during the construction phase wherever possible;
- Maintain and monitor all rehabilitated areas following re-vegetation or capping; and
- The rehabilitation plan should be updated annually.

15.3 Post Closure Land Use

For the purposes of this plan, the final land use post-closure for the Weltevreden project at this stage is to return the land back to at least a land use capability of grazing or wilderness using the SA Chamber of Mines Guidelines. Although closure occurs once operations cease, rehabilitation measures should take place as soon as construction commences and should continue through each phase of the project.

15.4 Activities for closure

15.4.1 Stockpile areas

The objective is to ensure that the area is not a source of pollution after closure of the mine. This will be achieved by:

- Removal of all stockpiled coal from the site;
- The sacrificial coal layer will be removed and the area topsoiled and vegetated to ensure no erosion takes place; and
- The area must be monitored thereafter to ensure that vegetation is established.

15.4.2 Open pit pits/strips

The environmental objective of the pit is to make it as safe as possible for humans and animals at closure, to affect the required water control and to achieve the highest land capability possible.

- Infilling of the pit/strips will occur as mining progresses and subsequent spoils rehabilitation will also take place for the areas which can only be accessed at the end;
- Material will be replaced in the reverse order to which it has been removed;
- If a certain lithology could significantly affect water quality it should be buried below the final expected water table; and
- The areas that have been infilled will be shaped to reduce the likelihood of ponding occurring on surface and to blend in with the surrounding topography.

15.4.3 Infrastructure areas

- All portable infrastructure will be removed off the site;
- Structures that require demolishing such as the hard park area will be demolished to 1m below ground level for areas which cannot be used by a subsequent land user;
- The rubble will either be buried on site provided it will not have any detrimental impacts on water quality; and
- All areas will be shaped and topsoiled with 300mm of topsoil and vegetated.

15.4.4 Pollution control dams

- The pollution control dam will become evaporation dams (wilderness land) at and after closure. During decommissioning activities, dirty water will continue to be fed into it, but once the area has been fully rehabilitated and maintained for three years, run-off from these areas will be accepted to be clean and allowed to discharge. The

pollution control dam will only then receive seepage from the dump and rainfall that falls directly into it;

- It will be covered by a layer of soil that will be able to support plant growth under a normal level of farm management; and
- All surface water, which will be considered to be clean water and meets the necessary catchment objectives after vegetation has established itself, will be diverted past the pollution control dam into the catchment.

15.4.5 Access roads

Access roads around the site should be ripped for all areas except those needed to access the facilities for inspection after closure. Wherever there are access roads that should be useable by the surface owner, these should be left.

15.4.6 Power line and electrical infrastructure

The environmental objective is to remove all infrastructure not required by future users of the property.

All onsite electrical reticulation infrastructure should be removed from site or, if the property of Northern Coal, should be sold and disposed of. The regional power line will be the property of Eskom and should remain on site for future use as it will serve the other customers around the area.

15.4.7 Post closure monitoring

Monitoring of possible decant from the pits will be required post closure as this may have a significant impact on surface water.

15.4.8 Air quality

The dust fallout stations should be maintained for a period of 5 years after closure or until a long term trend is established. If it is known that dust in excess of the baseline levels is occurring then the source of this dust will be established and suitable mitigation measures should be instituted.

15.4.9 Water monitoring

Surface and groundwater monitoring should continue for a period of at least 5 years after the cessation of production activities or until the pre-mining models are verified and the impacts from the various facilities are understood. Monitoring will continue further if results indicate a lack of compliance with water quality objectives. These water monitoring points should be left open for future monitoring by authorities if required, with suitable access control.

15.4.10 Social aspect

The social impact of the mine closure should be managed for a period of 3 years after final closure to ensure that any plans and closure activities related to training of staff and resettling of staff have proved successful. Also the surface owners should be consulted with for a period of 3 years to ensure that they know how to maintain the various facilities which are remaining. The community development impact should be monitored for a period of 3 years after closure. A trust will be set up to fund community projects.

16 Conclusion

The aim of the EIA process and the related studies is to provide adequate information to the decision makers to make an informed decision on the proposal.

The necessary social and environmental studies were conducted assess the impacts on the physical, biological and social environments within the proposed mining area. The impacts that mining is expected to have on these different environments have been assessed using a detailed quantitative impact assessment methodology. Mitigation measures and monitoring programs were generated and are included to assist in minimising and avoiding the negative impacts and maximising the benefits of the proposed mining operation.

Some of the more significant positive and negative impacts that are expected to result from the Weltevreden Project include the following:

- Alteration to topography from open pit pits and rehabilitation will have a negative impact on the topography of the site;
- Disturbance to the geological sequence and removal of coal. This is a permanent impact and mitigation will not be possible;
- Increase in erosion potential to soils from surface disturbance and vegetation removal. This could result in the loss of topsoil;
- Loss of the natural soil structure and soil properties from handling and contamination;
- Loss of the current agricultural land use and loss of high agricultural potential land;
- AMD could result in deterioration of surface and groundwater resources after closure;
- The establishment of the open pit may dewater the surrounding aquifers;
- The open pit areas will result in the destruction of habitats. A buffer zone will be required around the wetland areas and aquatic ecosystems to minimise/prevent impacts on them;
- Modification of hydrological processes will occur in areas where dewatering will take place; and
- Positive impacts are expected in terms of employment (limited), skills development, regional spending, and contribution to taxes, implementation of the Social and

Labour Plan and the continuous supply of coal to Eskom to ensure electricity generation.

Taking into consideration the position of the proposed mining area within the catchment, it is recommended that direct impacts to the wetland areas be restricted to the proposed open pit areas only and mining activities adhere to the 1:100 year floodlines and described buffer zones. Additionally, the functioning of the wetland areas which will be lost and should be artificially created so as to ensure the survival of the remaining wetland areas and larger system as a whole, ensuring water quality provision and enhancement services continue.

In Mpumalanga 45% of the land is classified as high agricultural potential and the proposed Weltevreden Project will result in the loss of high potential agricultural land.

From the information gathered during the EIA process it can be concluded that the proposed mine's overall impact on the natural environment will be of a medium significance. If all the mitigation measures, management and monitoring procedures recommended in this report are adhered to, the impacts will significantly be reduced.

17 Undertaking

UNDERTAKING BY APPLICANT TO COMPLY WITH THE PROVISIONS OF THE ACT AND THE REGULATIONS THERETO AND THE COMMITMENTS WITHIN THE EMP

I, ……, the undersigned and duly authorised thereto by…… have studied and understand the contents of this document in its entirety and hereby duly undertake to adhere to the conditions as set out therein.

Signed at……on this……day of……

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Appendix A: Plans

Appendix B: Public Participation Process Documents and Information

DIGBY WELLS ENVIRONMENTAL

Appendix C: Soil, Land Capability and Land Use Assessment Report (2009)

DIGBY WELLS ENVIRONMENTAL

Appendix D: Flora and Fauna Assessment Report (2014)

DIGBY WELLS ENVIRONMENTAL

Appendix E: Flora and Fauna Assessment Report (2009)

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Appendix F: Wetland Assessment Report (2014)

Appendix G: Wetland Assessment Report (2008)

Appendix H: Surface Water Assessment Report (2014)

Appendix I: Geohydrology Assessment Report (2011)

Appendix J: Air Quality Impact Assessment Report (2009)

Appendix K: Noise Impact Assessment Report (2009)

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Appendix L: Heritage Impact Assessment Report (2014)

DIGBY WELLS
ENVIRONMENTAL

Appendix M: Archaeological Impact Assessment Report (2008)

DIGBY WELLS
ENVIRONMENTAL

Appendix N: Baseline Socio-Economic Report (2014)

DIGBY WELLS
ENVIRONMENTAL

Appendix O: Blasting and Vibration Assessment Report (2008)

Appendix P: Sustainability Assessment Report (2009)