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ENVIRONMENTAL

Proposed Development of an Open Pit Coal Mine and Associated Infrastructure near Bronkhorstspruit, Gauteng

Final Scoping Report

Authority Reference Numbers:

Provincial Authority GDARD: 002/14-15/0171

National Authority DEA: 12/9/11/L45315/3

DMR: GP 30/5/1/2/2 (10027) MR

Project Number:

FOU2191

Prepared for:

Oakleaf Investment Holdings 95 (Pty) Ltd

June 2015

Digby Wells and Associates (South Africa) (Pty) Ltd
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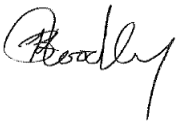
This document has been prepared by Digby Wells Environmental.

Report Type:	**Final Scoping Report**
Project Name:	**Proposed Development of an Open Pit Coal Mine and Associated Infrastructure near Bronkhorstspruit, Gauteng**
Project Code:	**FOU2191**

Name	Responsibility	Signature	Date
Mamane Moeketsane	Report Writer		May 2015
Kasantha Moodley	1st Review		May 2015
Grant Beringer	2nd Review		May 2015

NON-TECHNICAL SUMMARY

Introduction

Oakleaf Investment Holdings 95 (Pty) Ltd (Oakleaf) is proposing to develop and operate a new open pit coal mine and associated infrastructure on the farm Wachtenbietjeskop 506 JR, located near the town of Bronkhorstspruit in north eastern Gauteng (hereafter referred to as the project).

Digby Wells Environmental (Digby Wells) was appointed by Oakleaf as the independent environmental assessment practitioner to undertake the required environmental regulatory processes for the project. Oakleaf requires the following environmental approvals prior to commencing with the project:

- Mining Right (MR) in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), as amended (MPRDA);
- Environmental Authorisation (EA) in terms of the Environmental Impact Assessment (EIA) Regulations of June 2010 (GN R. 543), as amended and promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 2008), as amended (NEMA);
- Waste Management Licence (WML) in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA); and
- Integrated Water Use Licence (IWUL) in terms of the National Water Act, 1998 (Act No. 36 of 2008), as amended (NWA).

An integrated EIA process will therefore be undertaken for the project. An EIA is described as a *systematic process of identifying, assessing and reporting environmental impacts associated with an activity*.

The objective of this Final Scoping Report is to identify the key environmental and social risks and impacts associated with the proposed Oakleaf open pit coal mine and to focus the environmental assessment on key issues and ensure that reasonable and feasible project alternatives have been identified.

Project Location

The project is situated approximately 5.5 km north-east of the town Bronkhorstspruit and falls within the jurisdiction of the City of Tshwane Metropolitan Municipality in Gauteng.

The project's mining activity will be located on Portions 1 (also referred to as portion 70), 69, 75, 76 and 87 of the farm Wachtenbietjeskop 506 JR. A list of the farm portions which may be directly affected due to the proposed mine and support infrastructure is provided in Table 1. The total project footprint is 320 hectares (ha), approximately 250 hectares (ha) will be mined and 73 ha required for associated mine infrastructure.

Table 1: Project Affected Properties

Surveyor General Code	Farm Name	Farm Number	Portion Number
T0JR00000000050600069	Wachtenbietjeskop	506 JR	69
T0JR00000000050600001	Wachtenbietjeskop	506 JR	1 (70)
T0JR00000000050600075	Wachtenbietjeskop	506 JR	75
T0JR00000000050600076	Wachtenbietjeskop	506 JR	76
T0JR00000000050600123	Wachtenbietjeskop	506 JR	123
T0JR00000000050600124	Wachtenbietjeskop	506 JR	124
T0JR00000000050600150	Wachtenbietjeskop	506 JR	150
T0JR00000000050600087	Wachtenbietjeskop	506 JR	87
T0JR00000000050600139	Wachtenbietjeskop	506 JR	139
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T0JR00000000050600122	Wachtenbietjeskop	506 JR	122
T0JR00000000051500000	Resurgam	515 JR	R
T0JR00000000051500001	Resurgam	515 JR	1
T0JR00000000050600138	Wachtenbietjeskop	506 JR	138
T0JR00000000050600125	Wachtenbietjeskop	506 JR	125
T0JR00000000049100012	Tweefontein	491 JR	12

Project Description

The coal reserves to be mined consist of approximately 30 million tons of coal, which will be mined over 17 years. It is estimated that the Run of Mine (RoM) coal will have an average yield of 65 to 70 % for an export grade product and the remainder will be discarded as waste.

It is planned for the coal resource to be mined using open pit methods, using a combination of the strip and bench mining techniques. Bench mining involves the development of the open pit through a series of benches at varying depths. Strip mining involves the movement of overburden laterally to an adjacent empty pit where the mineral has already been extracted. The mining operations will occur at a depth ranging from 9 m to 76 m below ground. The proposed project will include two open pits and mining is planned to commence at the northern pit.

Topsoil and subsoil will be stripped using an excavator and will be stored in separate stockpile areas around the mine. Drilling and blasting will be employed for the hard overburden or bedrock to expose the coal seam. The overburden will be excavated and stockpiled separately for rehabilitation. The mined coal from the open pit will be transported via the haul roads and stored on the RoM stockpile area. The coal will be fed into a crushing plant and washing plant with a conveyor after which the coal product will be temporarily stored at the product stockpile are before being transported to the new proposed rail siding for distribution to the relevant markets.

The proposed mine will require support infrastructure such as water storage, sewage treatment, power supply, fuel storage, hauls roads, offices, security etc.

As part of the project development, existing infrastructure would need to be re-aligned, these include:

- Distribution powerline with a capacity of 11kV; and
- Water supply pipeline between the Wilge River pump station to Magalies Water in Cullinan.

The construction phase of the project will take approximately 1 year to complete and will include site establishment and the construction of all infrastructure, including the development of the box cut. The operations phase of the project will be approximately 15 years with production expecting to peak between year 3 and year 12 with approximately 1.8 million tonnes of coal produced. The decommissioning and closure phase will take approximately 5 years.

Project Alternatives

The Scoping Phase aims to identify and screen alternatives to ensure that they are reasonable and feasible and which can be assessed in further detail during the EIA Phase. The nature of the mineral reserve determines the mining method and the location of the feasible reserve to be mined determines the location of the mining operation. These two factors limit the project alternatives that are available for assessment. The following alternatives have been identified:

- Alternative infrastructure layouts (i.e. rail siding);
- Alternative operational activities (i.e. coal transfer via conveyor to a new rail siding or hauling coal to the existing rail siding in Bronkhorstspruit); and

- No-go alternative.

These alternatives will be further assessed during the EIA Phase.

Potential Project Impacts

Potential negative project impacts identified include impacts to the following resources and/or receptors:

- Loss of and degradation of natural habitat (fauna and flora);
- Deterioration of the quality of aquatic habitat through surface water run-off;
- Loss of high agricultural potential land and deterioration of the soil profile;
- Deterioration of the quality of surface and ground water resources;
- Deterioration of the ambient air quality;
- Destruction of identified/unidentified heritage sites;
- Impact on sense of place/perceptions;
- Deterioration of surrounding road network due to increased traffic; and
- Nuisance impacts associated with increased noise and vibration/blasting.

Potential project positive impacts identified include:

- Skills development through employment;
- Direct and indirect employment with an associated source of income;
- Local economic development initiatives; and
- Contribution to the regional and national economy through royalties and taxes.

On completion of this scoping exercise, specialist studies have been identified to conduct detailed assessments to determine the significance of impacts associated with the project. A list of the specialists studies proposed for the EIA Phase is presented in Table 2 below.

Table 2: EIA Specialist Studies

Biological	Physical	Social
Fauna and Flora	Soils and Land Capability	Socio-economic
Aquatic Ecology	Wetlands	Public participation
	Surface Water	Closure
	Groundwater	Heritage
	Air Quality	Visual

Biological	Physical	Social
	Rehabilitation	Traffic
		Noise
		Blasting and Vibration

Public Participation Process

For the Scoping Phase, the Draft Scoping Report (DSR) was made available to the public for review and comment between 02 March and 05 May 2015. A public meeting was held on Thursday, 19 March 2015 between 3 and 5 pm at the NG Church Hall in Bronkhorstspruit where the content of the DSR was presented and discussed. Furthermore, a landowners meeting was held on Wednesday, 18 March 2015 between 10 and 12 pm at the NG Church Hall.

Comments and questions received during the commenting period were captured in a Comment and Response Report (CRR) and incorporated in this Final Scoping Report. The public commenting period for this Final Scoping Report commences on ***03 June 2015 and concludes on 24 June 2015.*** This Final Scoping Report is available for public review at:

- Bronkhorstspruit Public Library;
- Eskia Mphahle Library; and
- Digby Wells Environmental Website - www.digbywells.com (Public Documents).

Please remember to submit your comments on this Final Scoping Report by **24 June 2015**. All comments must be forwarded to the following:

Nestus Bredenhann or **Vanessa Viljoen** of Digby Wells Environmental:

Fax Number: 086 583 5715

Email: nestus.bredenhann@digbywells.com / vanessa.viljoen@digbywells.com

Website: www.digbywells.com

Postal Address: Private Bag X10046, Randburg, 2125

All comments received on this Final Scoping Report will be incorporated into the Draft Environmental Impact Assessment Report/ Environmental Management Programme which will be made available to all project stakeholders for a period of 60 days. The Draft Environmental Impact Assessment Report/ Environmental Management Programme with comments received from project stakeholders will be submitted to the Gauteng Department of Agriculture and Rural Development (GDARD) and the Department of Environmental Affairs (DEA) for consideration and decision making.

ACRONYMS AND ABBREVIATIONS

µg/m^3	Micro grams per cubic meter
ABA	Acid Base Accounting
AMD	Acid Mine Drainage
Bgl	Below Ground Level
BID	Background Information Document
CEC	Cation Exchange Capacity
CoT	City of Tshwane
C Plan	Conservation Plan
CRR	Comments and Response Report
dBA	Decibels
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DoE	Department of Energy
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation (previously Department of Water Affairs)
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
FEL	Front End Loader
FSR	Final Scoping Report
GDARD	Gauteng Department of Agriculture and Rural Development
GN R.	Government Notice Regulation
Ha	Hectare
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IBA	Important Bird Area
IDP	Integrated Development Plan
IWUL	Integrated Water Use Licence

IWULA	Integrated Water Use Licence Application
IWWMP	Integrated Water and Waste Management Plan
kV	Kilovolt
LDV	Light Duty Vehicle
LED	Local Economic Development
LHD	Load-Haul-Dump
LoM	Life of Mine
m^3	Cubic Metres
mS/m	Millisiemens per Metre
MAE	Mean Annual Evaporation
mamsl	Metres above mean sea level
MAP	Mean Annual Precipitation
Mg/l	Milligrams per litre
Mm	Millimetres
Mm/a	Millimetres Per Annum
MPRDA	Minerals and Petroleum Resources Development Act, Act No. 28 of 2002
MRA	Mining Right Application
NAAQS	National Ambient Air Quality Standards
NEMA	National Environmental Management Act, Act No. 107 of 1998
NEMBA	National Environmental Management: Biodiversity Act, Act No. 10 of 2004
NEMWA	National Environmental Management: Waste Act, Act No. 59 of 2008
NFEPA	National Freshwater Ecosystem Priority Area
NGO	Non-Governmental Organisation
NID	Notice of Intent to Develop
NWA	National Water Act, Act No. 36 of 1998
PCD	Pollution Control Dam
PES	Present Ecological Status
PHRA-G	Provincial Heritage Resources Agency - Gauteng
PM	Particular Matter
PoS	Plant of Study
PPB	Parts Per Billion
PPM	Parts Per Million

PPP	Public Participation Process
PR	Prospecting Right
RoM	Run of Mine
SAHRA	South African Heritage Resources Agency
SANS	South African National Standards
SLP	Social and Labour Plan
SSC	Species of Special Concern
TOR	Terms of Reference
Tph	Tonnes Per Hour
Tpm	Tonnes Per Month
VIA	Visual Impact Assesment
WML	Waste Management Licence

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1 Introduction

Oakleaf Investment Holdings 95 (Pty) Ltd (Oakleaf) is proposing to develop and operate a new open pit coal mine and associated infrastructure on the farm Wachtenbietjeskop 506 JR, located near the town of Bronkhorstspruit in north eastern Gauteng (hereafter referred to as the project).

Digby Wells Environmental (Digby Wells) was appointed by Oakleaf as the independent environmental assessment practitioner to undertake the required environmental regulatory processes for the project. Oakleaf requires the following environmental approvals prior to commencing with the project:

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An integrated EIA process will therefore be undertaken for the project. An EIA is described as a *systematic process of identifying, assessing and reporting environmental impacts associated with an activity*.

1.1 Report Objectives

This Final Scoping Report (FSR) forms part of the EIA process and aims to identify those environmental issues and concerns that require investigation. This FSR addresses the scoping phase requirements of the NEMA and NEM:WA. The objectives of this FSR are to:

- Outline the project and regulatory process to be followed;
- Provide the need and desirability of the project;
- Describe the biophysical and socio-economic baseline of the project area;
- Consider feasible alternatives to the project and/or project activities;
- Identify the potential impacts that should be investigated further during the EIA process;
- Provide information to authorities and to interested and affected parties (I&APs)/stakeholders on the Project to allow them to comment and raise issues of concern; and

- Present the results of the Scoping Phase for the project and subsequently, to recommend a Plan of Study for the EIA phase.

1.2 Project Location

The project is situated approximately 5.5 km north-east of the town Bronkhorstspruit and falls within the jurisdiction of the City of Tshwane Metropolitan Municipality in Gauteng. (Refer to Plan 1 for the regional setting and Plan 2 for a local setting in Appendix A).

The properties that are likely to be directly affected by the project have been listed in Table 1-1. The project's mining activity will be located on Portions 1(70), 69, 75, 76 and 87 of the farm Wachtenbietjeskop 506 JR. Approximately 250 hectares (ha) will be mined and 73 ha required for associated mine infrastructure of the 320 ha project area.

Table 1-1: Project Affected Properties

Surveyor General Code	Farm Name	Farm Number	Portion Number
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T0JR00000000050600125	Wachtenbietjeskop	506 JR	125
T0JR00000000049100012	Tweefontein	491 JR	12

(Refer to Plan 3 in Appendix A for the land tenure).

The geographical co-ordinates for the mining area project boundary are as follows:

- Lat = 25°46'17.08"S and Long = 28°47'36.89"E
- Lat = 25°46'31.62"S and Long = 28°48'24.52"E
- Lat = 25°48'15.37"S and Long = 28°47'53.84"E
- Lat = 25°47'22.24"S and Long = 28°47'5.28"E

The current land use of the affected farm portions is predominantly agricultural land. Maize production and cattle grazing are also found within the project area. There are no major industrial developments found within the project boundary. The Bronkhorstspruit River flows along the southern section of the project area.

The proposed project site can be accessed via a well maintained gravel road, off the R25 Bronkhorstspruit – Groblersdal road.

1.3 Project Background and Overview

A Prospecting Right (PR) for the farm Wachtenbietjeskop 506 JR was issued to Muhanga Mines (Pty) Ltd on 14 November 2007, who renewed the PR on 12 November 2012 (Ref: GP 30/5/1/1/2(292). The PR area granted was 602.7 hectares (ha) and included portions 69, 1 (70), 74, 75, 76 and 87 of the farm Wachtenbietjeskop 506 JR. Muhanga Mines commenced with a drilling exploration programme in 2008 and approximately 26 boreholes were drilled and analysed.

In 2013, Muhanga Mines ceded the PR to Oakleaf via a Section 11 cession in accordance with the MPRDA. Oakleaf therefore currently holds the PR and commenced with a separate drilling exploration programme which involved drilling an additional 34 boreholes within the PR area[1].

[1] *It should be noted that Oakleaf is currently undertaking a separate application for a Prospecting Right (PR) on the farm portions located to the east and north of the proposed project. The PR application is being undertaken independently and is therefore not related to this application for a Mining Right on the proposed project site.*

Oakleaf now plans to develop and operate a new open pit coal mine within the PR area. A Mining Right Application (MRA) was submitted to the Department of Mineral Resources (DMR) in September 2014. It is planned for the coal resource to be mined using open pit methods, using the bench mining and strip mining techniques. Bench mining involves the development of an open pit through a series of benches at varying depths. Strip mining involves the movement of overburden laterally to an adjacent empty pit where the mineral has already been extracted. The proposed mine and supporting infrastructure will cover a total area of 320 ha and it is intended that the open pit mining operations will occur at a depth ranging from 9 m to 76 m below ground. The proposed project will include two open pits and mining is planned to commence at the northern pit.

The mining process will involve the stripping of topsoils and subsoils for rehabilitation purposes. Bedrock will be drilled and blasted to expose the coal seams; this hard material will also be stockpiled for rehabilitation. The coal seams will then be drilled and blasted and transported to a processing plant for screening and washing. The coal product will be transported via haul roads or a conveyor system to a proposed new rail siding. Oakleaf may however transport coal to the existing Bronkhorstspruit rail siding for the first 2 to 3 years of mine operation. These proposed options are discussed further in Section 5.

The project will also require support infrastructure including water storage dams, sewage treatment facilities, haul roads, power supply, fuel storage etc. Section 4 provides a detailed project description. Refer to Plan 4 in Appendix A for the detailed mine infrastructure plan.

1.4 Project Applicant

Oakleaf Investment Holdings 95 (Pty) Ltd (Oakleaf) forms part of the Canyon Group of Companies for which Canyon Coal functions as the operational division. Canyon Coal is a well-established South African mining company. Since the inception of their first operating mine in 2009, Canyon Coal has brought two additional mines online. The Bronkhorstspruit project constitutes one of two future projects said to come online in near future, pending environmental and other authorisations.

The details of the project applicant are provided in Table 1-2 below:

Table 1-2: Project Applicant Details

Project applicant:	Oakleaf Investment Holdings 95 (Pty) Ltd
Responsible position	Project Manager
Contact person:	Mr. Clifford Hallatt
Physical address:	7th Floor, Fredman Towers, 13 Fredman Drive, Sandown, 2196

Postal address:	PO Box 653749, Benmore, 2010		
Telephone:	011 035 0800	**Cell:**	084 468 8559
Fax:	087 230 5552	**Email**	c.hallatt@canyoncoal.com
Website:	www.canyoncoal.com		

1.5 Environmental Assessment Practitioner

Digby Wells and Associates (Pty) Ltd was formed in January 1995. Digby Wells employs a large team of professional consultants and administrative staff to provide a comprehensive Environmental and Social service. Digby Wells has extensive experience in providing services to South African clients, with the focus predominantly on the Mineral Resources and Energy sectors in Africa. Services are provided over the entire life cycle of an operation from early engagement prior to exploration, securing of exploration rights in the specific jurisdiction, services during the exploration phase, pre-feasibility study, definitive feasibility study, construction, operational phase, closure planning and implementation, as well as post closure monitoring.

The details of the independent Environmental Assessment Practitioner (EAP) are detailed in Table 1-3 below:

Table 1-3: Details of the EAP

EAP	Kasantha Moodley		
Responsible position	Project Manager/ EAP		
Physical address:	Fern Isle, Section 5, 359 Pretoria Avenue, Randburg		
Postal address:	Private Bag X10046, Randburg, 2125		
Telephone:	011 789 9495	Cell:	082 290 1440
Fax:	011 789 9498	Email address:	kasantha.moodley@digbywells.com
EAP Expertise:			
Kasantha Moodley has completed her B.Sc (Honours) in Environmental Science at the University of Witwatersrand. She is a Senior Environmental Consultant within the Environmental and Legal Services Department at Digby Wells Environmental. Kasantha has eight years of relevant experience in the field of Environmental Management. Her key area of expertise lies in undertaking			

environmental permitting applications and the planning and management thereof. Kasantha has a working knowledge of the South African regulatory guidelines and has been involved in a number of EIA processes.

Kasantha is a member of the International Association for Impact Assessment (IAIA) South Africa. Kasantha has also applied for registration as an independent environmental assessment practitioner with the Interim Board of Environmental Assessment Practitioners of South Africa.

The following team members have also been involved with the compilation of this FSR, their details are provided in Table 1-4 and Table 1-5 below.

Table 1-4: Project Team Member

Name:	Grant Beringer		
Responsible position	Project Sponsor/Director		
Physical address:	Fern Isle, Section 5, 359 Pretoria Avenue, Randburg		
Postal address:	Private Bag X10046, Randburg,2125		
Telephone:	011 789 9495	Cell:	082 906 6099
Fax:	011 789 9498	Email address:	grant@digbywells.com
EAP Expertise:			
Grant Beringer is a shareholder of Digby Wells and the Manager of the Projects Department. He has a Master of Science Degree from the University of Johannesburg, where he also completed his undergraduate BSc. studies in Geology, Geography and Environmental Management. Grant has been with Digby Wells since 2004 and has managed many projects within South Africa. His key functions within the company are Closure Cost Assessments, Closure Planning and Project Management.			

Table 1-5: Details of Team Member

Name:	Mamane Moeketsane
Responsible position	Project Administrator
Physical address:	Fern Isle, Section 5, 359 Pretoria Avenue, Randburg
Postal address:	Private Bag X10046, Randburg,2125

Telephone:	011 789 9495	Cell:	078 331 6553
Fax:	011 789 9498	Email address:	mamane.moeketsane@digbywells.com
EAP Expertise:			
Mamane is a junior consultant at Digby Wells Environmental within the Environmental Legal Services Department. She holds a BSc (Hons) in Environmental and Water Sciences from the University of the Western Cape. Mamane is involved in the writing of proposals and reports for a variety of projects, including Integrated Water Use Licence Applications (IWULA), Environmental Impact Assessment (EIA) Reports and Section 102 Amendments in terms of the Mineral and Petroleum Resources Development Act. In addition, she assists with field work and general administrative functions within the Department.			

2 Administrative Framework

This section identifies and describes the legislation and guidelines that are relevant to the project and to which the project must comply before any mining and/or construction activities may commence. This final scoping report will be subjected to the requirements of the NEMA, NEM:WA and NWA.

2.1 National Legislation

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

Under section 24 of the Constitution of the Republic of South Africa, it is clearly stated that:

Everyone has the right to (a) an environment that is not harmful to their health or well-being; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that -

(i) Prevent pollution and ecological degradation;
(ii) Promote conservation; and
(iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

Oakleaf has appointed Digby Wells as the independent environmental assessment practitioner to undertake the necessary EIA process to determine the impacts associated with the project. As part of the EIA process, mitigation measures and monitoring plans will be recommended to ensure that any potential impacts are managed to acceptable levels to support the rights as mentioned above. These mitigation and monitoring measures will be compiled into an Environmental Management Programme (EMP).

2.1.2 National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA)

The National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA), as amended, was set in place in accordance with section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making for issues affecting the environment. Section 24(1)(a) and (b) of NEMA state that the potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.

The Environmental Impact Assessment (EIA) Regulations, Government Notice Regulation (GN) R543 were published on 18 June 2010 and promulgated on 2 August 2010. Together with the EIA Regulations, the Minister also published GN R 544 (Listing Notice No. 1), GN

R545 (Listing Notice No. 2) and GN R 546 (Listing Notice No. 3) in terms of sections 24(2) and 24D of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended. These three listing notices set out a list of identified activities which may not commence without an Environmental Authorisation from the relevant Competent Authority through one of the following processes:

- Regulation GN R. 544 - Listing Notice 1 (as amended): 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 (as amended): 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 (as amended): 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.

These Listed Notices have been reviewed against the project activities to determine the likely triggers. The listed activities which are potentially triggered under the abovementioned Listing Notices are provided in Table 2-1 below.

The Department of Environmental Affairs (DEA) has published new EIA Regulations (GN R982) that came into effect on 8 December 2014. According to Chapter 8 (Transitional Arrangements) of GN R.982, pending applications in terms of the previous NEMA regulations (June 2010) must be undertaken in terms of those regulations. Furthermore, the transitional arrangements also make provision for listed activities that were not identified in terms of the previous NEMA regulations. These new listed activities may be authorised as if it were applied for, on condition that all potential impacts associated with the new activity or activities have been adequately assessed. The following activities, listed in terms of GN R. 984, will therefore be assessed as part of the project:

- (18) Any activity including the operation of that activity which requires a mining right as contemplated in sections 22 and 24 respectively of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure and structures, directly related to the extraction of a mineral or petroleum resource: and
- (22) An activity including the operation of that activity associated with the primary processing of a mineral resource including winning, extraction, classifying, concentrating, crushing, screening and washing but excluding the reduction, smelting, beneficiation, refining, calcining or gasification of the petroleum resource.

Table 2-1: Listed Activities Triggered by the Project (NEMA)

Government Notice	Activity No	Listed Activity	Project Relevance
GNR 544	Activity 9	The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water - (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more, excluding where: a. such facilities or infrastructure are for bulk transportation of water, sewage or storm water or storm water drainage inside a road reserve; or b. where such construction will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse.	An existing water pipeline traverses the Project site and will need to be re-routed to avoid the proposed mining areas. The diameter of the pipeline is approximately 0.6 metres and exceeds 1000 metres with a throughput greater than 120 litres per second. The water pipeline is owned by Petra Diamonds and transports clean water to its Cullinan Mine.
GNR 544	Activity 10	The construction of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more	The project proposes the construction of a substation on the project site to connect to an existing Eskom distribution powerline with a capacity of 88 kilovolts. The project area falls outside urban areas thus triggering this activity.
GNR 544	Activity 11	The construction of (iii) bridges and (iv) dams where such construction occurs within 32 metres of a watercourse measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	The proposed haul roads/conveyor systems and proposed rail siding will traverse over the Bronkhorstspruit and will require a crossing in the form of a bridge. There are dams located on the site which will be used to source water.
GNR 544	Activity 12	The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 19 of	As part of the proposed mining activities, two pollution control dams will be constructed as well as a slurry dam for the management of polluted water.

Government Notice	Activity No	Listed Activity	Project Relevance
		Notice 545 of 2010.	
GNR 544	Activity 13	The construction of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 80 but not exceeding 500 cubic metres.	As part of the proposed mine operation, fuel will be required to power machinery and equipment on site.
GNR 544	Activity 18	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from: (i) a watercourse	The proposed haul roads/conveyor systems and proposed rail siding will traverse over the Bronkhorstspruit and will require a crossing in the form of a bridge. The crossing will require the movement of material from the banks of the Bronkhorstspruit.
GNR 544	Activity 22	The construction of a road, outside urban areas: (i) with a reserve wider than 13.5 metres or, (ii) where no reserve exists where the road is wider than 8 metres.	The Project will include the construction of an access road and a haul road, it is expected that these roads will be greater than 8 metres wide.
GNR 544	Activity 26	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).	The Project activity may require the translocation or removal of a protected vegetative or fauna species.
GNR 544	Activity 47	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre - (i) where the existing reserve is wider than 13.5 metres; or (ii) where no reserve exists, where the existing road is wider than 8 metres – excluding widening or lengthening occurring inside urban areas.	The site will be accessed via an existing road which may require lengthening into the project site.
GNR 544	Activity 55A	The construction of facilities for the treatment of effluent, wastewater or sewage with a	A sewage treatment plant is proposed to be constructed on the Project site for the management of

Government Notice	Activity No	Listed Activity	Project Relevance
		daily throughput capacity of more than 2000 cubic metres but less than 15 000 cubic metres.	sewage waste from the ablution facilities.
GNR 545 (18 June 2010), as amended	Activity 5	The construction of facilities or infrastructure for any process or activity which requires a permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent and which is not identified in Notice No. 544 of 2010 or included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.	A Water Use Licence Application (WULA) will be applied for, for the abstraction and use of water from the Bronkhorstspruit and borehole water as well as the proposed crossing of the Bronkhorstspruit. Water Use Licences will also be required for the two pollution control dams on site.
GNR 545 (18 June 2010), as amended	Activity 6	The construction of facilities or infrastructure for the bulk transportation of dangerous goods - (iii) in solid form, outside an industrial complex, using funiculars or conveyors with a throughput capacity of more than 50 tons day.	The Project will involve the transport of coal product from the product stockpile to the proposed rail siding, which may be located beyond the proposed mining right area.
GNR 545 (18 June 2010), as amended	Activity 11	The construction of railway lines, stations or shunting yards, excluding - (i) railway lines, shunting yards and railway stations in industrial complexes or (iii) additional railway lines within the reserve of an existing railway line.	A proposed rail siding will be used to transport coal product off site for export. There are currently four location options under consideration for the proposed rail siding.
GNR 545 (18 June 2010)	Activity 15	Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more; except where such physical alteration takes place for: (i) linear	The proposed mining activities will occupy approximately 120 ha of the project site.

Government Notice	Activity No	Listed Activity	Project Relevance
		development activities; or (ii) agriculture or afforestation where activity 16 in this Schedule will apply.	
The Bronkhorstspruit and its tributaries are an ecologically sensitive area within the Gauteng province; the following activities have therefore been identified.			
GNR 546	Activity 2	The construction of reservoirs for bulk water supply with a capacity of more than 250 cubic metres.	The project will include the construction of water storage dams, pollution control dams and slurry dam.
GNR 546	Activity 4	The construction of a road wider than 4 metres with a reserve less than 13.5 metres.	The Project will include the construction of an access road and a haul road, it is expected that these roads will be greater than 8 metres wide.
GNR 546	Activity 12	The clearance of an area of 300 square metres or more of vegetation where 75 % or more of the vegetative cover constitutes indigenous vegetation.	The proposed mining activities will occupy approximately 120 ha of the Project site.
GNR 546	Activity 13	The clearance of an area of 1 hectare or more of vegetation where 75 % or more of the vegetative cover constitutes indigenous vegetation except where such removal of vegetation is required for: (1) the undertaking of a process or activity included in the list of waste management activities published in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which the case activity is regarded to be excluded from this list. (2) The undertaking of a linear activity falling below the thresholds mentioned in Listing Notice 1 in terms of GN No. 544 of 2010.	The proposed mining activities will occupy approximately 120 ha of the Project site.
GNR 546	Activity 14	The clearance of an area of 5 hectares or more of vegetation where 75 % or more of the	The proposed mining activities will occupy approximately 120 ha of the Project site.

Government Notice	Activity No	Listed Activity	Project Relevance
		vegetative cover constitutes indigenous vegetation except where such removal of vegetation is required for: (1) purposes of agriculture or afforestation inside areas identified in spatial instruments adopted by the competent authority for agriculture of afforestation purposes; (2) the undertaking of a process or activity included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the activity is regarded to be excluded from this list; (3) the undertaking of a linear activity falling below the thresholds in Notice 544 of 2010.	
GNR 546	Activity 16	The construction of: (i) jetties exceeding 10 square metres in size; (ii) slipways exceeding 10 square metres in size; (iii) buildings with a footprint exceeding 10 square metres in size; or (iv) infrastructure covering 10 square metres or more where such construction occurs within a watercourse or 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	The proposed conveyor systems and proposed rail siding will traverse over the Bronkhorstspruit.
GNR 546	Activity 19	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.	The site will be accessed via an existing road which may require lengthening into the Project site.

In view of the activities listed, it has been identified that a full EIA process is required for the project. An application for the above-listed activities has been submitted to the Gauteng

Department of Agriculture and Rural Development (GDARD), which is the relevant Competent Authority in terms of this application for Environmental Authorisation. The application was acknowledged by GDARD on 21 November 2014 with reference 002/14-15/0171.

2.1.3 National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA)

Waste management activities in respect of which a Waste Management Licence (WML) is required are to be undertaken in accordance with section 20 (b) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA).

On 29 November 2013 the Minister of Water and Environmental Affairs repealed the list of waste management activities published under GN R718 of 3 July 2009 (GN R718) and replaced it with a new list of waste management activities under GN R921 of 29 November 2013. Included in the new list of waste activities are activities listed under Category A, B and C. These activities include inter alia the following:

- Category A describes waste management activities requiring a Basic Assessment process to be carried out in accordance with the EIA regulations supporting an application for a waste management licence; and
- Category B describes waste management activities requiring an Environmental Impact Assessment process to be conducted in accordance with the EIA regulations supporting a waste management licence application.
- Category C describes waste management activities that do not require a WML but these activities will have to comply with the prescribed requirements and standards as prescribed by the Minister, which includes the Norms and Standards for Storage of Waste, 2013. These activities include the storage of general waste at a facility with a capacity to store in excess of 100 m^3; and storage of hazardous waste in excess of 80 m^3.

The waste management activities that may be triggered by the project are listed in Table 2-2 below.

Table 2-2: Listed Activities Triggered by the Project (NEM:WA)

Government Notice	Category and Activity	Listed Activity	Project Relevance
GN 921	Category B(1)	The storage of hazardous waste in lagoons excluding storage of effluent, wastewater or sewage.	The coal slurry generated from the coal washing plant will be stored in a slurry dam.
GN 921	Category B(7)	The disposal of any quantity of hazardous waste to land	The disposal of processed coal discards generated from the coal washing plant onto the discard

			dump on site. It is anticipated that 37 500 tpm to 42 000 tpm of coal discard will be produced.
GN 921	Category B(10)	The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity)	*The construction of the discard dump and slurry dams where the coal discards and slurry will be disposed of respectively.*

Based on the activities listed, it has been identified that a full EIA process is required for the project. An application for the above-listed activities has been submitted to the DEA, who is the relevant Competent Authority in terms of this application for a WML. The application was acknowledged by DEA on 15 December 2014 with reference 12/9/11/L45315/3.

A waste classification process will be undertaken in line with the Waste Classification and Management Regulations (GN R. 634) of August 2013.

2.1.4 National Water Act, 1998 (Act No. 36 of 1998) (NWA)

The National Water Act (Act No. 36 of 1998) (NWA) provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA.

The proposed mine is investigating the use of the existing municipal Sewage Treatment Plant (STP) as a possible water source for the mine. This will be supported by the construction of a water pipeline over the Bronkhorstspruit River. It is also expected to traverse other tributaries which fall within the proposed mining area. For this reason, an Integrated Water Use Licence Application (IWULA) and an associated Integrated Water and Waste Management Plan (IWWMP) are required in terms of Section 21 of the National Water Act, 1998 (Act No. 36 of 1998) (NWA). The IWULA is to be completed and submitted to the Department of Water and Sanitation (DWS) as the decision making authority.

The water uses described in Section 21 of the NWA which may be triggered in relation to the project are listed below:

- S21(a) – Taking water from a water resource;
- S21(b) – Storing water;
- S21(c) – Impeding or diverting the flow of water in a watercourse;
- S21(g) – Disposing of waste in a manner which may detrimentally impact on a water resource;

- S21(i) – Altering the bed, banks, course or characteristics of a watercourse; and
- S21(j) – Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

The IWULA will be submitted to the DWS during the EIA phase.

2.1.4.1 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, no person or persons may dispose of any substance that may cause water pollution.

Regulation 5 states that no person or persons 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 contravened, the user should apply for an exemption from the provisions of regulations 4 and 5 from the Minister.

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

Oakleaf has completed and submitted a Mining Right Application in terms of the Mineral and Petroleum Resources Act, 2002 (Act No.28 of 2002) (MPRDA), as amended, to the Department of Mineral Resources (DMR). The DMR has provided the acceptance of the application on 21 January 2015 with reference GP 30/5/1/2/2 (10027) MR. In terms of the MPRDA, an application for a mining right must be supported by various documents, including a Scoping Report, EIA and EMP. A separate scoping report and EIA report will thus be compiled to meet the requirements of the MPRDA. This process will however run in parallel to this EIA process undertaken to meet the requirements of NEMA, NEM:WA and the NWA.

2.1.6 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA)

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) regulates the management and conservation of the biodiversity of South Africa within the framework provided under NEMA. This Act also regulates the protection of species and ecosystems that require national protection and also takes into account the management of alien and invasive species. This Act works in accordance with the framework set under NEMA. The following regulations which have been promulgated in terms of the NEM:BA are also of relevance:

- Alien and Invasive Species Lists, 2014 published (GN R599 in *GG* 37886 of 1 August 2014);
- National Environmental Management: Biodiversity Act, 2004: Threatened and Protected Species Regulations;
- National list of Ecosystems Threatened and in need of Protection under Section 52(1)(a) of the Biodiversity Act (GG 34809, GN 1002, 9 December 2011).

As part of this project, a flora, fauna, wetlands and aquatic assessment will be undertaken to determine the current status of the environment and to determine any potential ecological sensitivities to be avoided and/or mitigated.

2.1.7 National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM:AQA)

The prevailing legislation in the Republic of South Africa with regards to the Air Quality field is the National Environment Management: Air Quality Act (Act No. 39 of 2004) (NEM: AQA). According to the Act, the DEA, the provincial environmental departments and local authorities (district and local municipalities) are separately and jointly responsible for the implementation and enforcement of various aspects of NEM: AQA.

A fundamental aspect of the new approach to the air quality regulation, as reflected in the NEM: AQA is the establishment of National Ambient Air Quality Standards (NAAQS). These standards provide the goals for air quality management plans and also provide the benchmark by which the effectiveness of these management plans is measured. The NEM: AQA provides for the identification of priority pollutants and the setting of ambient standards with respect to these pollutants.

The project will need to abide by these standards, where relevant.

2.1.8 National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)

The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) is the overarching legislation that protects and regulates the management of heritage resources in South Africa. The Heritage Resources Management (HRM) approach developed and implemented by Digby Wells is founded on Section 38(1) and 38(2) of the NHRA. These sections of the NHRA require that HRAs, in this case the South African Heritage Resources Agency (SAHRA) and Gauteng Provincial Heritage Resources Authority (PHRA-G), be notified as early as possible of any developments that may exceed certain minimum thresholds. The heritage specialist is required to provide the SAHRA and PHRA-G with sufficient information regarding the proposed development to determine whether a comprehensive Heritage Impact Assessment (HIA) is required. SAHRA and PHRA-G should respond within 14 days advising whether or not a HIA is required, and if required should state which specialist studies should be included.

The NHRA furthermore affords general and formal protection of certain categories of heritage resources, including:

- Formal protection:
  - National and provincial heritage sites under Section 27;
  - Certain types of protected areas under Section 28; and
  - Heritage areas under Section 32.
- General protection:
  - Certain structures under Section 34;
  - Archaeological and palaeontological resources, and meteorites under Section 35;
  - Certain categories of burial grounds and graves under Section 36; and
  - All public monuments and memorial under Section 37.

Any activity that will result in the change of the status quo of any heritage resources protected in terms of the above sections of the Act, must be considered as a *permitted activity.* Changes to such resources will therefore require authorisation through permits issued by either SAHRA or PHRA-G.

Digby Wells completed and submitted the NID to the SAHRA (Case ID: 6669) and PHRA-G in October 2014 for Statutory Comment in accordance with section 38(2) of the NHRA. Statutory comment from SAHRA was received on 10 December 2014. SAHRA requires that a HIA be completed and submitted to SAHRA and PHRA-G prior to the development.

The HIA must include:

- A Phase 1 archaeological assessment and any other applicable heritage components;
- A palaeontological desktop assessment and/or letter of exemption from a Palaeontologist; and
- Identification of heritage sites, assessment of significance, and recommendations for appropriate mitigations.

2.1.9 Additional National Legislation

The undertaking of an EIA is not only subjective to the regulations mentioned under NEMA, the MPRDA, the NWA, NEM:WA and the listed national legislative requirements above. There are other national regulations which may need to be adhered to in relation to the project stipulated in this report. These include:

- The Hazardous Substances Act, 1973 (Act No. 15 of 1973);
- The Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);
- The National Road Traffic Act, 1996 (Act No 93 of 1996);
- The Mine Health and Safety Act, 1996 (Act No. 29 of 1996):
- National Veld and Forest Fire Act,1998 (Act No. 101 of 1998);

- Environmental Conservation Act, 1989 (ECA), 1989 (Act No. 73 of 1989);
- National Forests Act, 1998 (Act No. 84 of 1998), specifically with reference to Protected Tree species;
- Employment Equity Act, 1998 (Act No. 55 of 1998);
- Basic Conditions of Employment Act, 1997 (Act No. 75 of 1997);
- Labour Relations Act, 1995 (Act No. 66 of 1995); and
- Skills Development Act (Act No. 97 of 1998) as amended.

2.2 Provincial Legislation

2.2.1 Gauteng Nature Conservation Bill (2013)

This Bill aims to provide for the sustainable utilisation and protection of biodiversity within Gauteng and to provide protection of wild and alien animals; protected plants; aquatic biota and aquatic systems; protected and alien invertebrates; preservation of caves, cave formations, cave biota and karst systems.

As mentioned above, this project will include a flora, fauna, wetlands and aquatic assessment will be undertaken to determine the current status of the environment and to determine any potential ecological sensitivities to be avoided and/or mitigated.

2.3 Local By-Laws

The specific by-laws which would be of relevance to the project would include the City of Tshwane (CoT) Sanitation By-Law (2003) and the Solid Waste By-Law (2005) which provide for applications to the CoT for the provision of sanitation and waste management services.

These applications and agreements will be considered once the EIA process has been completed.

2.4 Guidelines

The project shall strive to meet the principles as defined in the guidelines below.

2.4.1 National Development Plan (2012)

In 2010/11 the national government initiated a series of dialogue sessions which were aimed at understanding the challenges that the country faced. The outcome of these sessions was a National Development Plan (NDP) which emphasizes the need to reduce poverty and eliminate inequality to address the challenges identified. The NDP provides a vision for the society that South Africa aspires for in 2030. Central to the NDP are the following areas of intervention:

- Bringing about faster economic growth, higher investment and greater labour absorption;

- Promoting active citizenry to strengthen development, democracy and accountability;
- Focus on key capabilities of people and the state;
- Building a capable and developmental state;
- Encouraging strong leadership throughout society to work together to solve problems; and
- Uniting all South Africans around common programme to achieve prosperity and equality.

2.4.2 Accelerated and Shared Growth Initiative for South Africa (AsgiSA)

The Initiative was launched in 2003 with the vision to halve poverty and unemployment among the country's population by 2015. The Initiative is considered one of the key vehicles driving South Africa's economic policy and subsequent development plans. The primary aims of AsgiSA are to:

- Target specific sector strategies and initiatives (including mining) to further stimulate economic growth and job creation;
- Obtain balanced growth in the country's economy;
- Invest in infrastructure as a way to stimulate economic growth and job creation, and lay the foundation for fast-tracking expansion of the national economy;
- Invest in education and skills development;
- Eliminate the second economy (informal sector) by expanding women's access to economic opportunities, promote Small, Medium and Micro-sized Enterprises (SMMEs); and
- Improve the small business regulatory environment and promote youth development.

2.4.3 The New Economic Growth Path Framework (New Growth Path)

The New Growth Path for South Africa was launched by Government in 2010. In short, the policy is aimed at enhancing and facilitating growth, employment creation and equity. The policy's principal target is to create five million jobs over the next decade.

Central to the New Growth Path is a massive investment in infrastructure as a critical driver of jobs across the economy. The framework identifies investments in five key areas namely: energy, transport, communications, water and housing. Sustaining high levels of investment in these areas will create jobs in construction, operation and maintenance of infrastructure.

The Framework identifies five priority areas as part of the infrastructure programme to create jobs through a series of partnerships between the State and the private sector; one of these areas includes *Mining which c*alls for increased mineral extraction and improving infrastructure and skills development. It focuses support for beneficiation on the final manufacturing of consumer and capital goods, which can create large-scale employment.

2.4.4 Environmental Management Framework for the Olifants and Letaba Rivers Catchment Area (2009)

The governing authorities developed the EMF with the objective of ensuring that future development is sustainable as well as monitoring and controlling the cumulative impacts of anthropogenic activities on the natural environment. The process began by establishing a status quo of the environment in the Olifants and Letaba Rivers Catchment Area, and based on the information gathered in the status quo process the EMF was divided into eight (8) Environmental Management Zones as indicated below:

- Zone A: The Highveld / Energy hub area;
- Zone B: The Highveld to Bushveld transition area;
- Zone C: The Groblersdal / Marble Hall agricultural area;
- Zone D: Springbok flats rural area;
- Zone E: Rural Sekhukhune / Platinum mining focus area;
- Zone F: Nature conservation / tourism focus area;
- Zone G: Tzaneen / Phalaborwa activity corridor; and
- Zone H: Dry rural lowveld area.

The main reason for the division of the EMF into 8 environmental management zones came from the realisation that the EMF has different areas made of different environmental features and each presenting specific opportunities and challenges.

The project site falls within Management Zone B and one of the highlighted opportunities for the said zone is the mining of coal. Various specialists' studies will be undertaken as part of the EIA process with the objective of identifying and assessing potential impacts. Measures to mitigate and minimise negative environmental impacts as well as enhance positive impacts will be recommended.

2.4.5 The Tshwane Open Space Framework (2005)

The Tshwane Open Space Framework (TOSF) was approved by the CoT in November 2005. It consists of three (3) volumes:

- Volume 1: An analysis of the current Open Space situation within Tshwane;
- Volume 2: Open Space Vision, Policy, Metropolitan and Regional Open Space Plans; and
- Volume 3: Implementation Strategies (Alienation, Alternative Service Delivery, Open Space Development, Road Reserve and Safety).

The TOSF defines Open Space as *areas predominantly free of building that provide ecological, socio-economic and place-making functions at all scales of the metropolitan area*. Of particular importance is the value placed on all watercourses, referred to as Blue Ways, in

the city irrespective of the character and order. The value of Blue Ways is their ability to maintain natural hydrological and ecological cycles such as conserving aquatic systems, recharging underlying aquifers and preventing flooding. Aquatic, wetlands, hydrological and geo-hydrological studies will be undertaken as part of the EIA phase. These studies will identify the roles that the watercourses have on the environment and the community.

2.4.6 Provincial Growth and Development Strategy (PGDS)

The PGDSs (of which there is one for each province of South Africa), are aligned with the NDP, NSDP, National Infrastructure plan and all provincial policies that have bearing on development. The Gauteng Employment, Growth and Development Strategy 2009 - 2014 guides provincial development and aims to establish a prosperous, sustainable growing provincial economy to reduce poverty and improve social development (Gauteng Province, 2003).

2.4.7 Gauteng Strategy for Sustainable Development (GSSD) (2007)

This is a strategy devised by the Gauteng Provincial Government which outlines the desired state of sustainable development in Gauteng. The GSSD outlines the path to be followed by the public sector, private sector and the civil society sector to steer the Gauteng Province towards a more sustainable direction. As a private entity, Oakleaf has a responsibility to ensure that the project meets the requirements of the GSSD guidelines through the project life-cycle.

2.4.8 Gauteng Spatial Development Framework (GSDF)

The GSDF is used as a tool for forward planning to direct decisions within the domain of land development. The approval of the GSDF in terms of the Local Government Municipal Systems Act (Act No. 32 of 2000) implies that the GSDF has statutory status as the lone spatial planning instrument in the province, and as such should be considered the primary frame of reference to which the PGDS, IDPs and SDFs should be aligned with. In broad terms, the GSDF:

- Indicates the spatial implications of the core development objectives outlined in the PGDS;
- Serves as a spatial plan that facilitates local economic development (LED);
- Lays down strategies, proposals and guidelines as these relate to overall sustainable development;
- Facilitates cross-boundary co-operation between municipalities and provinces;
- Serves as a manual for integration and standardisation of the planning frameworks across all spheres of provincial government; and
- Informs the City of Tshwane Metropolitan Municipality's (CTMM) Spatial Development Framework with specific regards to the location and nature of the physical development.

2.4.9 Regional Spatial Development Frameworks

In 2011 the CoT embarked on a process to compile seven Regional Spatial Development Frameworks (RSDF's) for the administrative planning regions of within metropolitan area in 2011. The RSDF's are inter-linked and aligned with the 2012 CoT SDF as well as the Tshwane City Development Strategy, 2005 Tshwane Densification and Compaction Strategy and Tshwane Open Space Framework. The provisions of RSDF for Region 7 are to:

- Indicate where public and private development infrastructure investment should take place;
- Indicate desired development and land use patterns for different areas;
- Indicate where development of particular land uses should be discouraged or restricted;
- Provide broad indication of the areas where priority spending should take place; and
- Provide guidelines for development and land use decision-making.

The primary growth management tool contained in the SDF is the urban edge, which is used to counter urban sprawl and unplanned expansion, encourage densification and protect natural resources within the city.

2.4.10 Integrated Development Plans

An IDP is a municipal-level planning document that aims to provide a developmental framework for regional and local government, in which municipalities must provide leadership, management, budgeting, and direction in the provision of services and infrastructure. They serve to guide developmental planning and community development. Municipal IDPs highlight local needs and priorities that could be considered by the project.

2.4.11 Additional Guidelines

The guidelines listed below are also of relevance to the project and will be considered during the EIA process:

- South Africa's National Biodiversity Strategy and Action Plan (NBSAP);
- National Spatial Biodiversity Assessment (NSBA);
- DWAF: Best Practice Guidelines;
- DEAT Air Quality Guidelines; and
- SANS 10103:2008 The Measurement and Rating of Environmental Noise with Respect to Land Use, Health, and Annoyance and to Speech Communication.

3 Project Need and Desirability

3.1 Need for the Project

According to the Department of Energy (DoE) South Africa's energy resource is dominated by coal. Approximately 77 % of South Africa's primary energy needs are provided by coal resources[2]. This resource also provides a considerable source of foreign revenue from exports which represented over R 50.5 billion in 2011. The coal mining industry is also responsible for significant levels of direct and indirect employment in South Africa with approximately 78 600 people employed directly in coal mining in 2011[3].

Given South Africa's abundant coal resources particularly in the Waterberg basin, South Africa is likely to continue to include coal as a significant part of its energy mix. This is particularly beneficial in light of South Africa's development priorities of job creation and economic growth as per the National Development Plan (2012).

According to the South African Coal Road Map (July, 2013), the available data suggests that sufficient coal resources are available to supply all required grades of coal to power stations in the Central Basin until the mid-2020s. There is however significant uncertainty associated with the timing, capacity and projected qualities of new mines, as well as the probability of some of these resources going to export. It has been noted that the early closure of existing coal-fired power stations are not feasible, particularly in light of the recent rolling load shedding. Many of the existing coal-fired power stations will need a supply of coal well into the 2030's with four stations needing significant volumes of coal beyond 2040. The South African Coal Road Map (July 2013) has therefore identified the need for new coal mines to be built in either the Central Basin or Waterberg to secure supply to the existing power stations. It is however recognised that there are several alternatives to the current power generation activities, including renewable energy which reduces the demand on non-renewable resources like coal.

The coal mined from the proposed mine will be crushed and graded into various sizes for different intended uses. The coal product will be used locally in the power generation and metallurgical industries as well exported.

3.2 Project Benefits

The project will result in several benefits both at the local and national levels. The estimated operational cost over the first 10 years of the project is R 295 million primarily for the procurement of labour, goods and services. Further to this, the national economy is also expected to benefit through the export of the coal resources and the resulting foreign revenue over the Life of Mine (LoM) which is approximately 15 years. Other annual

[2] http://www.energy.gov.za/files/coal_frame.html, accessed on 13 November 2014

[3] The South African Coal Road Map, July 2013

regulatory costs to be incurred by the proposed project include the payment of royalties (roughly 3 % of profits), rates and taxes and further R 650 000 will be spent annually to comply with mining health and safety regulations, and almost R 1.8 million on occupational health and safety.

The local economy will be boosted by the creation of job opportunities. The planned labour complement, once the mine is fully operational, is expected to be 250 employees (mine and contractor employees). Oakleaf's recruitment policy is based on the South African Mining Charter, which dictates that a considerable proportion (40 %) of a mining operation's employees should be recruited from historically disadvantaged communities and where necessary, receive appropriate skills training (DMR, 2004). Employees recruited from local historically disadvantaged communities should also represent vulnerable groups such as women and people with disabilities. It is Oakleaf's intention to achieve the Mining Charter's targets, including the employment of at least 10 % females (DMR, 2004).

As part of this project, Oakleaf has drafted a Social and Labour Plan (SLP) which outlines the Local Economic Development (LED) programmes set for the surrounding community. The main priority of the LED programmes is to improve the educational facilities within the surrounding communities. As part of its LED planning, Oakleaf also intends to implement measures to advance procurement from Historically Disadvantaged South African (HDSA) suppliers and will continually seek to allocate a substantial amount of annual expenditure in services and consumables to suppliers with this status. The commitment to purchasing will also extend to create long term partnerships with suppliers so as to mentor and support local HDSA-owned businesses. Over a ten year period, just over R 4.5 million will be spent on Human Resource Development (HRD), and R 3.1 million on LED. A total of almost R 7.7 million has been assigned to the execution of the SLP for the first ten years of the project.

The proposed Oakleaf coal mine intends to develop a Skills Development Plan which will aim to address the proposed mine's operational requirements and also cater to employees' future employment aspirations. Underlying the envisaged skills development plan is the overarching objective of enabling current HDSAs to be equipped to apply for increasingly senior level and ultimately management positions at the mine. This will be done through a series of programmes which will help improve the skills of the community such as Adult Basic Education and Training (ABET), portable skills development initiatives, learnership programmes, mentorship plans and bursaries.

4 Project Description

The project involves the development of a new open pit coal mine and supporting infrastructure. The raw coal, once extracted, will be transported to a processing plant for screening and washing. The coal product will be either transported via haul roads or a conveyor system from the product stockpile area to a proposed new rail siding or the existing Bronkhorstspruit siding. The proposed mine will require support infrastructure such as water storage, sewage treatment, power supply, fuel storage, hauls roads etc.

This section aims to provide a detailed description of the project and its associated components. Refer to Plan 4 in Appendix A for the detailed mine infrastructure plan.

4.1 Mining Activity

4.1.1 Mineral Resource

The project is located within the isolated sedimentary basins on the north western border of the Witbank Coalfield. The general geology is of the Karoo Supergroup with accompanying Ecca formation structures such as sandstone, shale and dolerite intrusions from time to time (Jaco-K Consulting, 2010).

The coal bearing resource comprises of two coal seams (No. 2 and No. 1 coal seams) with a combined average coal thickness of 12.75 m. Within the project area Seam 2 is split into an Upper and Lower ply. Both Seam 2 Upper and Seam 2 Lower have the largest resource area with Seam 2 Lower having the better coal quality. Seam 1 is also split into an Upper and Lower ply of which only the Upper ply has continuous coal to form a resource. The Seam 1 Upper coal qualities are considered to be good quality. The No. 1 seam in general is of poorer quality while the No. 2 coal seam is of higher quality.

The coal reserves to be mined consist of approximately 30 million tons of coal, which will be mined over 17 years. It is estimated that the Run of Mine (RoM) coal will have an average yield of 65-70 % for an export grade product and the remainder will either be rewashed in the processing plant and/or discarded as waste.

4.1.2 Mining Method

It is planned for the coal resource to be mined using open pit methods due to the depth of the coal reserve below ground. Bench mining and strip mining techniques have been proposed. Bench mining involves the development of an open pit through a series of benches at varying depths. Strip mining involves the movement of overburden laterally to an adjacent empty pit where the mineral has already been extracted. The proposed mine and supporting infrastructure will cover a total area of 320 ha and it is intended that the open pit mining operations will occur at a depth ranging from 9 m to 76 m below ground. The proposed project will include two open pits and mining is planned to commence at the north pit.

Topsoil and subsoil will be stripped using an excavator and will be stored in separate stockpile areas around the mine. Drilling and blasting will be employed for the hard overburden or bedrock to expose the coal seam. The overburden will be excavated and stockpiled separately for rehabilitation. The mined coal from the open pit will be transported via the haul roads and stored on the RoM stockpile area. The coal will be fed into a crushing plant and washing plant with a conveyor after which the coal product will be temporarily stored at the product stockpile area before being transported to the new proposed rail siding for distribution to the relevant markets. A temporary discard dump containing a six month capacity will be constructed to store discard before being either rewashed or backfilled into mined out areas.

4.2 Support Infrastructure

The proposed mine would require additional infrastructure and services to support the proposed mining operation.

4.2.1 Stockpile Areas

Topsoil, subsoil and overburden material will be excavated and stored on site for rehabilitation. The mined coal will also need to be temporarily stored on a RoM stockpile and a product stockpile area. The specifications of these proposed stockpile areas have been provided below.

4.2.1.1 Topsoil

There are two topsoil stockpile areas proposed with a planned stockpile height of 3.22 m and a slope angle of 36 °. The anticipated volume of material to be stored ranges between 60 000 and 73 000 m^3. The footprint area required for the topsoil stockpile ranges between 1.8 and 2.2 ha.

4.2.1.2 Subsoil

There will be three subsoil stockpile areas proposed with a planned stockpile height of 8.79 m and a slope angle of 36 °. The anticipated volume of material to be stored ranges between 31 000 and 64 000 m^3. The footprint area required for the topsoil stockpile ranges between 3.5 to 7.3 ha.

4.2.1.3 Overburden Material

There is one overburden stockpile planned with a proposed height of 9.16 m and a slope angle of 36 °. The anticipated volume of material to be stored is 63 000 m^3 with a footprint area of 6.9 ha.

4.2.1.4 ROM and Product Stockpile

The RoM stockpile area will be approximately 1.6 ha with a planned stockpile height of 1.5 m and a volume of 24 038 m^3. The RoM will also have a slope angle of 36 °.

The product stockpile area is approximately 19 ha in area.

4.2.2 Process Plant

4.2.2.1 Screening and Crushing

RoM coal will be fed to the process plant by means of a feeder bin at the RoM pad. Coal will be fed into the bid by means of a Front End Loader (FEL). The first stage of the process plant is to screen the coal into various particle sizes. This is done by the use of a 1.5 x 2.5 m primary vibrating grizzly screen fitted with 80 mm bar spacing. The coal fraction of 250 x 80 mm fraction will be discharged into a primary double roll crusher, which will reduce the oversize fraction to 90 mm in size. The primary crusher product will re-join the grizzly undersize fraction which feeds into a secondary 1.8 x 6.0 m double deck screen fitted with 60 and 50 mm bar spacing. The oversize (+75 mm) fraction will be fed to a secondary double roll crusher, the crushed product will be returned to the primary screen feed conveyor belt, in a closed crushing circuit.

4.2.2.2 Coal Washing and Processing

The eventual crushed and screened undersize fraction (-75mm) will be fed to the cyclone, drum and spiral sections of the wash plant which will then be deposited onto a product stockpile. The washing section will have a capacity of 250 tonnes per hour (tph) and will operate during mining hours.

The slurry from the thickener underflow will report to the filter press and make up 12 % to 15 % of the plant feed. The Dense Media Separation (DMS) plant will be capable of a 95 % organic efficiency with a product yield of 60 %. The remaining 25 % to 28 % solid discard will be placed in the opencast voids.

The plant will produce a product suitable for local and export markets.

4.2.2.3 Product Storage

The coal product will be stored on a product stockpile, the area of which will be 19 ha. The product stockpile conveyor belt will be fitted with a level probe to avoid over filling the stockpile and a mass meter for process accounting purposes.

4.2.3 Water Supply and Management

Possible water sources for use in mining operations include the existing Sewage Treatment Plant, owned and operated by the City of Tshwane Metropolitan Municipality, onsite dams as well as available site boreholes. These water sources are still to be confirmed by undertaking the relevant feasibility studies. Pipes and pumps will be constructed to pump water from these resources directly to the process plant. Process water will be managed and re-used throughout the operations of the project via clean and dirty water separation system, which shall include separate drains that lead into the following dams.

The total water requirements for the mine will be approximately 1 million m³/ per annum.

4.2.3.1 Slurry Dam

The purpose of the slurry dam is to collect and separate water from its dissolved constituents. A slurry dam will be constructed adjacent to the processing plant.

4.2.3.2 Pollution Control Dams

The purpose of a pollution control dam is to store process water for re-use in the plant. The proposed PCD will have a depth of approximately 2.5 m. The PCD is proposed to be located within a dirty water area, south of the proposed plant.

4.2.4 Power Supply

The project will obtain power from an existing Eskom distribution powerline with a capacity of 88 kilovolts (kV). Oakleaf are proposing the construction of a substation on the project site to connect to this powerline to secure power for the operation of the proposed mine. The required power requirements would need to be confirmed with Eskom.

Electricity will also be generated by means of diesel generator sets for lighting and pumping of water. Oakleaf is also currently investigating the feasibility of using onsite solar power generation as a backup system. The maximum power requirements for the mine will be 3 MVA.

4.2.5 Waste Management

The proposed mine will result in the generation of slurry waste, which will be stored in the slurry dam. Furthermore, the solid coal discard will be temporarily stored in a discard bin and dump before being taken back to the open pit for final disposal. It is anticipated that 37 500 tpm to 42 000 tpm of coal discard will be produced.

A sewage treatment plant is proposed as part of the project to manage sewage waste. Oakleaf is also investigating the utilisation of the existing municipal sewage treatment plant opposite the proposed mining area. Other wastes including materials and chemicals from maintenance activities and daily operation of the proposed mine will also be generated. All hazardous wastes will be stored and handled appropriately prior to being disposed of by a licensed hazardous waste disposal contractor. General domestic wastes will be managed in accordance with the requirements of the CoT.

4.2.6 Access and Site Roads

The project site is bordered by the R907 to the northwest, the R25 to the west, and the R104 to the south. The N4 highway is located further south from the proposed project site. The project site can be accessed via the R907, which links to a well maintained gravel road leading to the proposed project site. One main haul road is proposed which will run from the north pit around the plant area and ends at the south pit.

Oakleaf intend on using the surrounding road network to haul coal to the existing rail siding in Bronkhorstspruit. This activity is being proposed for the first 3 to 5 years of production.

However, this activity may be extended for the life of mine (17 years), should a new rail siding not be constructed.

4.2.7 Conveyor System

A conveyor belt is proposed to be constructed between the RoM stockpile and the process plant. RoM will be fed into the plant by means of a feeder bin at the RoM pad. The coal will be fed into the bid by means of a FEL.

A conveyor belt may also be constructed between the product stockpile area and the proposed new rail siding. There are two alternative routes currently being assessed.

4.2.8 Rail Siding

Coal product may be transported via a conveyor belt to a proposed new rail siding from where the coal product will be distributed to the intended local and export markets. There are currently four options being considered for the proposed new rail siding, one of which is within the proposed mine area and the other three being located along the existing metro railway line.

4.2.9 Workshop Area

A workshop and office area is proposed which will also include a contractor's yard where machinery and equipment can be maintained and repaired. It is likely that this area will include offices, a laboratory, wash bays and storage facilities. These buildings are proposed to be approximately 3 m in height.

4.2.10 Hazardous Storage

Four diesel storage tanks with a combined capacity of 138 m^3 are proposed to be located in close proximity to the workshop area. This facility will be adequately bunded and have the necessary control systems in place to manage the potential risks of fire and /or explosion.

4.2.11 Vehicles and Equipment

The following vehicles and machinery will be used for the construction and operation of the proposed mine:

- Excavator;
- Dozer to move material;
- Load Haul Dump (LHD);
- Front End Loader;
- 34 ton interlink haul trucks;
- 8.3 ton train wagons (100 wagons per train), provided by the relevant railway operator;

- Mine passenger vehicles;
- Grader for road maintenance;
- Water Bowser for dust suppression; and
- Generator for lighting and water pumping: and
- 2 ton Light Duty Vehicles (LDV).

4.2.12 Re-location of Existing Infrastructure

As part of the project, Oakleaf is also proposing the re-alignment of a distribution powerline with a capacity of 11 kV as this powerline transects through the proposed project site.

Furthermore, a water pipeline was identified which crosses the corner of the proposed northern pit. The pipeline has an internal diameter of 615 mm with a capacity of 890 to 920 m^3. The pipeline is used for the abstraction of water from the Wilge River pump station to Magalies Water in Cullinan, where the water is supplied to the Cullinan Diamond Mine and Magalies Water. This existing pipeline will need to be re-routed should the project proceed. The proposed new pipeline route will run from the corner of the eastern boundary of the project site, along the eastern boundary and through the project site (along the proposed access road) and along the western boundary of the project site, where it will re –connect to the existing pipeline (refer to Plan 4 in Appendix A).

4.3 Activities per Project Phase

The following activities are envisioned for each of the project phases:

- Construction
  - Site establishment;
  - Site clearing, including the removal of topsoil and vegetation;
  - Construction of mine related infrastructure, including haul roads, pipes, dams;
  - Construction of washing plant;
  - Relocation of Infrastructure (power line and water pipeline)
  - Blasting and development of initial box-cut for mining, including stockpiling from initial box-cuts; and
  - Temporary storage of hazardous products, including fuel and explosives, as well as waste and sewage.
- Operation
  - Stripping topsoil and soft overburden;
  - Removal of overburden, including drilling and blasting of hard overburden;
  - Loading, hauling and stockpiling of overburden;

- Drilling and blasting of coal.
- Load, haul and stockpiling of RoM coal.
- Use and maintenance of haul roads for the transportation of coal to the washing plant;
- Water use and storage on-site; and
- Storage, handling and treatment of hazardous products (including fuel, explosives and oil) and waste.

- Decommissioning and closure
  - Demolition and removal of all infrastructure, including transporting materials off site;
  - Rehabilitation, including spreading of soil, re-vegetation and profiling or contouring;
  - Environmental monitoring of decommissioning activities; and
  - Storage, handling and treatment of hazardous products (including fuel, explosives and oil) and waste.
  - Post-closure monitoring and rehabilitation.

4.4 Project Schedule

The construction phase of the project will take approximately 1 year to complete and will include site establishment and the construction of all infrastructure, including the development of the box cut. The operations phase of the project will be approximately 15 years with production expecting to peak between year 3 and year 12 with approximately 1.8 million tonnes of coal produced. The decommissioning and closure phase will take approximately 5 years.

Table 4-1: Project Schedule

Project Phase	Proposed Schedule
Construction	Q 3 – 2016 – Q 3 - 2017
Operations	Q 3 – 2017 – 2032
Decommissioning and Closure	2033-2038

4.5 Staff Requirements

The planned labour complement, once the mine is fully operational, is expected to be 250 employees (mine and contractor employees). Only nine employees will be directly employed by Oakleaf, of these two will be directors, one mine manager, one engineer, one financial

and human resource manager, one accountant, two weighbridge operators and one Safety Health and Environmental officer. Based on the current mining programme the mine workforce will be recruited in mid-2016.

According to the mining programme 240 employees will be appointed by the primary mining contractor approximately 3 months before operations commence. Contractors will be required to honour commitments made in the SLP and also to comply with the Mining Charters requirement in terms of Black Economic Empowerment (BEE). The current business requirement and manpower plan foresee the combined workforce to be employed within several core business areas, these areas are listed in Table 4-2 below.

Table 4-2: Employment Requirements

Designation	Number
Top and senior management	7
Weighbridge operators	2
Coal handling and loading	18
Services	18
Railway siding	18
Transport	37
Open Pit Mining	150
Total	**250**

5 Project Alternatives

In terms of Section 28 of the EIA Regulations (2010), project alternatives must be considered during the EIA process. In terms of these regulations, "**alternatives**" are defined as:

In relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

- The property on which or location where it is proposed to undertake the activity;
- The type of activity to be undertaken;
- The design or layout of the activity;
- The technology to be used in the activity;
- The operational aspects of the activity; and
- The option of not implementing the activity" (the 'no-go' option).

The Scoping Phase aims to identify and screen alternatives to ensure that they are reasonable and feasible and which can be assessed in further detail during the EIA Phase.

The nature of the mineral reserve determines the mining method and the location of the feasible reserve to be mined determines the location of the mining operation. These two factors limit the project alternatives that are available. The following sections highlight the identified alternatives which are all considered to meet the objective of the project.

5.1 Infrastructure and Layout Alternatives

As discussed under Section 4.2, the coal product will be transported off-site via a rail siding, which links to the existing rail network. To transfer the coal product from the product stockpile area to the proposed rail siding, Oakleaf has identified several layout and operational activity alternatives, these are described below.

5.1.1 Rail Siding Layouts

Oakleaf proposes to construct a rail siding for the purposes of transporting the coal product off site to the local and export markets. As an interim alternative however, Oakleaf is proposing to haul the coal product to the existing Bronkhorstspruit rail siding. There are currently four location alternatives being considered for the new proposed rail siding, described below, as well as the option of utilising the existing siding.

5.1.1.1 Option 1 (New Rail Siding)

Option 1 is located entirely on the RE of the farm Resurgam 515-IR. This option is approximately 3 100 m in length and will include a loop design. To ensure access to the RE of the Farm Resurgam 515-IR, Oakleaf proposes to construct a link road from the main road

to the existing farm access road. This alternative is the preferred rail siding layout as only one property will be impacted on.

5.1.1.1 Option 2 (New Rail Siding)

Option 2 is located along Portions 113 of Farm Wachtenbietjeskop 506 JR and the RE of the farm Resurgam 515-IR. This proposed rail siding is about 2 217 m in length and runs in parallel to the existing railway line.

5.1.1.2 Option 3 (New Rail Siding)

Option 3 is located along Portions 113,140,141,142,143,144,145,150,113,122,123,124 and 139 of Farm Wachtenbietjeskop 506 JR. This proposed rail siding is about 2516 m in length and runs in parallel to the existing railway line.

5.1.1.1 Option 4 (New Rail Siding)

Option 4 is located within the proposed mine area and is about 1 122 m in length. This alternative would require the construction of a rail bridge over the Bronkhorstspruit River, as well as a rail line across at least two properties.

5.1.1.1 Option 5 (Existing Rail Siding)

As an interim alternative, Oakleaf plans on hauling coal to the existing rail siding in Bronkhorstspruit, located 8 km from the proposed project site. This will occur for the first three to five years of mining, however this option is being considered for the LoM.

5.1.2 Transfer via Conveyor System

This alternative would involve the construction of an overland conveyor belt between the product stockpile area and the proposed new rail siding. The route for the proposed conveyor belt would be dependent on the chosen location for the proposed new rail siding. There are currently two proposed routes under consideration, namely Option 1 and Option 2, discussed below.

5.1.2.1 Option 1

This proposed conveyor route is about 2 674 m in length and is aligned in a south west direction towards the proposed rail siding Option 1 which falls outside of the proposed mine area. This proposed route would cross over the Bronkhorstspruit River and would also traverse 5 properties, namely Portions 139,138,113 of the farm Wachtenbietjeskop 506 JR and Portion 1 and the Remaining Extent (RE) of the farm Rhenosterfontein 515 JR. The farms and current activities would be directly impacted by the proposed conveyor.

5.1.2.1 Option 2

The proposed conveyor route is about 1 993 m in length and is aligned in a southerly direction towards the proposed rail siding Option 2 which falls outside of the proposed mine

area. This proposed route would also cross over the Bronkhorstspruit River, however only traverse 1 property, namely Portion 144 of the farm Wachtenbietjeskop 506 JR. The proposed conveyor would essentially divide this farm as the proposed route traverses the farm north to south in the middle of the farm. This would likely have direct and noteworthy impacts depending on the current activities occurring on the farm.

5.2 No-Go Alternative

The no-go alternative would entail maintaining the status quo. The current land use is primarily maize and soya bean farming and small scale cattle farming. The no-mining option will result in the continuation of such land use.

Although economically viable, the continuation of agriculture would not provide the level of medium term economic growth to the area that mining would offer. These economic benefits include an increase in employment at the local level, contribution to the national economy in taxes and royalties and an injection into the local economy through the procurement of goods and services at the regional level. Furthermore, the justification for the project, including the provision of coal product to existing power stations to secure South Africa's power supply, would not be met. In addition, the no-go alternative would also result in lost foreign revenues from the planned export coal product.

The no-go alternative also means that all potential negative impacts associated with the proposed mine and its associated infrastructure would not occur. Hence, the EIA process will determine if the project would result in any environmental or social fatal flaws that may result in the project being a no-go.

5.3 Summary of the Preferred Alternative

The preferred alternative at this stage of project planning is Option 5 which entails the hauling of coal to the existing rail siding in Bronkhorstspruit.

A comparative assessment of the above-mentioned project alternatives will be undertaken. The assessment will consider environmental, social, economic and technical criteria to determine the most feasible project.

6 BIOPHYSICAL BASELINE

6.1 Topography

The project area is relatively flat with slightly undulating topography in the surrounds (Figure 6-1). The topographical model (Plan 5 in Appendix A) indicates that the elevation of the project area decreases from 1 415 metres above mean sea level (mamsl) in the northeast to 1 370 mamsl in the southwest on the banks of the Bronkhorstspruit River. There are no large hills or koppies within the project area.

Figure 6-1: Topography of the Project Area and Surrounds

The majority of the project area has gentle slopes of less than 1 ° and these are located in the northern part of the project area. Isolated slopes of between 1 ° and 2 ° occur mostly in the central part of the project area, while the slightly steeper slopes of between 3 ° and 7 ° occur in the southern part of the project area along the Bronkhorstspruit River. Plan 6 in Appendix A illustrates the slope model of the project area.

The slope aspect/ direction of the project area is generally from north to south towards the Bronkhorstspruit River. Plan 7 illustrates the aspect model of the project area.

6.2 Land Use

The receiving environment is characterised by natural Rand Highveld Grassland vegetation (Mucina & Rutherford, 2006) with scattered farmhouses, various small holdings and a small town (Bronkhorstspruit) located within 5 km of the project area. Agriculture forms the predominant land use in the project area (Figure 6-2). Livestock grazing takes place on the natural Grasslands (PC Meyer Consulting, 2013) (Figure 6-3).

Figure 6-2: Land use in the Project Area

Figure 6-3: Livestock Grazing within the Project Area

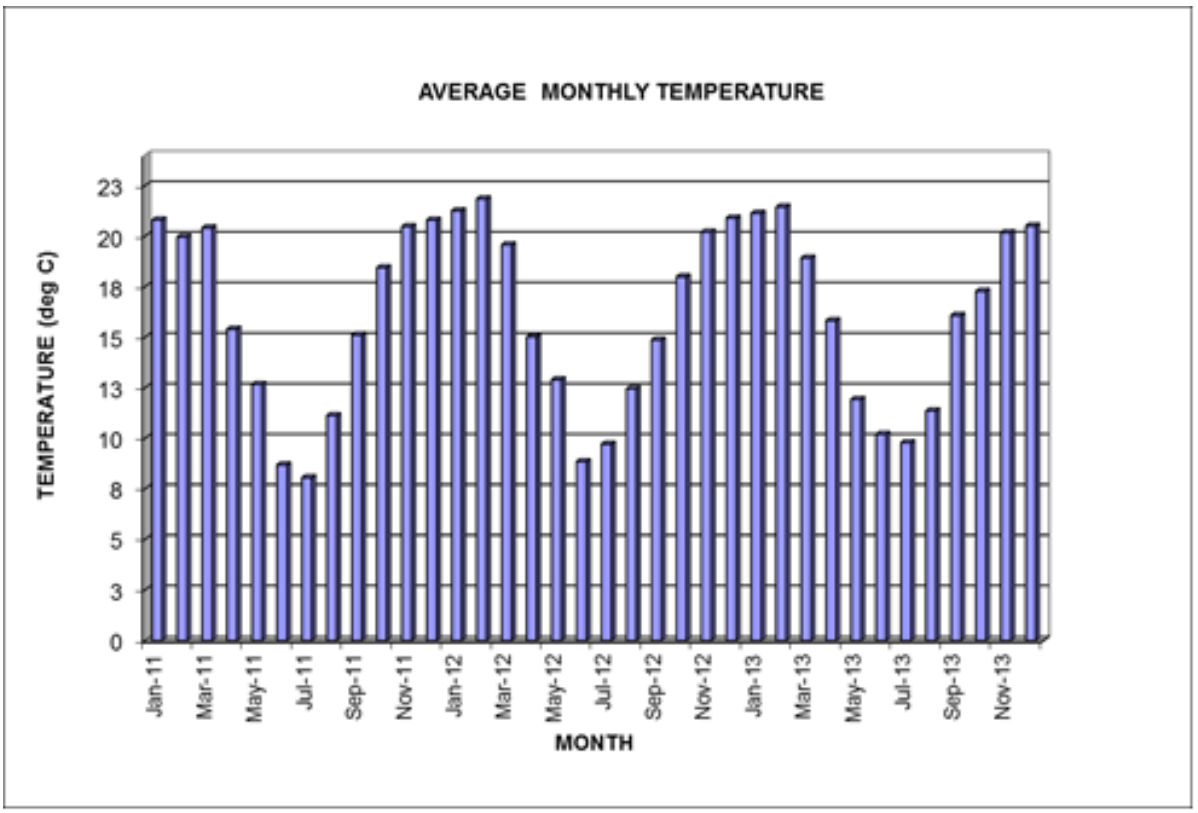
6.3 Climate

Site specific MM5 modelled meteorological data set was obtained from the Lakes Environmental in Canada to determine local prevailing weather conditions. This dataset consists of surface data, as well as upper air meteorological data that is required to run the dispersion model. It is necessary if site specific upper air meteorological data is not available. The Pennsylvania State University / National Center for Atmospheric Research (PSU/NCAR) meso-scale model (known as MM5) is a limited-area, non-hydrostatic, terrain-following sigma-coordinate model designed to simulate or predict meso-scale atmospheric circulation.

This data has been tested extensively and has been found to be exceptionally accurate. Modelled meteorological data for the period January 2010 to December 2013 obtained for a point close to the proposed project site (25.786022 S, 28.794103 E) was analysed. Data availability was 100%.

6.3.1 Temperature

Three-year average monthly maximum, mean and minimum temperatures for the project are illustrated in Figure 6-4. The average monthly maximum temperatures range between 21.3 °C in January to 10.2 °C in July, with monthly minimum ranging from 20.8 °C in January to 8.1 °C in July. The annual mean temperature for the project area is given as 15.6 °C.

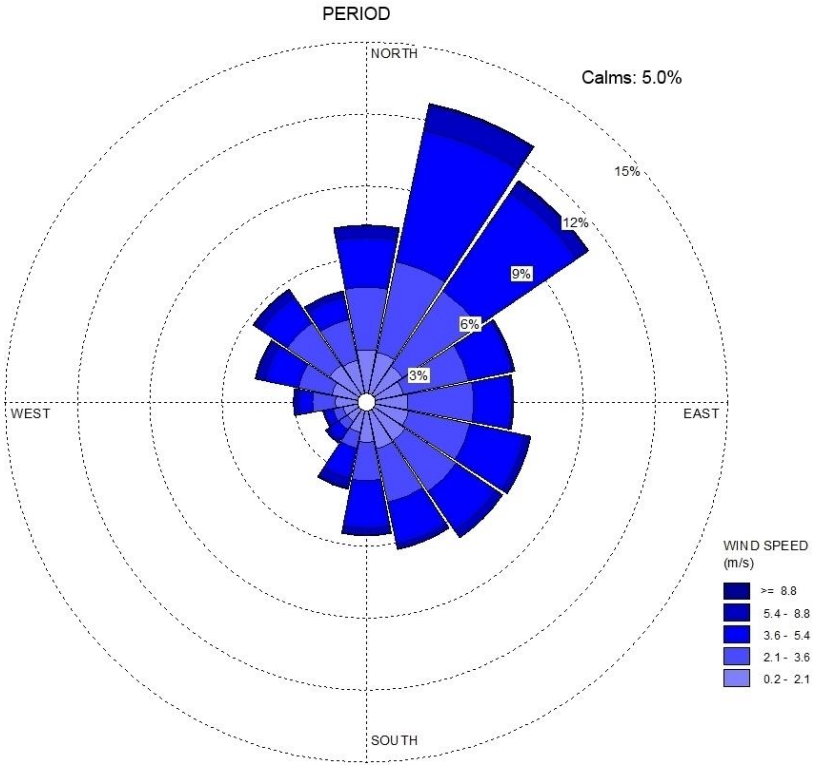


Source: Modelled MM5 data (2010-2013)

Figure 6-4: Average Monthly Temperature

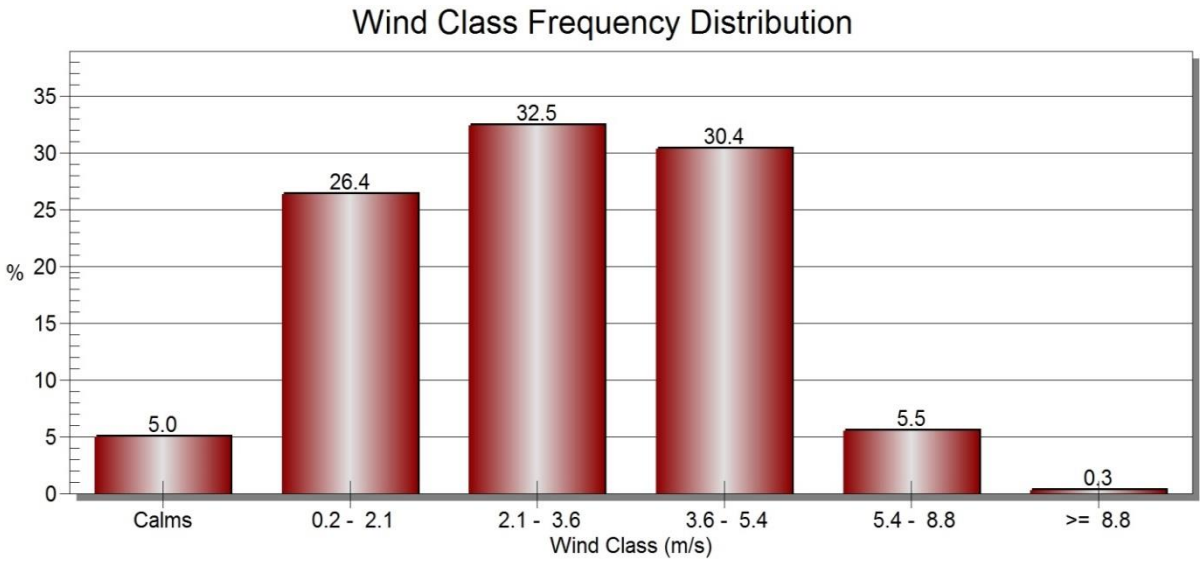
6.3.2 Wind

The spatial and annual variability in the wind field for the project area is clearly evident in Figure 6-5. The predominant wind directions are from the north northeast and northeast respectively. Secondary winds were observed from the north and southeast. Over the three year period, frequency of occurrence was 13 % from the north northeast and 11 % from the northeast. The average wind speed observed for the period was 2.87 m/s, with winds ≥5.4 m/s occurring for 5.5 % of the time. Calm conditions (wind speeds < 0.5 m/s) occurred for about 5 % of the time. Wind class frequency distribution is provided in Figure 6-6.



Source: Modelled MM5 data (2010-2013)

Figure 6-5: Surface Wind Rose for Project Area



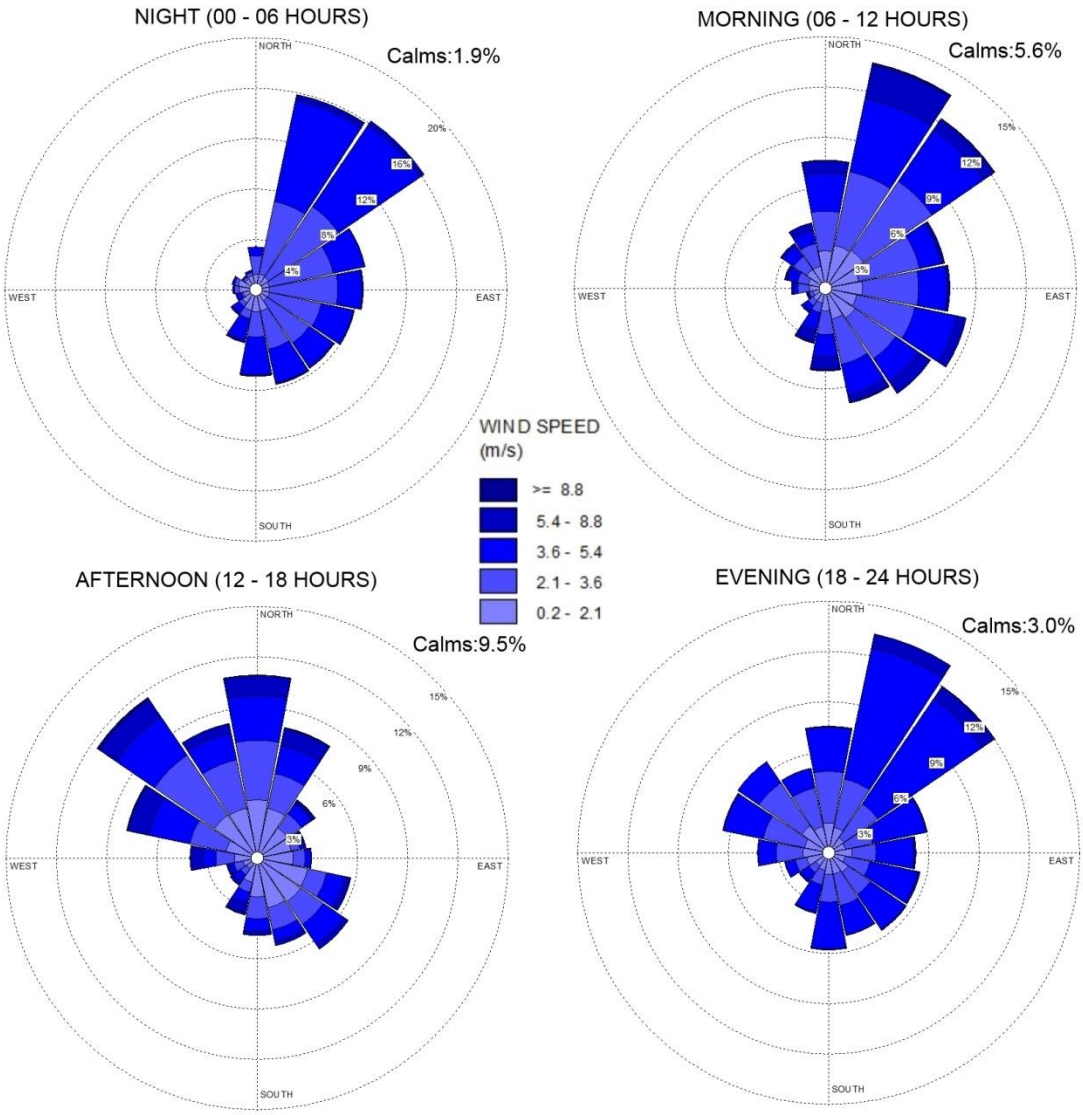
Source: Modelled MM5 data (2010-2013)

Figure 6-6: Wind Class Frequency Distribution for Project Area

The diurnal patterns during the night, morning, afternoon and evening hours are presented in Figure 6-7. At night, winds coming from the north northeast (16 %) and northeast (16 %) dominated. During the morning hours, the strong winds were coming from the northeast (13 %) and north northeast (12 %). In the morning, wind speeds greater than 5 m/s capable of generating dust occurred for about 9 % of the time. In the afternoon strong winds from the north and northwest dominated with 11 % and 12 % respectively. In the evening hours, winds were blowing from the north northeast (13 %) and northeast (12 %).

Calm conditions in the morning, afternoon, evening and night time occurred for 5.6 %, 9.5 %, 3 % and 1.9 % of the time.

The seasonal patterns indicate that Spring was dominated by winds from the north northeast (19 %), northeast (12 %) and north (11 %) respectively. Wind speeds between 5.4-8.8 m/s were observed 11 % of the time. Average wind speed was 3.4 m/s and calm 2.2 %. Summer was dominated by winds from the northeast (19 %), north northeast (16 %) and east northeast (11 %), with average wind speed decreasing to 2.8 m/s. In autumn, winds from the northeast and southeast sectors dominated with an average wind speed of 2.41 m/s. Winter was dominated by winds from the southeast sector with secondary winds from the northeast.



Source: Modelled MM5 data (2010-2013)

Figure 6-7: Diurnal Variation of Winds between Night Time 00:00 – 06:00 (top left), Morning 06:00 – 12:00 (top right), Afternoon 12:00 – 18:00 (bottom left) and Evening 18:00 – 24:00 (bottom right)

6.3.3 Precipitation

The statistics for two rainfall zones were obtained from World Research Council (WRC) Report 298 (1994) which covered the hydrological years from 1920 to 1989.

None of the rainfall stations in close proximity to the project site are currently active, therefore the rainfall station at Premier Mine (station # 0514 010) which is approximately 50 km from the project site was selected to determine if any significant changes in the Mean Annual Precipitation can be expected. This rainfall station is located on the western boundary of rainfall zone B3A and was included in the calculations for this rainfall zone. All values were normalised to percentages of MAP to ensure that the aerial variation between

the various rainfall stations is taken into account. The mean annual precipitation, 10th percentile of annual rainfall (P10; to represent dry periods) and 90th percentile of annual runoff (P90; to represent wet periods) were calculated. The recorded MAP was 615.7 millimetres per annum (mm/a). The MAP for the wettest 10 % of the record (90th percentile, or MAP 90) was calculated to be 754.8 mm.

Rainfall is seasonal and largely occurs during the summer months, October to April. Mean annual precipitation for the whole catchment is 630 mm, but the rainfall pattern is irregular with coefficients of variation greater than 0.25 across most of the catchment[4]

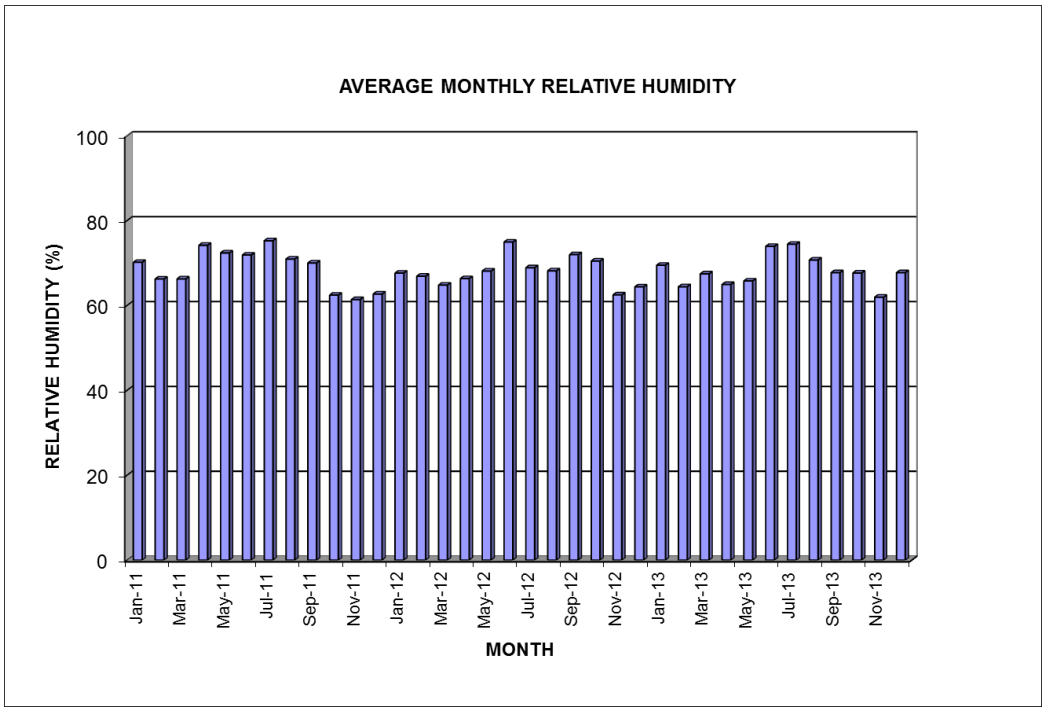
The mean annual precipitation for the Bronkhorstspruit area is 670 mm, with a mean annual evaporation of 2 117 mm and a mean annual evapotranspiration of 1 460 mm.

6.3.4 Humidity and Evaporation

Figure 6-8 is representative of the relative humidity for the project area. The annual average - maximum, minimum and mean relative humidity is 70.4 %, 65.9 % and 68.2 % respectively. The monthly maximum relative humidity remains above 60% for the whole year and ranges from 75.2 % in winter (July) to 62.5 % in spring (November). The monthly minimum relative humidity on the other hand varied between 61.4 and 71.9 respectively.

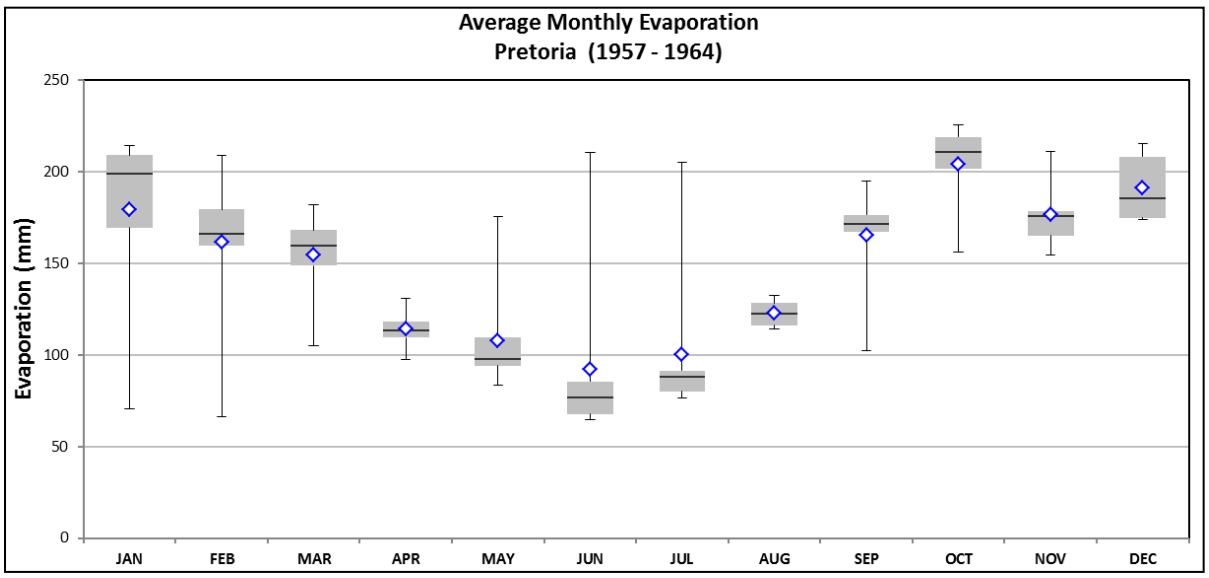
Figure 6-9 shows that the average evaporation rates displayed seasonality pattern, with the rate peaking in Spring through the Summer months and lower in winter. The monthly average recorded the lowest value in June and July of 92 mm and 100 mm respectively.

[4] (Technical Note: Hydrological Review of the Olifants River Catchment, date and author unknown)



Source: Modelled MM5 data (2010-2013)

Figure 6-8: Average Monthly Relative Humidity



Source: South African Weather Service (1957-1964)

Figure 6-9: Average Monthly Evaporation for Pretoria S-Pan Evaporation Station

6.4 Geology

The project's coal deposit is located in the Nooitgedacht Outlier, an erosional relict of the Vryheid Formation. The Vryheid Formation forms part of the Ecca Group of the Karoo Supergroup (Plan 8, Appendix A).

The regional pre-Karoo basement comprises the Loskop Formation (Pretoria Group) and felsite of the Selons River Formation (Rooiberg Group), both of which are overlain by grit and sandstone sediments of the Wilge River Formation of the Waterberg Group.

The glacial deposits of the Dwyka Group overlay the pre-Karoo basement rocks and form the base of the Karoo Supergroup in the project area. Above the Dwyka Group is the Ecca Group. Deposition of this sequence occurred in fluvial to shallow marine environments, with climate conditions that were favourable for plant growth leading to peat and coal formation. The younger Groups of the Karoo Supergroup, namely the Beaufort and Stormberg Groups do not occur in the project area.

The Vryheid Formation comprises of clay, mudstone, shale, siltstone, sandstone, grit, conglomerates and coal. The depositional environment for the project area is thought to be fluvio-lacustrine comprising braided river streams and natural lakes and dams.

The structure of the Karoo Supergroup is consistent with that of a retro-arc foreland basin, which has formed behind the Cape fold-thrust belt. The Dwyka Group occurs at depths of between 20 m to 60 m below the surface with a gentle upward dip towards the north and west, and a steep upward dip towards the east. No late intrusions have been documented in the project area and only localised faulting and fracturing occurs.

6.5 Soil

6.5.1 Land Type

A land type denotes an area that can be shown at 1:250 000 scale and that displays a marked degree of uniformity with respect to terrain form, soil pattern and climate. One land type differs from another in terms of one or more of terrain form, soil pattern and climate.

The dominant land type within the project site is defined as the Bb12 land type. The Bb land type consists of a plinthic catena where red soils are not widespread, these are defined below:

- Plinthic properties occur in subsoil horizons. A subsoil horizon is a subsurface horizon that consists of 10 % or more of an iron rich, humus-poor mixture of kaolinitic clay with quartz and other diluents. This horizon changes irreversibly to a hardpan or to irregular aggregates on exposure to repeated wetting and drying with free access to oxygen; and
- A catena is defined as a sequence of soils of similar age derived from similar parent material formed under similar macroclimatic conditions, but has different characteristics due only to variation in topography and drainage.

6.5.2 Soil Form

The following soil types characterise the project area.

6.5.2.1 Hutton Soil

The Hutton soil form comprises an orthic A horizon overlying a red apedal B horizon, underlain by unspecified material. The red apedal B horizon has a macroscopically weak developed structure or is altogether without structure and reflects weathering under well drained, oxidised conditions. The clay fraction is dominated by non-swelling 1:1 clay minerals and the red colour of the soil is ascribed to iron oxide coatings on individual soil particles that consist of at least 15 % hematite (Fe_2O_3).

The soils of this form in the study area are developed on silica rich parent material (sandstone). This results in sandy profiles with low clay content, ranging from mostly deep soils of high agricultural potential (> 50 cm), to soil of medium agricultural potential and intermediate depth (30 – 50 cm) in limited locations.

6.5.2.2 Clovelly Soil

The Clovelly soil form comprises an orthic A horizon overlying a yellow-brown apedal B horizon, underlain by unspecified material. The yellow-brown apedal B horizon is essentially similar to the red apedal B horizon and is distinguished purely on the basis of its yellow or brown colour.

6.5.2.3 Glencoe Soil

The Glencoe soil form comprises of an orthic A horizon overlying a yellow brown apedal B horizon on hard plinthite.

6.5.2.4 Dresden Soil

The Dresden soil form comprises of an orthic A horizon overlying hard plinthite. Dresden soils are shallow and are regarded as soils of low agricultural potential.

6.5.2.5 Mispah Soil

The Mispah soil form comprises an orthic A-horizon overlying hard rock. These shallow soils mainly occur in areas dominated by rock outcrops and are regarded as soils of low agricultural potential.

6.5.2.6 Katspruit and Kroonstad Soils

The Katspruit soil form comprises an orthic A-horizon overlying a G horizon. This sequence of horizons indicates a waterlogged soil indicating a permanent water table that is probably the result of accumulation and lateral drainage of water on the slowly permeable sandstone layer underlying the soil observed in low lying areas (seepage zones). The Kroonstad soil form comprises an orthic A horizon over an E horizon over a G horizon. Although Kroonstad soils can be very deep, agricultural activities are not recommended due to the role they play in natural water drainage and filtration.

6.5.2.7 Wetland Soils

Wetland areas are defined as water saturated areas occurring within a landscape. The soil in these areas will either be permanently or seasonally waterlogged with water. A wetland is defined as an area covered permanently, occasionally, or periodically by fresh or salt water up to a depth of 6 m (e.g. flooded pasture land, marshland, shallow inland lakes, rivers and their estuaries, intertidal mud flats). It is expected that the properties of soils occupying the wetlands potentially present within the project area will reflect hydromorphic properties. Examples of these hydromorphic soils include Katspruit, Longlands, Kroonstad and Fernwood soil types.

Hydromorphy is a process of gleying and mottling resulting from the intermittent or permanent presence of excess water which then allows hydromorphic soils to form. Hydromorphic soil is a suborder of intrazonal soils, consisting of seven great soil groups, all formed under conditions of poor drainage in marshes, swamps, seepage areas, or flats.

6.5.3 Soil Fertility

Soils are expected to be sandy with medium to high agricultural potential based on profile depth. The soils will generally be acidic with low natural fertility due to their sandy nature and low cation exchange capacity (CEC). There is likely to be a low CEC in the case of the sandy soil and medium CEC in the case of soils with higher clay content.

6.6 Surface Water

6.6.1 Water Catchment

The project site is located within the Wilge River catchment which forms part of quaternary catchment B20D, within the Upper Olifants Water Management Area (WMA 04) and in the eastern catchment areas of quaternary catchment B20D (Plan 9). The project site occupies 1.1 % of the B20D quaternary catchment.

The Mean Annual Runoff (MAR) for the quaternary catchment B20D is 46.4 mm, which is representative of a net MAR of 22.39 Mm^3 (Million cubic metres). The Mean Annual Precipitation (MAP) of the catchment is 671 mm. These values represent a MAR: MAP ratio of 39 % whilst the rainfall that ends up as runoff. The Mean Annual Evaporation (MAE) is 1724 mm. Refer to Table 6-1.

Table 6-1: Summary of the surface water attributes of the B20D quaternary catchment

Total Catchment Area (km^2)	MAP (mm)	MAR (mm)	MAR m^3* 10^6	MAE (mm)
480	671	46.4	22.39	1724

Source: Water Research Commission of South Africa,2005

6.6.2 Water Resource and Quality

The project site contains three pans and a non-perennial stream which is a tributary to the Bronkhorstspruit River which is located to the south of the project site. Another unnamed stream exists on the southern side of the project area and also feeds into the Bronkhorstspruit. The surface water in the project area is mainly used for irrigation purposes and livestock watering.

Five water samples were collected from the water resources on the project site as well as the surrounding water resources, samples were sent to Aquatico Laboratory (Pty) Ltd, a SANAS accredited laboratory to be analysed for physical and chemical water quality parameters. Plan 10 indicates the surface water sampling points.

The water quality results for the selected water quality parameters are provided in Table 6-2 and were benchmarked with the South African National Drinking Water Standards (SANS 241-1:2011).

The overall surface water quality of the area falls within the recommended water quality concentration limits (Class I – SANS 241-1:2011), with the exception of the Ammonia (7.91 mg/l and 4.54 mg/l) measured from surface water point SW3 and SW4. Elevated concentration of Ammonia may be associated with contamination from animal wastes, this was evident on the project site, especially cattle farming. SW5 showed no signs of contamination as a result of livestock and all the water quality parameters were within the SANS drinking water quality standards.

The DWS has published the resource quality objectives for the Olifant Water Management Area (WMA4) in 2014. Several recommendations have been made in terms of the Bronkhorspruit and Wilge Rivers which will be considered in the impact assessment phase.

Table 6-2: Water Quality Results

Sample ID		Total Dissolved Solids	Nitrate NO_3 as N	Chlorides as Cl	Total Alkalinity as $CaCO_3$	Sulphate as SO_4	Calcium as Ca	Magnesium as Mg	Sodium as Na	Potassium as K	Iron as Fe	Manganese as Mn	Conductivity at 25 ° C in mS/m	pH-Value at 25 ° C	Aluminium as Al	Free and Saline Ammonia as	Fluoride as F
Class I	(Recommended)	<1000	<10	<200	N/S	<400	<150	<70	<200	<50	<0.2	<0.1	<150	5-9.5	<0.3	<1	<1
Class II	(Max. Allowable)	1000-2400	10-20	200-600	N/S	400-600	150-300	70-100	200-400	50-100	0.2-2	0.1-1	150-370	4-5 or 9.5-10	0.3-0.5	1-2	1-1.5
	Duration	7 years	7 years	7 years	N/S	7 years	7 years	7 years	7 years	7 years	7 years	7 years	7 years	No Limit	1 year	None	1 year
SW1		36.00	1.23	6.14	19.60	-0.04	3.79	2.32	4.39	1.94	0.19	0.00	7.09	7.10	0.00	0.20	0.19
SW2		40.00	1.21	5.84	23.60	-0.04	4.42	2.38	5.40	1.61	0.06	0.00	7.14	8.58	0.00	0.06	0.19
SW3		239.00	0.41	27.20	163.00	22.20	18.80	15.00	32.80	11.70	0.00	0.00	46.30	7.77	0.00	**7.91**	0.26
SW4		212.00	0.34	25.10	142.00	17.70	19.40	15.70	29.90	10.20	0.00	0.00	42.00	7.53	0.00	**4.54**	0.23
SW5		171.00	0.89	7.97	162.00	1.01	26.90	20.90	8.93	1.68	0.00	0.00	29.70	8.33	0.00	0.10	0.24

6.7 Groundwater

6.7.1 Water Level

Digby Wells undertook a hydrocensus with the objective of identifying current groundwater uses and possible sources of contamination. The hydrocensus (October 2014) was undertaken within a 5 km radius of the project site. During the hydrocensus a total of 33 sites were surveyed, 32 boreholes and 1 spring (Plan 11 in Appendix A). Of the 32 boreholes, 30 were equipped and in use, 3 boreholes had wind pumps and 27 were equipped with submersible pumps.

These boreholes are reportedly used for domestic/gardening (22), stock watering (6) and irrigation purposes (2). The remaining 2 boreholes are open and not used for any particular activity. The spring is used for domestic purposes.

Groundwater levels were measured at 23 of these boreholes. The water levels ranged from 0 m below ground level (bgl) to 39.8 m bgl. The average water level for the project area is 13.27 m bgl with the general groundwater contours and flow directions mimicking the topographical slope towards the Bronkhorstspruit River.

A comparison of the water level elevation with topography shows a poor correlation of 30.8 % (Figure 6-10). Only boreholes with a static water level were used to plot this figure. The boreholes that are currently in use were not included. The poor correlation most probably relates to different hydrostatic heads in different aquifers in the project area or the impact of nearby pumping on measured groundwater levels.

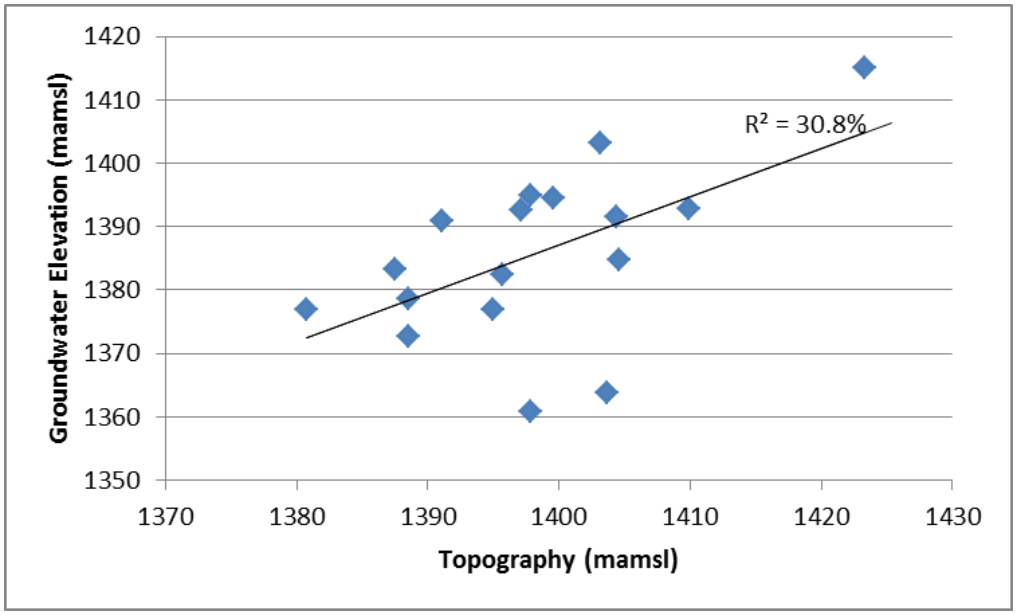


Figure 6-10: Correlation between Topography and Water Level

6.7.2 Groundwater Quality

Fifteen (15) water samples were taken from 14 boreholes and 1 spring, these were sent for macro- and micro-chemical analysis to Aquatico Laboratory (Pty) Ltd, a SANAS accredited laboratory.

The results indicate that the pH values vary between 5.33 and 8.97. No comparison could be identified between the pH value and specific geological units or locality. Most field measurements presented a near neutral to slightly acidic water.

The field EC-value (electrical conductivity) varied between 15.3 millisiemens/m (mS/m) and 191.5 mS/m.

The groundwater quality results have been compared to the South African National Standards (SANS 241:2011) for Drinking Water and have been grouped into classes in accordance with the above stated standard.

According to the SANS241:2011 standards, water quality have two benchmarks: Class I and Class II:

- Concentrations within the Class I limits are considered good quality water;
- Concentrations between Class I and II are considered as marginal. This is the maximum allowable concentration if consumed for not more than 7 years; and
- Concentrations exceeding the Class II limits (also referred as Class III) are unacceptable for human consumption.

6.7.2.1 Class I

Thirteen of the fourteen boreholes sampled are suitable for human consumption. None of the tested inorganic parameters exceeded the recommended drinking water guideline limits. All sampled boreholes fell within this class with the exception of one sampled site which had elevated nitrates. The sample taken at the spring fell within Class I.

The recommended maximum sulphate limit for human consumption is 400 milligrams per litre (mg/l), but the concentration in the sampled boreholes ranges from less than 0.04 mg/l to 96 mg/l.

6.7.2.2 Class II

One borehole falls under Class II due to elevated nitrates (17.80 mg/l). The elevated nitrates can be attributed to agricultural practices as the borehole is located downstream at the borders of ploughing fields.

The three boreholes with the highest measured EC value are located along the southern flank of the Bronkhorstspruit and just south of the project site.

6.8 Air Quality

Major atmospheric pollutants in the vicinity of the project area will be influenced by several local and regional pollutants signature, which include:

- Emissions from coal-fired power plants;
- Operational open pit and underground coal mines in the Mpumalanga Highveld; and
- Residential and agricultural activities in the vicinity.

6.8.1 Dust Fallout

Dust deposition data is crucial as measurements are used to assess monthly, seasonal, and inter-annual variability in dust fallout rates – pre and during mining operations. The amount of dust collected at any given time is a function of the rate of deposition, which may vary widely depending on meteorological factors such as wind speed and direction and variations in the background dust concentrations.

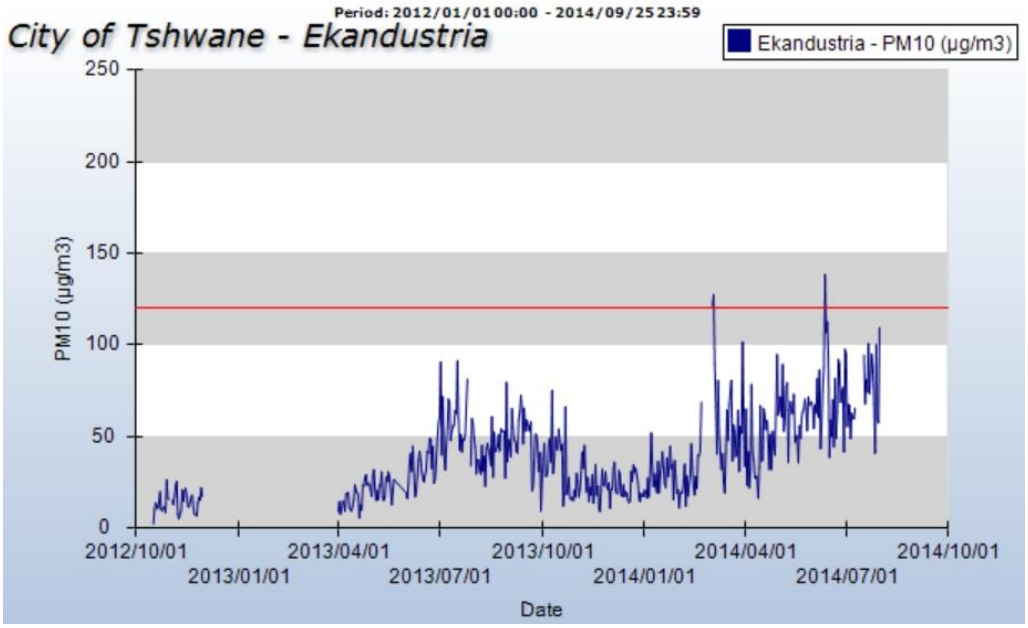
At present, dust deposition data is not available for the project area. A dust monitoring network has, however been set up to assess deposition rates in the area for a period of six months. Results from the proposed monitoring network will be incorporated into the EIA report. The proposed dust monitoring sites are depicted in Plan 12 in Appendix A.

6.8.2 Particulate Matter

Site specific data for criteria pollutants is not available. Hence, monitored data from the Tshwane Ambient Air Quality Station at Ekandustria (25.692556S 28.712833E) about 13 km northwest of the project area was used to assess the background levels of particulate matter (PM). The site was set up as a residential and industrial background station, located at an altitude of 1 500 mamsl.

The PM_{10} concentrations at the Ekandustria Air Quality monitoring station (Figure 6-11) is generally below the ambient air quality standard of 120 µg/m^3 for a greater part of the period surveyed, except for some exceedances in March and June 2014. However, Figure 6-11 shows that the site would have violated the future standard of 75 µg/m^3 many times.

$PM_{2.5}$ data was not available for the site, however, it will be recommended that an onsite monitoring station be commissioned to monitor these pollutants should mining commence.



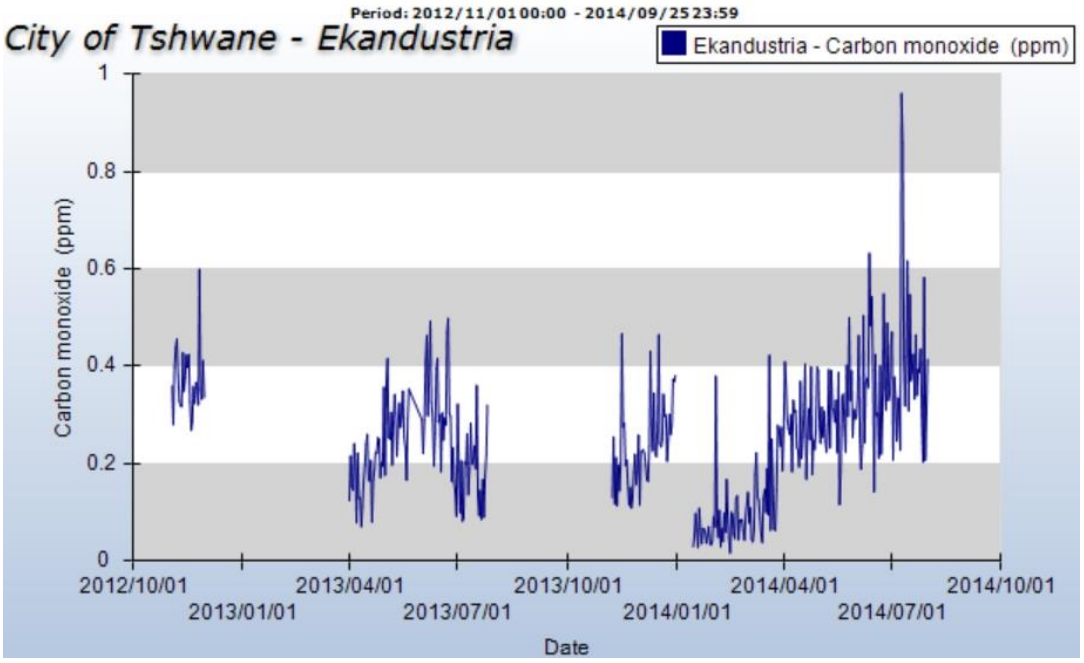
Source: Tshwane Ambient Air Quality Station at Ekandustria

Figure 6-11: PM_{10} concentrations at the Ekandustria

6.8.3 Gaseous Pollutants

6.8.3.1 Carbon Monoxide

The highest 1-hour Carbon Monoxide (CO) concentrations at the Tshwane Ambient Air Quality Station at Ekandustria measured for the period 01/01/2014 – 25/09/2014 was less than 1 parts per million (ppm) (Figure 6-12). This is very low and within the current NAAQS of 26 ppm. For the period under survey, there was no exceedance of the recommended standard and the permissible frequency of exceedance (88 allowable in a year).

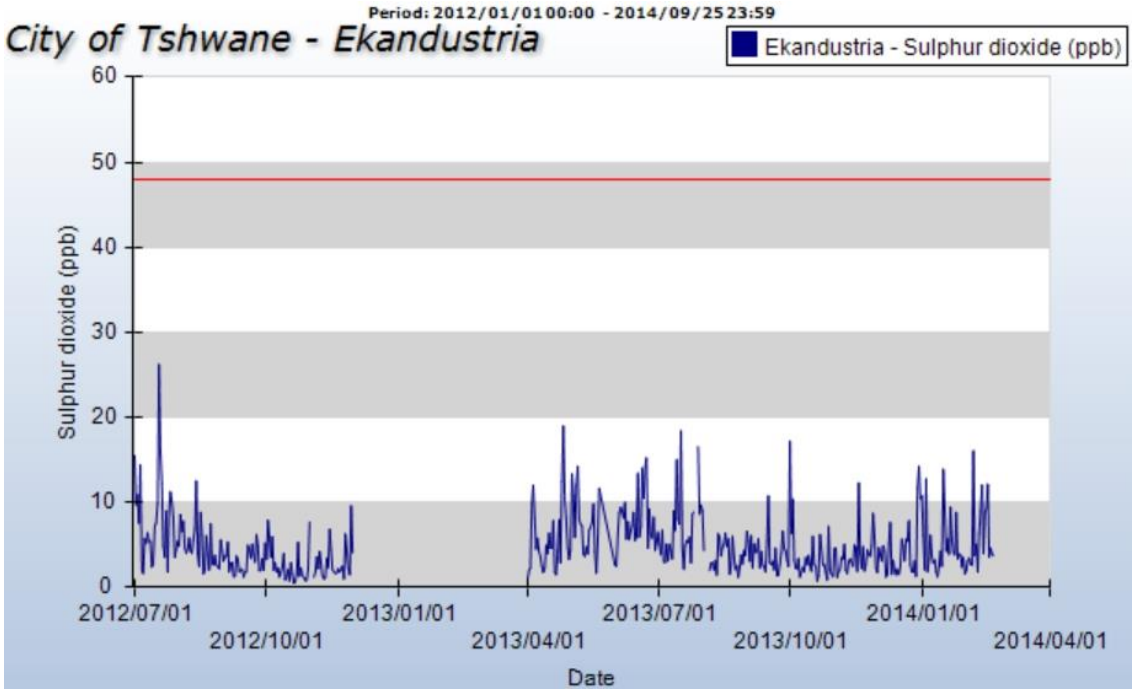


Source: Tshwane Ambient Air Quality Station at Ekandustria

Figure 6-12: Carbon Monoxide 1- Hour Averages

6.8.3.2 Sulphur Dioxide

Figure 6-13 depicts the 24-hour levels of SO_2 measured at the Tshwane Ambient Air Quality Station at Ekandustria for the period 01/01/2014 – 25/09/2014. During the monitoring period, the levels of SO_2 measured were below the 24-hour standard of 48 parts per billion (ppb). The concentrations of SO_2 measured at the site were generally below 20 ppb. It is evident that there was no violation of the permissible frequency of exceedances (4 times) within a year.



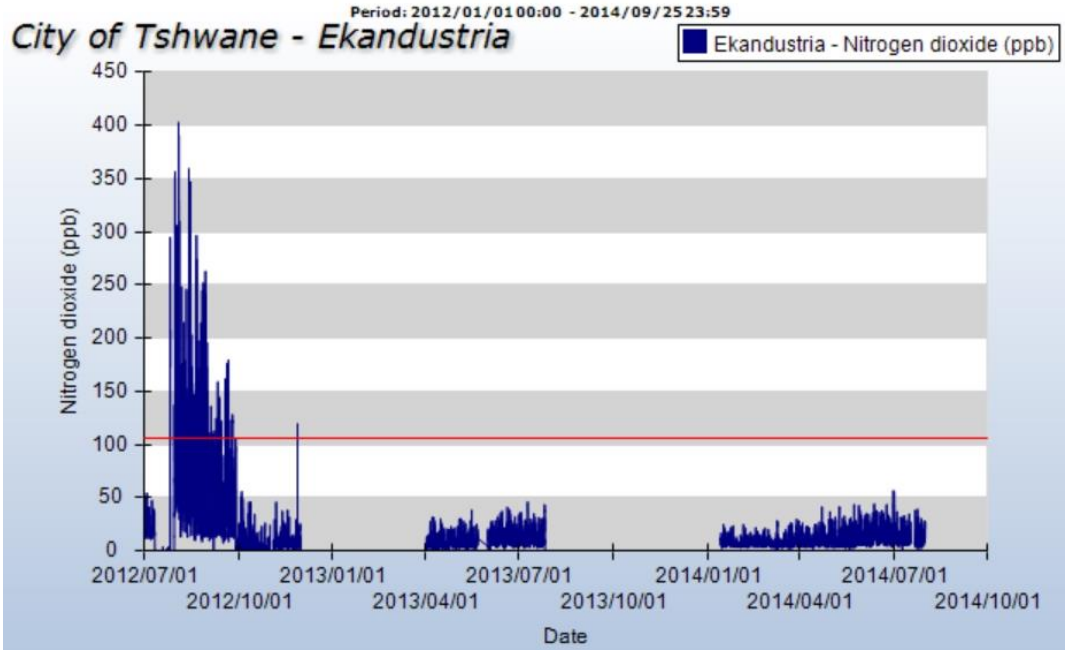
Source: Tshwane Ambient Air Quality Station at Ekandustria

Figure 6-13: Sulphur dioxide 24 hour averages

6.8.3.3 Nitrogen Dioxide

Figure 6-14 shows the levels of NO_2 measured at the Tshwane Ambient Air Quality Station at Ekandustria for the period 01/01/2014 – 25/09/2014. For the monitoring period, it is observed that the NAAQS limit 106 ppb was exceeded on a number of occasions between the months of July and October 2012. The permissible frequency of exceedance of 88 times within a year may have been exceeded.

The levels normalized and dropped significantly to below 50 ppb for the rest of the period. This may have been a one-off incident that generated a significant quantity of NO_2 near the ambient air quality monitoring station.



Source: Tshwane Ambient Air Quality Station at Ekandustria

Figure 6-14: Nitrogen dioxide 1- Hour Averages

6.9 Fauna and Flora

6.9.1 Flora

The project site falls within the Grassland Biome (Rutherford and Westfall 1994), one of nine South African plant Biomes. The Grassland Biome is the second most bio-diverse biome in South Africa next to the Fynbos Biome. This biome is rich in flora and fauna diversity but is under threat due to rapid urbanisation and expansion of mining and industrial activities.

The project site occurs in the Rand Highveld Grassland regional vegetation type (Mucina and Rutherford 2006). This vegetation type is recognised as a '*Vulnerable'* ecosystem as only a small fraction is conserved in statutory reserves and in private conservation areas. The vegetation can be described as being species-rich, wiry, sour grassland alternating with low, sour shrubland on rocky outcrops and steeper slopes. Most common grasses on the plains belong to the genera *Themeda*, *Eragrostis*, *Heteropogon,* and *Elionurus*. High diversity of herbs, many of which belong to the Asteraceae family, is also a typical feature. Rocky hills and ridges carry sparse (savannoid) woodlands with *Protea caffra* subsp. *caffra*, *Protea welwitschii*, *Acacia caffra* and *Celtis africana*, accompanied by a rich suite of shrubs among which the genus *Searsia* (especially *S. magalismontana*) is most prominent.

The POSA database lists 153 plant species that are expected to occur in the QDS 2528DD, in which the project site occurs. The expected plant species for the project site are listed in Appendix B. Due to the fact that a large portion of the project area was used for crops, the natural vegetation occurring within the project site is limited in extent (92 ha, approximately 17 % of the project site) and is restricted to areas that were not suitable for crop agriculture,

such as permanent wetlands and rocky outcrops. The remainder of the project site is dominated by maize and bean crops, as well as small patches of pasture grass. The initial field investigation yielded 47 plant species recorded on site (as listed in Appendix B) and it is highly likely that additional species may occur; this will be confirmed during the wet season survey. Approximately 27 % of plants in natural areas on site were non-native species.

Natural vegetation was classified as *Eragrostis – Verbena* Grassland, *Parinari – Tristachya* Rocky Grassland and wetland areas comprised of *Juncus – Trifolium* Hydromorphic Grassland and bushclumps of *Populus canescens*. Table 6-3 describes the vegetation units classified for the project site and the common and characteristic plant species of the more diverse units are represented in Figure 6-15 and Figure 6-16.

The distribution of the vegetation units on site is represented in Plan 13 in Appendix A.

Table 6-3: Vegetation Habitats on the Project Site

***Eragrostis – Verbena* Grassland**	
	Description: Terrestrial grassland bordering the wetland areas. Made up of *Eragrostis* grass species and invaded by *Verbena bonariensis* (Tall Vervain). Substrate is loam to sandy with sporadic occurrence of rocks. Plant diversity regarded as relatively low. Common and characteristic plant species included: *Acanthospermum australe* (Bristly Starbur), *Eragrostis* spp., *Lobelia flaccida* (Wild Lobelia), *Plantago lanceolata* (English Plantain) and *P. major* (Common Plantain). Not all grasses were identified, due to the time of sampling.
***Parinari – Tristachya* Rocky Grassland**	
	Description: Short rocky grassland with relatively high plant diversity towards the southern portion of the site. Substrate was made up of rocks and shallow soils, providing habitat for plant species that were typically edaphic. An alien bushclump of *Eucalyptus camuldulensis* (Red River Gum) occurs between the rocky grassland and the pasture grassland habitat. Common and characteristic plant species included: *Aloe greatheadii* (Spotted Aloe), *Becium obovatum* (Cat's Whiskers), *Eragrostis gummiflua* (Gum Grass), *Lopholaena coriifolia* (Small-leaved Fluffbush), *Parinari capensis* (Sand Piper), *Tristachya leucothrix* (Trident Grass) and *Xerophyta retinervis* (Black Stick-lily).

Pasture Grasslands	
	Description: Fields of mono-specific grass (likely to be Eragrostis curvula) pastures found on portion 69 of Wachtenbietjieskop farm, as well as on a section to the south-east of the site.
Wetland areas	
	Area: *Populus canescens* and *Juncus – Trifolium* Hydromorphic Grassland. Wetland areas have been partially encroached upon by crops in the area. The remaining open water and permanently wet areas have been classified as *Juncus – Trifolium* Hydromorphic Wetlands. Common plant species included: *Juncus effusus* (Common Rush), *Schoenoplectus decipiens, Trifolium repens* (White Trifolium) and *Ledebouria cooperi* (Striped Squill).
Transformed Land	
	Maize and Bean crops occupied the majority if the site. Gardens and infrastructure were also included in the Transformed Land unit.

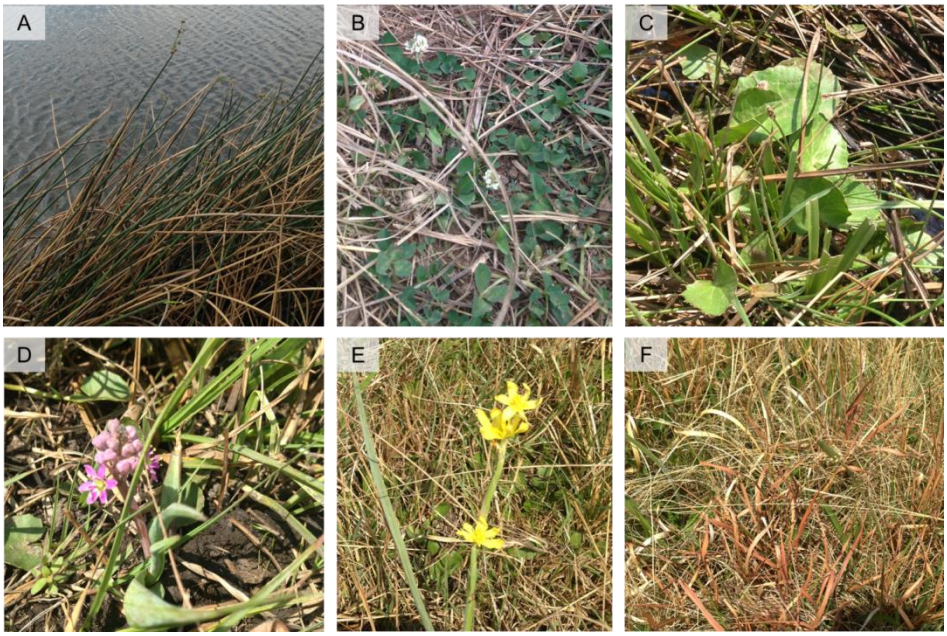


Figure 6-15: Examples of Plant Species found in the *Juncus* – *Trifolium* Hydromophic Grasslands vegetation type (A: *Schoenoplectus decipiens*; B: *Trifolium repens* (White Clover); C: *Centella asiatica* (Pennywort); D: *Ledebouria cooperi* (Striped Squill); E: *Homeria pallida* (Yellow Tulip) and *Imperata cylindrica* (Cottonwool Grass))

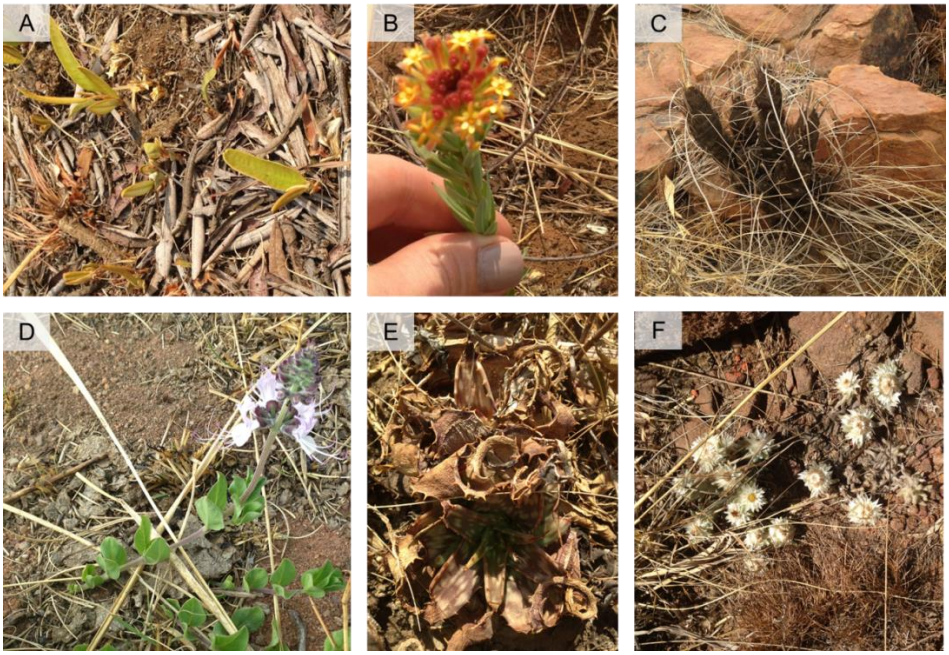


Figure 6-16: Examples of plant species found in the *Parinari* – *Tristachya* Rocky Grasslands Vegetation Type (A: *Parinari capensis* (Sand Piper); B: *Gnidia Kraussiana* (Yellow Heads); C: *Xerophyta retinervis* (Black Stick-lily); D: *Becium obovatum* (Cat's Whiskers); E: *Aloe greatheadii* (Spotted Aloe) and F: *Helichrysum cerastioides* (Wolbossie))

6.9.1.1 Species of Special Concern (SSC)

The Gauteng Department of Agriculture, Conservation and the Environment (GDACE), now the Gauteng Department of Agriculture and Rural Development (GDARD) recommends in the Requirements for Biodiversity Assessments (V.2), that a buffer of 100 m be placed around all populations of Red Data plants (GDACE, 2008). No Red Data plants were recorded on site but additional species may be recorded during the wet season survey. Plant species of special concern (SSC) expected to occur, as well as species recorded on site, are listed in Table 6-4.

Table 6-4: Plant Species of Special Concern

Family	Species	Common Name	Status
Aquifoliaceae	*Ilex mitis*	African Holly	Declining
Zamiaceae	*Encephalartos lanatus*	Woolly Cycad	NT

It will be recommended that all red data and protected species are translocated to a nursery or a suitable alternative site. The African potato (*Hypoxis*) species in the area, as well as the Eland's Root (*Elephantorrhiza sp*.) are not considered to be red data species as they are relatively common. *Hypoxis hemerocallidea* , however, is listed as Declining and should be avoided or translocated as a last resort if found on the project site.

6.9.1.2 Alien and Invasive Plant Species

Alien plants are considered to be non-native plants that invade formerly pristine environments (Bromilow 2010). Invasions by alien plants cause a change in the composition and functioning of ecosystems and delivery of ecosystem services (Wilgen and de Lange 2011). If alien invasions are not controlled, they exhibit the ability to transform heterogeneous landscapes to homogenous, often dominated by single species or scattered mono-specific clumps, thereby replacing natural vegetation. Further to this, alien bushclumps can alter hydraulic properties, such as infestations of *Pinus* in the Fynbos biome, rendering a water deficit for native plants in the area (Foxcroft 2002).

Alien plant species in South Africa have been classified according to NEMBA (No. 10 of 2004), as published in August 2014 (GN R599 in *GG* 37886 of 1 August 2014) into the following categories:

- Category 1a: Species requiring compulsory control;
- Category 1b: Invasive species controlled by an invasive species management programme;
- Category 2: Invasive species controlled by area, and;
- Category 3: Invasive species controlled by activity.

Five of the fourteen plant species recorded on the project site have been assigned alien invasive categories. Most significant is the Red River Gum (*Eucalyptus camuldulensis*), that forms dense infestations and transpires excessive amounts of water. Table 6-5 lists alien plant species recorded on the project site.

Table 6-5: Alien Plant Species Recorded on Site

Family	Species	Common Name	Alien Category
Asteraceae	*Acanthospermum australe*	Bristly Starburr	
	Bidens pilosa	Black Jack	
	Tagetes minuta	Khakibos	
	Xanthium strumarium	Rough Cockleburr	
Meliaceae	*Melia azederach*	Syringa	1b
Myrtaceae	*Eucalyptus camuldulensis*	Red River Gum	2
Oxalidaceae	*Oxalis corniculata*	Yellow Wood Sorrel	
Paperveraceae	*Argemone ochroleuca*	Mexican poppy	1b
Pinaceae	*Pinus patula*	Spreading-leaved Pine	
Poaceae	*Pennesetum clandistenum*	Kikuyu	
Salicaceae	*Populus canescens*	Poplar	
Solanaceae	*Datura stramonium*	Thorn Apple	1b
	Solanum sisymbriifolium	Dense-thorned Bitter Apple	1b
Verbenaceae	*Verbena bonariensis*	Common Vervain	

6.9.2 Fauna

A detailed desktop review and a two day site visit were undertaken in October 2014 for the dry season survey. The surveys are to confirm and identify fauna and faunal activity on the site area and around the site area. The survey included small mammals, large mammals, birds, reptiles, invertebrates and amphibians.

6.9.2.1 Mammals

During the October 2014 survey, undertaken by Digby Wells, evidence of nine mammal species was found. These species are also listed in Table 6-6. The spoor of various mammal species was identified throughout the project site. This included the common antelope and buck species as well as a number of carnivorous mammals including; *Galerella sanguinea*

(Slender Mongoose), *Atilax paludinosus* (Water Mongoose) and *Canis mesomelas* (Black-backed Jackal). Examples of mammals recorded on site are represented in Figure 6-17.

Table 6-6: Mammal Species Observed on the Project Site

Common Name	Species	Threat Status (SA)
Common Duiker	*Sylvicapra grimmia*	LC
Black-backed Jackal	*Canis mesomelas*	LC
Yellow Mongoose	*Cynictis penicillata*	LC
Slender Mongoose	*Galerella sanguinea*	LC
Water Mongoose	*Atilax paludinosus*	LC
Cape Porcupine	*Hystrix africaeaustralis*	LC
Common House Rat	*Rattus rattus*	LC
Scrub hare	*Lepus saxatilis*	LC
Rock Dassie	*Procavia capensis*	LC

Figure 6-17: Examples of Mammals on Site (A: *Rattus rattus* (Common House Rat) (Sherman Trap); B) *Canis mesomelas* (Black-backed Jackal) - possibly poisoned, C) *Galerella sanguinea* (Slender Mongoose))

6.9.2.2 Avifauna

The 81 bird species found/seen on the project site were recorded through opportunistic sightings and sighting points. The most productive results were close to wetland areas and along the Bronkhorstspruit river system. Of interest was the observation of what could possibly be a poisoned *Aquila verreauxii* (Verreax's Eagle). Examples of avifauna recorded on the project site are represented in Figure 6-18.

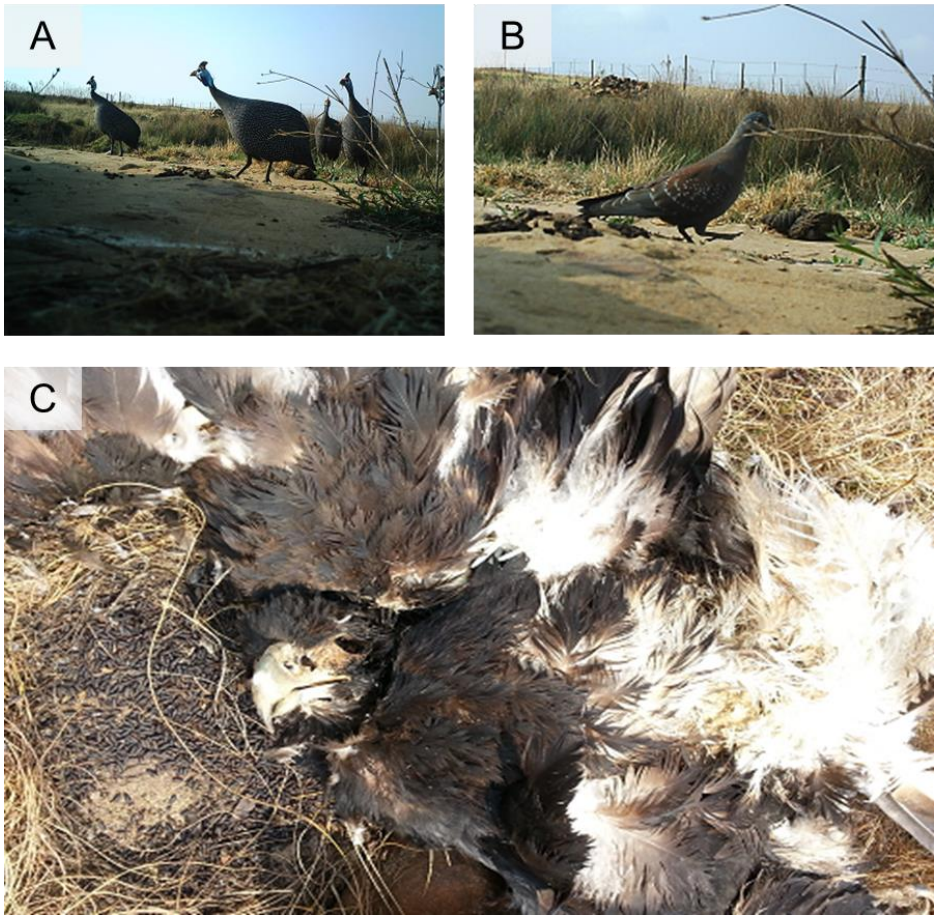


Figure 6-18: Examples of Avifauna Recorded on the Project Site (*Numida meleagris* (Helmeted Guineafowl)); B) *Columba guinea* (Speckled Pigeon) and C) *Aquila verreauxii* (Verreax's Eagle) (Possibly Poisoned)

6.9.2.3 Herpetofauna

The reptile population in the area is expected to be relatively high due to the type of habitat types, but since these animals are very sensitive to vibrations and noise, and hide easily in crevices and undergrowth, they are not easily spotted.

Of the 54 amphibians endemic to South Africa, 16 (30 %) are found in the Grassland Biome (Passmore and Carruthers, 1995). Of these, 8 species (50 %) are endemic to the biome.

Two frog species were identified within the project site, due to the close proximity of the Bronkhorstspruit River and the wetland areas found on the project site, the number of amphibians is likely to be much higher than those identified. No Red Data frog species were recorded during the sampling survey. The species recorded are listed in the Table 6-7 below.

Table 6-7: Herpetofauna Identified within the Project Site

Species Name	Common name	Status (South Africa)
Xenopus laevis	Common Platana	LC
Amietophrynus maculatus	Flat-backed toad	LC

6.9.2.4 Invertebrates

Insects are vital to the functioning of the earth's ecosystems in their present form and help to maintain the balance that allows the vast diversity of life to coexist. For example, some insects assist plant species to reproduce and disperse, while others feed on the same plants and keep them in check, allowing room for other species. Other insects turn the soil or feed on decomposing matter, thus playing important roles in nutrient cycling. Virtually every aspect of ecosystem functioning is dependant in some way on insects, which are the main non-plant drivers of ecosystem dynamics.

Due to the season and brevity of the site investigation, few butterfly or invertebrate species were observed on site. Please refer to Appendix B for the complete list.

6.9.3 Sensitivity Assessment

The sensitivity assessment takes into account the regional sensitivity of the greater study area (including conservation plans and proximity of the site to protected areas) as well as the site-specific sensitivity (based on the presence of sensitive and important species and habitat).

6.9.3.1 Gauteng C-Plan

The Gauteng Conservation Plan (C-Plan) was developed by the Gauteng Department of Agriculture and Rural Development to represent priority areas for conservation in Gauteng. The purpose of C-Plan is to serve as a primary decision support tool for the biodiversity component of the EIA process, to inform protected area expansion and biodiversity stewardship programmes in Gauteng and to serve as a basis for development of Bioregional Plans in municipalities.

According to the Gauteng C-plan, areas that are regarded as ‘irreplaceable’ and ‘important’ are present in the study area (Plan 14 in Appendix A). This indicates that that these areas necessary to achieve the conservation objectives of C-Plan.

6.9.3.2 Protected Areas

The project site does not coincide with any formally protected area (Plan 15 in Appendix A). The Rhenosterspoort Private Nature Reserve is situated to the east of the project site. Since many fauna species are known to travel over large distances, it is likely that there may be an exchange of species between natural areas on site and the adjacent protected area.

Further to this, the study area does not fall within any Important Bird Areas (IBA's) according to Birdlife South Africa.

6.9.3.3 Threatened Ecosystems

The study area is surrounded by habitat that has been regarded as threatened, as part of the Rand Highveld Grassland (Plan 16 in Appendix A). The project site itself, however, has not been incorporated into this threatened ecosystem and this is most likely attributable to the fact that the area has been disturbed.

6.9.3.4 Site Specific Sensitivity

All wetlands and riparian habitat associated with the project site were allocated an ecological sensitivity of 'very high' based primarily on the importance as faunal habitat. Wetlands are critical for the maintenance of biodiversity and are also protected according to the National Water Act, 1998 (Act No. 36 of 1998).

The rocky grassland habitat, namely, *Parinari – Tristachya* Rocky Grassland, was allocated a 'high' ecological sensitivity due to the diversity of plant species present here, as well as the suitability of the substrate to support plant SSC. The Provincially Protected *Aloe greatheadii* (Spotted Aloe) was recorded in the rocky grassland. The natural grassland surrounding the wetland areas, *Eragrostis – Verbena* Grassland, received a 'medium' sensitivity. Although this grassland was not regarded to be in particularly good ecological condition, it was largely intact and has the potential to support small mammal populations. This area also serves as a buffer around the wetland.

Pasture grasslands and agricultural areas were not considered to be of significant value to biodiversity, since they were comprised of mono-specific stands. (Plan 17 in Appendix A) represents the ecological sensitivity of the project site.

6.10 Wetlands

The water systems associated with the project site are all linked to the Olifants River and fall within the greater Olifants River catchment. Owing to the cumulative impacts on the Olifants River, as well as its link to important habitats in the Kruger National Park (KNP), the Department of Water Affairs (DWA) has recently placed significant emphasis on the importance of conservation of watercourses associated with this catchment.

6.10.1 National Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources were considered to evaluate the importance of the wetland areas located within the project site.

Spatial layers (FEPA's) used include the wetland classification and ranking. Table 6-8 illustrates the different wetland types recorded according to NFEPA. The identified wetland areas play important functions such as the enhancement of water quality, attenuation of floods and biodiversity support.

The NFEPA wetlands have been ranked in terms of importance in the conservation of biodiversity. Not all of the wetlands present on the project site have been recognised by NFEPA and this may be attributable to the large-scale nature of the NFEPA assessment. The Bronkhorstspruit River system has been classified as a valley floor wetland and has been allocated an NFEPA rank of 6. The channelled valley bottom running through the site was similarly assigned a rank of 6. This is indicative that although these wetlands have been recognised by NFEPA, they are not highlighted as being of any particular importance for the meeting the national objectives of NFEPA.

Table 6-8: NFEPA Wetland Classification Ranking Criteria

Criteria	Rank
Wetlands that intersect with a RAMSAR site.	1
Wetlands within 500 m of an IUCN threatened frog point locality; Wetlands within 500 m of a threatened water bird point locality; Wetlands (excluding dams) with the majority of their area within a sub-quaternary catchment that has sightings or breeding areas for threatened Wattled Cranes, Grey Crowned Cranes and Blue Cranes; Wetlands (excluding dams) within a sub-quaternary catchment identified by experts at the regional review workshops as containing wetlands of exceptional Biodiversity importance, with valid reasons documented; and Wetlands (excluding dams) within a sub-quaternary catchment identified by experts at the regional review workshops as containing wetlands that are good, intact examples from which to choose.	2
Wetlands (excluding dams) within a sub-quaternary catchment identified by experts at the regional review workshops as containing wetlands of biodiversity importance, but with no valid reasons documented.	3
Wetlands (excluding dams) in A or B condition AND associated with more than three other wetlands (both riverine and non-riverine wetlands were assessed for this criterion); and Wetlands in C condition AND associated with more than three other wetlands (both riverine and non-riverine wetlands were assessed for this criterion).	4
Wetlands (excluding dams) within a sub-quaternary catchment identified by experts at the	5

Criteria	Rank
regional review workshops as containing Impacted Working for Wetland sites.	
Any other wetland (excluding dams).	6

6.10.2 GDARD C Plan

According to the GDARD C - Plan, the wetlands in the study area are regarded as 'Ecological Support Areas' and 'Irreplaceable'. Irreplaceable areas are necessary for achieving the objectives of the C-plan.

6.10.3 Identified Wetlands

An unchannelled valley bottom wetland occurs in the south-western part of the project site, which becomes a channelled valley bottom wetland with associated seepage areas. Open water was observed during the dry season survey, indicating that this system is permanent. The unchannelled valley bottom wetland occurs within an existing crop of Maize (*Zea mays*); however the boundaries of the wetland will be confirmed during the summer season survey.

These wetlands are dominated by typical wetland indicator species, including; *Schoenoplectus corymbosus, Trifolium repens* and *Juncus effusus*. Additionally the exotic species Silver Poplar (*Populus canescens*) occurs within close proximity to the wetland. The preliminary wetland delineation is represented in Plan 18 in Appendix A.

Existing impacts to the wetlands include trampling and overgrazing by livestock of the farm. In addition to this, there are three dams within the project site, which have impacted the natural flow scheme of surface water.

Buffer zones are a requirement to facilitate the protection of the delineated wetland areas within the project site. The purpose of the establishment of buffer zones is to minimise the anthropogenic impacts associated with the proposed development on the receiving water resources. A buffer zone is defined as: "*the strips of undeveloped, typically vegetated land (composed in many cases of riparian habitat or terrestrial plant communities) which separate development or adjacent land uses from aquatic ecosystems (rivers and wetlands).*"

The DWA have recently recommended that a buffer of 200m be placed around all wetlands that are linked to the Olifants River. The legislated buffer requirement, however, is 100 m according to the NWA (No. 36 of 1998).

6.10.4 Wetland Unit Identification

The majority of wetlands identified within the project site can be classified as valley bottom systems linked to streams associated with the Bronkhorstpruit River. The identified wetland units associated with the project site are described below.

6.10.4.1 Channelled Valley Bottom

According to Kotze *et al.* (2007), channelled valley bottom systems are characterised by less active deposition of sediment and an absence of oxbows and other floodplain features such as levees and meander scrolls. These wetland types tend to be narrower and have somewhat steeper gradients and the contribution from lateral groundwater input relative to the main stream channel is generally greater. The primary cause of this channelling is the result of erosion (Kotze *et al.* 2007).

6.10.4.2 Unchannelled Valley Bottom

The valley bottom wetlands without channels are located at the lowest position in a landscape where the water drained from the local slopes accumulate. Water expressed in the hillslope seepage wetlands may also drain towards the valley bottom wetlands. These wetland systems play important functions such as sediment trapping, flood attenuation and nutrient-cycling. The valley bottom without a channel wetland on site receives extensive amounts of sediment and flow from the surrounding cultivated slopes. This allows an opportunity for contact between solute-laiden water and the wetland vegetation, thus providing an opportunity for flood and contaminant (nutrients, pesticides, herbicides) attenuation. Extensive areas of these wetlands remain saturated as stream channel input is spread diffusely across the valley bottom, even at low flows (Kotze *et al.,* 2007). These wetlands also tend to have a high organic content.

Lateral seep zones form part of the adjacent hillslope seepage wetlands, this is a characteristic for all the valley bottom wetlands. The primary drivers for these systems, owing to the shallow gradients along the valley bottoms are diffuse horizontal surface flow and interflow. There is generally a clear distinction in the transition in the vegetation structure between the mixed grass-sedge meadow zones that characterise these wetlands to the more intermittently wet grassland habitats associated with the adjacent hillslope seepage wetlands (Kotze *et al*., 2007).

6.10.4.3 Hillslope Seepage Wetland

Hillslope seepage wetlands are usually associated with a perched groundwater table, where precipitation that occurs within the greater catchment is temporarily stored within the soil profile as a result of impervious strata in the soil profile. The impervious strata within the soil profile is normally made up of an unweathered parent material or swelling clays typically associated with granites, sandstones or shales. Hillslope seepage wetlands are expressed were the soil profile is shallow enough such that impervious layer and the water stored within the soil profile are expressed on the surface. The soils in the area must be waterlogged long enough for oxygen to be depleted through a chemical process of reduction which results in the presence of radoximorphic features in the soil.

Hillslope seepage wetlands are created and maintained by infiltration processes that occur in the surrounding non-wetland areas within the catchment. Hillslope seepage wetlands connected to watercourses are wetland systems which are directly linked on the surface to

watercourses. This type of system typically contributes to flow in the watercourses, even if this contribution is only on a seasonal basis.

6.11 Aquatic Ecology

The current land uses in the B20D catchment include irrigated and dryland agriculture, with numerous abstraction points along the Bronkhorstspruit. In addition to crop agriculture, live-stock farming including cattle and sheep production also occurs adjacent to the river, with the river system often being responsible for providing drinking water for livestock. In addition, there is a sewage treatment facility located immediately upstream of the proposed project site and therefore potential eutrophication and solid waste can be expected within the associated aquatic ecosystem.

The desktop survey of the upstream region of the B20D catchment indicated limited industrial activities within the project area. Industrial activities observed in the upstream catchment included several old coal mining areas. When considering the abovementioned potential impacts and the most recent desktop information available, the Present Ecological Status (PES) and Attainable Ecological Class (AEC) are presented in the table below (Table 6-9).

Table 6-9: Ecological Status of the B20D Catchment

Component	Category
PES	Class C (Moderately modified)
AEC	Class B (Largely natural)
Importance and sensitivity	Moderate

From this table, the PES of the associated aquatic ecosystems may be considered moderately modified. This modified status is most likely a result of the abovementioned activities. In addition, the AEC has been set at Class B.

According to the National Freshwater Ecological Priority Area's (NFEPA) the catchment is considered an upstream management area (Nel *et al*., 2011). Due to this classification the B20D catchment should be managed in such a manner to promote water quality for downstream regions.

The fish species expected to be present in the B20D quarterly catchment are presented in the table below (Table 6-10).

Table 6-10: Expected Fish Species of the B20D Catchment

Scientific Name	Common Name
Barbus anoplus	Chubbyhead barb
Barbus neefi	Sidespot bard
Barbus paludinosus	Straightfin barb
Labeobarbus polylepis	Smallscale yellowfish
Barbus trimaculatus	Threespot barb
Clarius gariepinus	Sharptooth cat fish
Cyprinus carpio	Carp
Gambusia affinis	Mosquito fish
Micropterus salmoides	Bass
Pseudocrenulabris philander	Southern Mouth Brooder
Tilapia sparmanii	Banded tilapia

7 SOCIO-ECONOMIC BASELINE

7.1 Social Profile

7.1.1 Population Demographic

The population within the local study area grew considerably during the last decade to reach just less than 110 000 people in 2011. This population comprised 31 000 households, which equates to an average household size of 3.5 (StatsSA, 2013).

Table 7-1 presents the gender and age distribution of the local study area, and indicates that males and females tend to be equally distributed. The gender distribution among household heads indicates that just more than a third of all households (36 %) in the local study area are headed by females. The age distribution shows that the majority of the local project site's population falls within the 15-64 year bracket, while only a quarter are younger than 14 years.

Table 7-1: Gender-and Age Distribution

Study area	Gender		Age category (in years)		
	Female	Male	0-14	15-64	65+
Local	50 %	50 %	28 %	68 %	4 %
Regional	50 %	50 %	23 %	72 %	5 %

Source: StatsSA, 2013

The population within the project area is somewhat differentiated from an ethnic and language perspective, with several prominent languages (i.e. IsiNdebele, IsiZulu and Sepedi) spoken in the local study area. With regards to race Black Africans constitute the overwhelming majority, followed by White. The majority of the Black African population reside in townships within and surrounding Bronkhorstspruit, while the white minority mostly reside in Bronkhorstspruit town or smallholdings or farms.

7.1.2 Education

Education levels among the local population is presented in Table 7-2 below, which indicates a generally low level of formal education among the local study area's population, with more than two thirds of individuals not completing secondary schooling, irrespective of their gender grouping.

Table 7-2: Highest Level of Education (20 years and older)

Education level	Study area					
	Local			Regional		
	General	Female	Male	General	Female	Male
None	8 %	9 %	7 %	4 %	5 %	4 %

Education level	Study area					
	Local			Regional		
Some primary	25 %	24 %	25 %	18 %	18 %	18 %
Completed primary	5 %	5 %	5 %	4 %	4 %	4 %
Some secondary	31 %	31 %	32 %	29 %	28 %	29 %
Completed secondary	22 %	23 %	22 %	28 %	28 %	27 %
Higher	8 %	8 %	8 %	18 %	18 %	18 %

Source: StatsSA, 2013

7.1.3 Local Economy and Employment

The manufacturing sector is the largest contributor (30 %) to the local study area's economy in terms of Gross Domestic Product (GDP), followed by the services, (28 %), financial (17 %) and trade (12 %) sectors (StatsSA, 2013). Ekandustria is regarded as the main industrial focal point in the local study area and provides manufacturing services to provincial, national and international exporters. Activities within the services and finance sectors are mostly located in Bronkhorstspruit town.

Although the local study area is endowed with large areas of highly arable land, the sector only contributes 3 % to the local economy. The bulk of agricultural produce is derived from commercial farms around the Bronkhorstspruit town, primarily producing maize, beef, groundnuts, cotton, sunflower and sorghum, and subsistence production of vegetables.

Mining activities within the local study area is relatively limited, with the closest mining operations, HCI Palesa Colliery and Phalanndwa Colliery, located 18 km northwest and 40 km south of the proposed mine area, respectively. Anglo American is in the process of developing the New Largo Colliery that will be located approximately 20 km south of the proposed mining area.

In 2011, the employment rate among the local study area's labour force was 72 %. Employment was mostly provided within the formal sector, which is centred on the manufacturing and service sectors. Although agriculture contributes only slightly to the local economy, the sector is considered a major source of employment within the area. Employment within this sector is usually seasonal and with low remuneration.

Unemployment among the economically active population is relatively high, when compared to the regional study area (see Table 7-3 and Table 7-4). The level of unemployment amongst females is just more than 10 % higher than for males (StatsSA, 2013).

Table 7-3: Employment Status

Study area	Status			
	Employed	Unemployed	Not economically active	Discouraged work seeker (DWS)
Local	45 %	18 %	32 %	5 %
Regional	51 %	16 %	29 %	3 %

Source: StatsSA, 2013

Table 7-4: Unemployment among the Economically Active Population

Study area	Economically inactive and DWS	Economically Active	Employed	Unemployment
Local	37 %	63 %	72 %	28 %
Regional	32 %	68 %	76 %	24 %

Source: StatsSA, 2013

7.1.4 Income

People's living standards, as well as their ability to afford basic services such as water, sanitation and health care, are indicated through income levels. Table 7-5 shows the general monthly income distribution as well as the proportionate breakdown across genders. Generally income levels within the local study area are low, with more than 50 % of people earning less than R 800 a month. The proportion of people earning no income is high; of those not earning any income females outnumber males by 9 percentage points (see Table 7-5). It is notable that of those earning an income, females are also worse off than males, this gender discrepancy tends to increase considerably within the higher income brackets.

A large number of people who earn nothing (45 %) and a small number (4 %) of people who earn over R 12 801 per month (see Table 7-5), is indicative of a high Gini-coefficient[5] (measure of inequality). The majority of the local study is affected by inequality with the Gini-coefficient higher than 0.69, this figure increases to 0.73 in the region (Statistics South Africa, 2011).

[5] The Gini-coefficient, developed in 1912 by Italian statistician Corrado Gini, is a mathematical measure of income inequality. Its theoretical maximum value is 1 – which would imply that a single person receives 100% of the total income and the remaining people receive none – and its theoretical minimum value is 0 – in which case everyone receives exactly the same income. The Gini-coefficient of the United States of America is between 0.45 and 0.5, while that of Sweden is 0.23.

Table 7-5: Individual Monthly Income

Study area	Income category	General proportion	Gender proportion	
			Male	Female
Local	None	45 %	40 %	49 %
	R1-800	21 %	20 %	21 %
	R801-3200	21 %	23 %	20 %
	R3201-R12800	9 %	12 %	7 %
	R12801-204801+	4 %	5 %	3 %
Regional	None	44 %	41 %	47 %
	R1-800	12 %	12 %	12 %
	R801-3200	18 %	18 %	18 %
	R3201-R12800	14 %	15 %	13 %
	R12801-204801+	11 %	13 %	9 %

Source: StatsSA, 2013

7.1.5 Housing

The majority of households (75 %) within the local study area reside in formal dwellings, with the remainder residing in informal housing. The housing type is also linked to ownership. Security of tenure contributes to more permanent and conventional housing types, while a lack of security tend to bring about informal dwellings. Almost 60 % of dwellings in the local study area are privately owned, of these the majority have been fully paid off.

Market-driven housing is concentrated in Bronkhorstspruit Town, Bronkhorstspruit Dam and the Silverlakes estate. Public housing, on the other hand, is concentrated on the northern areas of Zithobeni, Ekangala and Rethabiseng.

7.1.6 Service Delivery

7.1.6.1 Water and Sanitation

Government water schemes provide most households within the local study area with piped water (86 %); however, a considerable number of households still depend on groundwater resources for domestic and agricultural use (7 %). Rural communities are almost totally dependent on piped ground water abstracted from boreholes by pumps.

In terms of sanitation just more than half (56 %) the households within the local study area have access to flush sanitation, followed by a large number of households (36 %) that rely on pit facilities. These figures are considerably lower than those of regional study area.

7.1.6.2 Energy Sources

The majority of households within the local study area have access to, and uses electricity for lighting cooking and heating purposes; with candles being the second most common energy source for lighting, and paraffin commonly used for cooking (see Table 7-6).

Table 7-6: Energy Sources and Uses

Energy source and purpose	Study area	
	Local	Region
Energy used for lighting		
Electricity	88 %	89 %
Candles	10 %	9 %
Paraffin	1 %	2 %
Other	1 %	-
Energy used for cooking		
Electricity	82 %	85 %
Paraffin	8 %	11 %
Wood	6 %	1 %
Gas	3 %	3 %
Other	1 %	-
Energy used for heating		
Electricity	68 %	74 %
None	12 %	13 %
Wood	9 %	4 %
Other	11 %	10 %

Source: StatsSA, 2013

7.1.6.3 Health Facilities

The co-ordination of health facilities is planned at a district level and is therefore not directly the responsibility of the region. There are five clinics located in the local study area which provides Primary Health Care to the Community as well as the implementation of health programmes. These clinics are Zithobeni Clinic, Re-Thabiseng, Ekangala Clinic, Dark City Clinic, and Bronkhorstspruit Clinic.

7.1.6.4 Transport and Road Networks

Four major roads serve the local study area: N4 Platinum Highway, R513, R104 (Old Bronkhorstspruit Road) and R25. Government operated bus and rail transport services do not extend into the local study area. Public transport is mostly privatised and road based

(e.g. mini-busses), highlighting the importance of the maintenance and management of road infrastructure. Non-motorised transport (i.e. walking and bicycles) is the most common means of mobility in rural areas, especially for shorter distances. A fair number of mini-buses and buses carry passengers to and from rural areas to areas of employment in Bronkhorstpruit or Ekandustria.

7.2 Cultural Heritage

A review of the South African Heritage Resources Information System (SAHRIS) palaeo-sensitivity map (PSM) indicated that the palaeo-sensitivity of the geological formation within which the project area is situated is moderate.

Through a review of relevant previously completed studies (van der Walt, 2007; van Schalkwyk, 2007a; van Schalkwyk, 2007b; van der Walt, 2008a; van der Walt, 2008b; van Schalkwyk, 2008; Kusel, 2009; Kitto, 2013), no heritage resources associated with the Stone Age or Iron Age were identified. All identified sites were associated with the Colonial and Historical Period, therefore, further discussion will be focused on this time period.

The outbreak of the First Anglo-Boer War occurred in Potchefstroom in December 1880 as a result of an uprising by burghers and the subsequent proclamation reinstating the Boer Republic (Von der Hyde, 2013).

A column of British soldiers was despatched from the east around Lydenburg to reinforce the Pretoria garrison for fear of an armed Boer incursion. To prevent a concentration of British troops in Pretoria, a commando under Frans Joubert was sent toward Middelburg to oppose the approaching British column (Von der Hyde, 2013).

Nine days after receiving the order, Lieutenant Colonel Phillip Anstruther departed for Pretoria along with 247 men and 34 wagons that included three women and children. On 20 December, the British column was ambushed which resulted in the Battle of Bronkhorstspruit directly adjacent to the project area (See Figure 7-1). The battle occurred approximately 1.5 km from their intended camp in Bronkhorstspruit. Boers approached the column and demanded that they halt their advance on Pretoria. The British refused to halt and as a result were attacked. Within minutes, 77 British soldiers were killed and 80 wounded, opposed to the Boer's one casualty and one wounded (Von der Hyde, 2013).

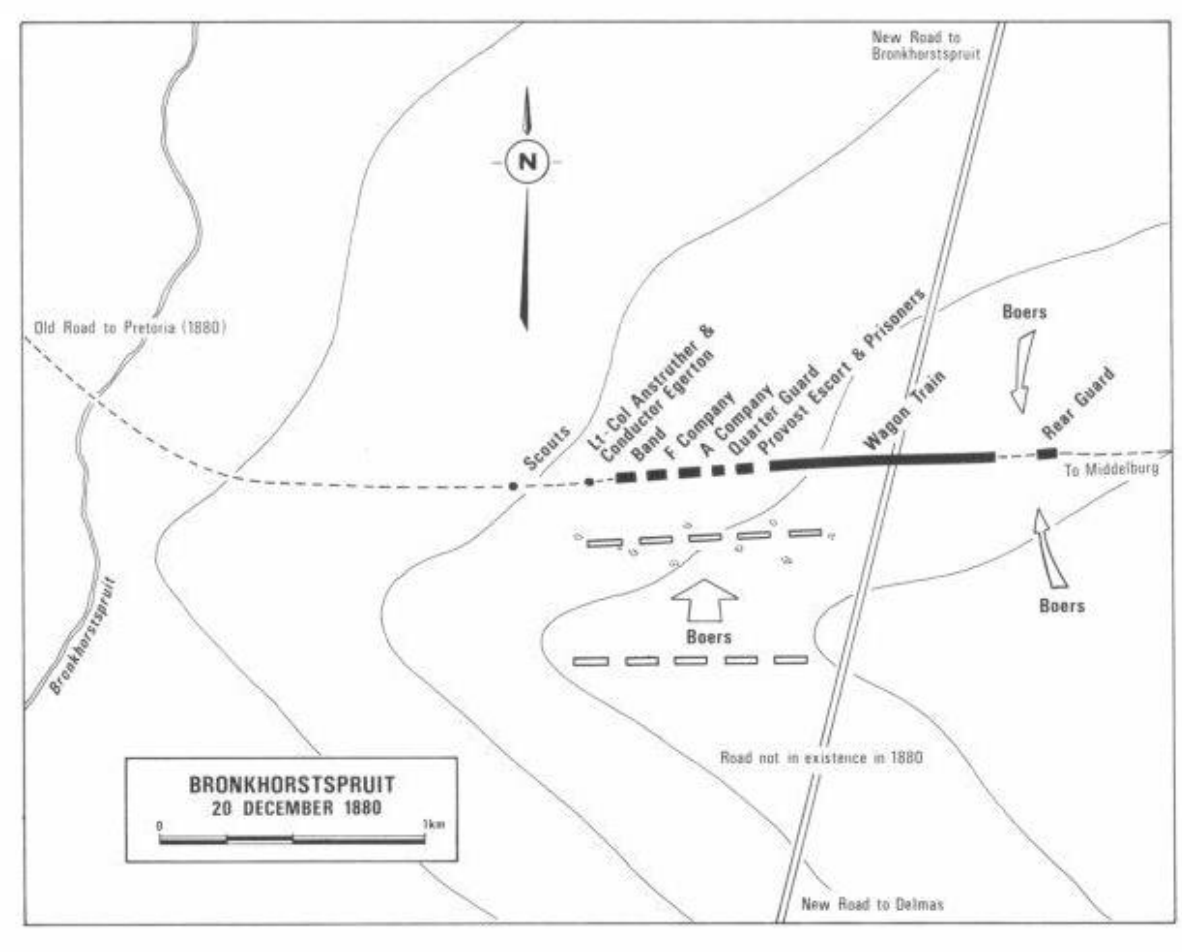


Figure 7-1: Depiction of the Battle of Bronkhorstspruit

Historic aerial imagery indicates that through time, the project area has been predominantly used for agricultural purposes. Potential structures were identified in the 1939 aerial imagery, which appear to have been removed by 1976. The present environment is still dominated by agricultural fields and grazing land. Rocky outcrops were identified within the project area, to the south in close proximity to the Bronkhorstspruit River.

In addition to the identification of the Battle of Bronkhorstspruit battlefield, a total of four heritage resources were identified within the project site during the heritage survey, presented in Table 7-7.

Table 7-7: Identified Heritage Resources within the Project Site

Site type	GPS Co-ordinates	Description	Images
Structure	-25.791248/ 28.786547	A four room historical stone structure with a fireplace in the main sitting room. No electrical wirings or plumbing was identified within the house, and roof was presumably thatch. The date of the house is unknown and is assumed to be historical at this point. The site is located less than 5 m from the berm for the open pit.	
Potential Palaeontological site	-25.795355/ 28.790237	Possible fossilised sea bed. These are located 10 m from proposed haul road.	

Historical site	-25.797801/ 28.798163	An area measuring approximately 100 m x 300 m with rectangular stone walls, presumably cattle kraals. This site is located 100 m from the proposed haul road.	
Burial ground	-25.788695/ 28.793123	Approximately 30 graves first identified by Pistorius 2010. The burial ground is located in the proposed open pit area.	

7.3 Traffic

The existing road network around the project site includes the following roads:

- Road R907 is a gravel road, with the exception of approximately 300 m which is surfaced, where the R 907 intersects with Road R25. The intersection with Road R25 is stop controlled with priority on Road R25. The road serves mainly the farming commuting along the route. Road R907 falls under the jurisdiction of Gautrans;
- Road R25 is a single lane surfaced carriageway. The road provides access between the project site and Bronkhorstspruit, Road R104 and the N4 National Road to the south. Road R25 falls under the jurisdiction of Gautrans; and
- The N4 National route is a four lane dual carriageway and links Pretoria and Witbank. The N4 falls under the jurisdiction of the South African National Roads Agency Limited (SANRAL).

The provincial PWV Road Master Plan indicates that the project site is affected by the future alignment of the K16 road. The road is planned along the northern boundary of the project site. Currently only a "Route Determination Report" has been prepared for the route where it borders the northern boundary of the property.

7.4 Noise

The immediate area (adjacent properties) surrounding the proposed project are rural farmlands which include associated dwellings and smallholdings. The noise levels are expected be around 45 dBA during the daytime and 35 dBA during the night time, according to the SANS 10103:2008 guidelines. Noise levels in rural districts may reach up to an average of 55 dBA during the daytime due to noise sources from farming activities like vehicle movement (i.e. tractors and other farming vehicles).

7.5 Visual Receptors

The potential visual receptors within the project area include the residents of farmhouses and people working at the small holdings/ factories. The project area is located close to the Bronkhorstspruit Town; therefore people residing in this area are likely to be affected by the development. Small holdings that are found in the vicinity of the project area are also classified as potential visual receptors. Roads that could potentially be affected include the R104, R25, R907 and N4. Users of the railway line that passes 1 km from the southern boundary of the project area are also likely to be affected.

8 PUBLIC PARTICIPATION PROCESS

The Public Participation Process (PPP) has been developed to ensure compliance with environmental regulatory requirements. The PPP is designed to provide Interested and Affected Parties (I&APs) with an opportunity to evaluate the project, to provide the needed inputs and to receive feedback from the project team and/or proponent. This section provides an overview of the PPP describes what activities have been undertaken to date and includes next steps as part of the environmental regulatory process.

8.1 Process Objectives

The PPP objectives for the project have been set out below:

- To ensure that I&APs are informed about the project;
- To provide I&APs opportunity to engage and provide comment on the project;
- To draw on local knowledge by identifying environmental and social concerns associated with the project;
- To involve I&APs in identifying methods in which concerns can be addressed;
- To verify that stakeholder comments have been accurately recorded; and
- To comply with the legal requirements.

As part of the PPP, there are three (3) main phases of consultation as detailed below:

8.1.1 Scoping Phase

As part of the Scoping Phase, the following main PP activities are undertaken:

- Identification of stakeholders;
- Distribution of a Background Information Document (BID), placement of adverts and site notices;
- Making the relevant environmental reports available for public comment;
- Consultation with I&APs; and
- Obtain suggestions and concerns from I&APs.

8.1.2 Impact Assessment Phase

During the Impact Assessment Phase the main PP activities envisaged to be undertaken include:

- Provide feedback about the specialist studies conducted and mitigation measures proposed by means of consultation with I&APs;
- Making the relevant environmental reports available for public comment;
- Provide opportunity for I&APs to comment on specialist findings, impacts assessments and recommendations; and
- Verify that comments raised by I&APs have been accurately recorded.

8.1.3 Decision-making Phase

With completion of the Impact Assessment Phase process, all registered IAPs will be notified of the decision made by the relevant competent authorities on the project.

8.2 Methodology

The proposed methodology implemented for the PPP is in-line with the prescribed environmental regulatory requirements as described in Section 2.

8.2.1 Scoping Phase

8.2.1.1 Identification of Stakeholders

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

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

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

- **Government:** National, Provincial, District and Local authorities;
- **Landowners:** Directly affected and indirectly affected landowners;
- **Land occupiers:** Directly affected and indirectly affected land occupiers;
- **Communities:** Surrounding communities;
- **Non-Governmental Organisations (NGOs):** Environmental and social organisations;

- **Agriculture:** associations or organisations focussed on agricultural activities; and
- **Business:** small medium enterprises and formal organisations.

A stakeholder database has been compiled which will be updated throughout the project (refer to Appendix C1). Directly affected landowners for the proposed project are listed in Table 8-1:

Table 8-1: Directly Affected Landowners

Farm	Portion	Owner
WACHTENBIETJESKOP 506	69	Anna Maria Louw Van Zyl
WACHTENBIETJESKOP 506	(70)1	Hennie Boshoff Trust
WACHTENBIETJESKOP 506	75	Gustav Adolph Potgieter
WACHTENBIETJESKOP 506	76	Andre Du Toit
WACHTENBIETJESKOP 506	87	Oakleaf Inv Holdings 95 Pty Ltd
WACHTENBIETJESKOP 506	123	Jan Christiaan Wennick Britz
WACHTENBIETJESKOP 506	124	Nagypro 010 Pty Ltd
WACHTENBIETJESKOP 506	150	Sandile Terrence Khumalo
WACHTENBIETJESKOP 506	139	El Shadai Pty Ltd
WACHTENBIETJESKOP 506	113	Municipality of Bronkhorstspruit
WACHTENBIETJESKOP 506	140	El Shadai Pty Ltd
WACHTENBIETJESKOP 506	141	George Frederik Pieterse
WACHTENBIETJESKOP 506	142	La Vita Impex Pty Ltd
WACHTENBIETJESKOP 506	143	La Vita Impex Pty Ltd
WACHTENBIETJESKOP 506	144	Wilma Pieterse
WACHTENBIETJESKOP 506	145	Quintin Eric Lester Cooper & Maureen Angela Cooper
WACHTENBIETJESKOP 506	122	Ivan Sydney Raubenheimer
RESURGAM 515	R	Hendrik Johannes Cronje
RESURGAM 515	1	Municipality of Bronkhorstspruit
WACHTENBIETJESKOP 506	138	Municipality of Bronkhorstspruit
TWEEFONTEIN	12	National Government of the Republic of South Africa

8.2.1.2 Public Participation Materials

Considering the legislative requirements and good practice the following methods have been implemented to disseminate information to project stakeholders. The various PP materials used during the Scoping phase have been included in Appendix C. A description of each of these PP materials is provided below:

- **Landowner Notification Letter:** a letter informing directly affected landowners was developed and sent via email and hand delivered to a few. This letter provided a broad overview of the proposed project, applicable legislation and contact details where any concerns/queries and/or suggestions may be submitted;
- **Background Information Document (BID):** includes the location and a description of the proposed project, the legislative processes and requirements that will be followed, the specialist studies to be conducted, the competent authorities, and the consultation and registration process including contact details of the responsible person representing the EAP;
- **Newspaper Advertisements:** an English newspaper advert was placed in one Local and one Regional Newspaper. The advert included a brief project description, information about the required legislation, the competent authorities and details of the appointed EAP;
- **Site Notices:** The site notices contained a brief project description, information about the required legislation, the competent authorities and details of the EAP; and
- **Letter with Comment and Registration Sheet:** a letter was sent in English which contained information about the proposed project, applicable legislation and competent authorities. A Registration and Comment Sheet was also provided for stakeholders to use for formal registration as I&APs or to submit comments.

8.2.1.3 Consultation with Stakeholders

Considering the sensitive nature of the proposed development, early engagement was undertaken with stakeholders in an effort to share project information and to obtain comments for consideration by the project team and specialists. These included:

- **One-on-one meetings**: meetings were conducted with some of the directly affected and adjacent landowners in October 2014 and in February 2015; and
- **Telephonic consultations**: various telephonic consultations were conducted with directly affected and adjacent landowners during October /November 2014 and February 2015.

All comments raised by stakeholders have been captured in the Comment and Response Report (CRR) (see Appendix C10). Stakeholder comments have been considered and addressed, where applicable, by the project team to ensure that the scope for specialist studies to be undertaken is well defined. Responses have been provided to the comments raised by stakeholders and included in the CRR.

During the scoping phase of the EIA process, a public meeting, landowners meeting and key authorities meetings were held. During these meetings the project scope and anticipated

impacts were shared with stakeholders. More importantly, comments and concerns from stakeholders were obtained. Knowledge gathered through these discussions will inform specialist studies.

The PowerPoint presentation used at the stakeholder meetings is included under Appendix C8. At all the stakeholder meetings legislation reference materials, CDs containing the DSR and comment sheets were made available. An infrastructure layout map was also available for stakeholders to peruse.

This FSR has been made available to stakeholders on the Digby Wells website (www.digbywells.com) and in public places for a 21 day comment period and notification has been distributed to inform stakeholders. Stakeholders will have the opportunity to verify that their comments were captured and also to review responses provided by the project team.

It is recognised that there are many stakeholders that may be indirectly affected by the proposed project. Through the scoping phase public consultation process, Digby Wells have made every effort to identify and include I&APs. All recommendations and suggestions by I&APs to consider or request participation from other parties have been considered and therefore adds significant value to the overall public participation process.

8.2.1.4 Public Participation Activities

The table below provides more detail about the PP activities undertaken thus far, together with referencing materials included as Appendices.

Table 8-2: Public Participation Activities during Scoping

Activity	Details	Reference in Report
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 C1** **Stakeholder Database**
Land Claims Commissioner	The Provincial Land Claims Commissioner has been informed on 21 October 2014, by means of a letter requesting confirmation if any land claims exist on the affected properties. Feedback from the Commissioner on 9 February 2015 indicated that there are no current claims on the project affected properties. A follow-up letter was received from the Land Claims Commissioner on 19 February 2015 indicating there is a land claim on Portions 80 and 216 of Farm Roodepoort 504 JR Gauteng.	**Appendix C2** **Land Claims Letter**

Activity	Details	Reference in Report
Landowner Consultation	Various one-on-one meetings were undertaken with directly affected and adjacent landowners during October 2014 and February 2015.	**Appendix C10 Comment and Response Report**
Directly affected landowner notification	Notification letter distributed to directly affected landowners via email in October 2014.	**Appendix C3 Landowner Notification Letter**
Distribution of announcement letter and Background Information Document (BID)	BID, announcement letter with Registration and Comment Sheet was emailed and posted to stakeholders on Monday, 26 January 2015. An SMS notification was sent on 27 January 2015 to all stakeholders on the database to announce the EIA process.	**Appendix C4 BID and Comment Sheet**
Placing of newspaper advertisement	An English advert was placed in the Pretoria News on Wednesday, 28 January 2015 and in the Streeknuus on Friday 30January 2015.	**Appendix C5 Advertisements**
Putting up of site notices	English site notices were put up at the proposed project site, local libraries, municipal offices and public places such as recreational venues on Monday, 2 February 2015 at: ▪ Bronkhorstspruit Public Library; ▪ City of Tshwane Metropolitan Municipality ▪ Various points around the proposed Project area. A site notice placement map has been developed, indicating the various points where site notices were placed.	**Appendix C6 Site Notices**
Announcement of Draft Scoping Report	Announcement of availability of the Draft Scoping Report was emailed and posted to stakeholders on 26 February 2015. Copies of the Draft Scoping Report were available at: ▪ Bronkhorstspruit Public Library; and ▪ Eskia Mphahlele Library. An SMS was sent to the full database on 26 February 2015 indicating that the Draft Scoping Report was available for comment and inviting people to the public meeting. The Draft Scoping Report was also available at www.digbbywells.com and will also be made available the Public Meeting. *(Comment period: 02 March 2014 – 05 May 2015)*	**Appendix C7 Announcement Letter**

Activity	Details	Reference in Report
Focus Group Meetings	A Focus Group Meeting was held with landowners on Wednesday, 18 March 2015 from 09:00 – 12:00 at the NG Church Hall in Bronkhorstspruit. A Focus Group Meeting was held with Local and Provincial Authorities on Thursday, 19 March 2015 at the City of Tshwane Offices from 10:00 – 13:00.	**Appendix C8** **Meeting Minutes and Presentation**
Public Meeting	A Public Meeting has been held on 19 March 2015 at 15:00 – 17:00 at NG Church Hall, 51 Cnr Louis Botha and Cornelius Ave, Bronkhorstspruit.	**Appendix C8** **Meeting Minutes and Presentation**
Announcement of Final Scoping Report	Announcement of availability of the Final Scoping Report was emailed and posted to stakeholders on 18 May 2015. Copies of the Final Scoping Report are available at: ▪ Bronkhorstspruit Public Library; and ▪ Eskia Mphahlele Library. An SMS was sent to the full database on 18 May indicating that the Final Scoping Report is available for comment. The Final Scoping Report was also available on www.digbbywells.com (Public Documents). *(Comment period: 03 June – 24 June 2015)*	**Appendix C9** **Announcement Letter and Comment sheet**
Obtained comments from stakeholders	Comments, issues of concern and suggestions received from stakeholders will be captured in the Comment and Response Report.	**Appendix C10** **Comment and Response Report**

8.2.1.5 Issues and Concerns Raised by I&APs

The following key issues were raised by I&APs during the scoping phase:

- Impact of dust to people and crops and the associated mitigation measures;
- Water availability in the area is already stressed and will impact the Cullinan and Loskop Dams;
- Water quality impacts to surface water resources and their users as well as to borehole users;
- Long-term impact of acid mine drainage;
- Impacts on fauna, flora and wetlands;

- Appropriate closure and rehabilitation practices and assurance of financial provisioning;
- Extent of noise impacts;
- Concern of damage to graves and buildings of historical value within the proposed mine boundary;
- Impacts to business (farmers and Rainbow Chickens);
- Impacts to farmworkers who have to relocate and other land –users (Orphange, B&Bs);
- Escalation in crime and poaching due to influx;
- Increase in traffic and impact to road condition (R907 and R25);
- Damage to houses and structures from blasting;
- Visual impact of area, impacting on tourism;
- Proposed mine will devalue properties;
- Issues regarding the public participation process held and not been adequately informed;
- Concerns on the technical approach of the studies proposed as part of the EIA process; and
- Need for additional information on the project and what is being proposed.

8.2.2 Consultation during the Impact Assessment Phase

Public Participation activities during the Impact Assessment Phase will revolve around I&APs providing comments on specialist study findings, recommendations and mitigation measures proposed. These studies and recommendations will be included as part of the Draft EIA Report. It is anticipated that the following PPP activities will be undertaken during the Impact Assessment Phase:

- The Draft EIA Report will be made available for public comment for 60 days in accordance with NEMA and NEM:WA;
- Copies of the Draft EIA Report will be made available on the Digby Wells website and in public places or stakeholders will be able to request a CD copy;
- Focus Group Meetings will be held with landowners, and NGOs and/or Authorities;
- A Public Meeting will be conducted and stakeholders will be informed timeously thereof;
- The Draft EIA Report will be updated with stakeholder comments and the Final EIA Report will be made available for 21 days for public comment;

- Stakeholders will be informed of the stakeholder meetings and report availability by means of email, post and telephonic engagement; and
- Stakeholders will be informed of the Authorities decision on the applications for environmental authorisation and waste management licence and provided information on the appeal process.

9 POTENTIAL PROJECT IMPACTS

9.1 Soils

There are many activities imposed by the proposed open pit mining operations which could potentially impact on soil and land capability as the receiving environment. The activities are divided into the various mine activity phases namely the construction, operation and decommissioning phases.

9.1.1 Construction Phase

Removal of topsoil starts with the clearance of vegetation using machinery. Vehicle movement may potentially have a significant effect on the soil leading to compaction, surface crusting, water runoff and erosion.

The stripping of top and sub-soil means that total destruction of the natural soil horizons occurs. Soils that have been stripped can never be replaced in their original state due to the alteration of physical, chemical and biological soil properties during removal and stockpiling.

Stockpiling influences soil properties negatively, while the duration of the soil stockpiling in addition causes soil deterioration, especially soil biological quality.

9.1.2 Operational Phase

Vehicle movement may have a significant effect on the soil leading to compaction, surface crusting, water runoff and erosion. Vehicle movement will be restricted to roads and may generate dust, spillages of lubricants and petroleum products, compaction, water runoff and erosion.

9.1.3 Decommissioning Phase

Vehicle movement will be restricted to roads and may generate dust, spillages of lubricants and petroleum products, compaction, water runoff and erosion. Dust suppressants, usually bio-degradable clay binding compounds are sprayed onto the roads using a water truck.

Profiling and contouring impacts on soil through the effects of incorrect steep slopes causing water concentration and high flow velocities during rainfall events, thereby increasing the erosion potential of flowing water.

Water runoff must be diffused by installation of water management infrastructure preventing concentrated runoff and decreasing the erosion potential of flowing water.

9.1.4 Cumulative Impacts

Most of the soils found on the project site are expected to be of high agricultural potential while another part close to the Bronkhorstspruit River, is of importance from a wetland and hydrological perspective.

Cumulative open pit mining impacts on land capability therefore impacts on agricultural potential, crop production and food security. Soil that has been lost to production through open pit mining cannot be brought back into the production cycle. Mining houses in South Africa attempting soil rehabilitation of open pit coal mining areas on high potential soil have a history of reconstructing soils with low arable agricultural potential.

Post mining agricultural potential depends to a large extent on the rehabilitation efforts by the mining company. The project has a relatively small regional agricultural impact but the problem is exacerbated in the event where a large number of open pit coal mines operate in the same geographical area.

9.2 Surface Water

Based on the current mine plan, the location and extent of the South Pit would be seen as bordering the Bronkhorstspruit and will be located within recommended buffer and floodline zones.

9.2.1 Construction Phase

The removal of vegetation may result in areas being more susceptible to erosion, which could potentially cause siltation of surface water resources. Initial removal of topsoil may potentially change the surface water flow patterns and may cause siltation of the surrounding surface water bodies.

Construction of mine infrastructure may disrupt the surface water flow patterns and that could potentially influence erosion due to the increased runoff velocity. Dust generated during earth moving activities and hauling material may also result in dust deposition of the surrounding water bodies.

9.2.2 Operational Phase

The impact from blasting relates to the release of nitrates from the explosives used, if there are no storm water management measures in place, storm water runoff from the mine may contaminate water resources with nitrates. Soil erosion of topsoil or product stockpiles may result in the siltation of surface water resources. Coal dust generated from product storage and hauling material may also result in dust deposition of the surrounding water bodies.

If hazardous waste is not stored in an isolated bunded hard park area, there may be negative impacts on water bodies if any runoff from these areas reaches the receiving environment. Accidental spills and leaks of hazardous substances may contaminate storm water run-off potentially impacting the quality of surface water resources.

Potential impacts to water availability and supply will also be considered, particularly on the surrounding dams including Loskop and Priemiermyn Dam.

9.2.3 Decommissioning Phase

Restoration of the project site to a state that closely resembles pre-mining conditions may improve the quantity of water reporting to the catchment. Surface water flow and drainage patterns will thus be restored.

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

Another long term potential negative impact may result if the water trapped in the open pit and voids to rise and decant onto the surface water bodies, this could potentially result in contamination of the surrounding water bodies.

9.3 Groundwater

9.3.1 Construction Phase

Minor impacts on the groundwater may result from accidental hydrocarbon spillage from construction vehicles and/or machinery.

Paved areas and road construction may lead to an increased surface runoff that will increase evaporation and decrease infiltration to aquifers.

9.3.2 Operational Phase

Groundwater quality may be negatively impacted on due to the potential formation of Acid Mine Drainage (AMD) from exposed waste rock dumps, coal stockpiles, and deposition of discard into the open pits. Coal deposition is associated with pyrite being formed as the stratum is deposited in a reducing atmosphere. Mining activities may expose the pyrite to oxidising agents such as oxygen and ferric iron. This will lead to formation of acidic conditions and the subsequent water quality deterioration due to heavy metal transport and salt loading, as the buffering capacity of the natural rock is utilised.

Drawdown of the surrounding aquifers due to pit dewatering may potentially influence the groundwater system. This may impact on water users in the area that rely on groundwater for

domestic and agricultural purposes. Many ecological systems also rely on groundwater and may potentially be impacted.

9.3.3 Decommissioning Phase

Incorrect rehabilitation or removal of hazardous material may pollute the aquifers for a long period of time. Acid Mine Drainage is an on-going chemical reaction and if incorrect backfilling and flooding techniques are undertaken the contamination risk may increase.

Dewatering of the open pit may no longer be necessary and thus the cone of depression may recover. The natural water table may rise, making more groundwater available for water users.

During the post-closure phase, the acid formation and acid neutralisation potential of the surrounding rock Acid Mine Drainage may continue lowering the pH and pollute the groundwater environment. No potential impact is expected on the water quantity during the post mine phase. However it is possible that the artificial aquifers created by the mining process may lead to decant zones whereby groundwater is lost through the system.

9.4 Air Quality

9.4.1 Construction Phase

The stripping of surface vegetation and the construction of additional surface infrastructure such as access roads may have potential impacts on ambient air quality. These impacts include increased dust load in the area as a result of wind erosion of exposed surfaces and vehicle entrained dust.

9.4.2 Operational Phase

During the operational phase there may be increased emissions associated with blasting of the open pit, entrainment of dust during hauling and stockpiling, and wind erosion of storage facilities.

9.4.3 Decommissioning Phase

During the decommissioning phase the areas initially cleared for construction, access roads and exposed storage facilities will be rehabilitated to a landscape similar to the pre-development conditions. This could lead to increased dust generation.

9.4.4 Cumulative Impacts

The project site is situated in an area where land use is predominantly cultivated land. The cumulative impacts on the air quality may be related to increased dust levels in the mining area, bearing in mind that agricultural activities are already taking place in the vicinity. Dust levels are

usually higher during clearing and tilling of soils for cultivation. The background dust deposition rates will be compared with the predicted to assess cumulative impacts associated with the operational phase of the project.

9.5 Flora and Fauna

9.5.1 Construction Phase

The main impact on vegetation and animal life may potentially occur during this phase when existing vegetation will be removed and any remaining animals will most likely move away from the project area.

During construction the amount of heavy vehicle activity will increase dramatically, potentially increasing the risk of pollution of water and soil which may impact the health of flora and fauna.

The destruction of natural vegetation and faunal habitat may have an effect on animal species present within the project site. Noise created during construction may have a negative effect on fauna, causing them to move away from the project site. Dust generated may also impact fauna and flora within the vicinity of the project site. Dust emissions may potentially affect the respiration rates of plants/crops and also the respiratory systems of fauna.

9.5.2 Operational Phase

During the operational phase no further additional potential impacts on the floral community are likely to occur. After construction it is possible that the disturbed areas will be re-vegetated and some faunal species will migrate back in to the project site. However, the increase in human activity including noise disturbance may have an overall negative impact on the remaining faunal life. Dust generated from the haul roads and product storage may also impact fauna and flora within the vicinity of the project site. Dust emissions may potentially affect the respiration rates of plants/crops and also the respiratory systems of fauna.

9.5.3 Closure Phase

Mining and rehabilitation should be developed together and be maintained during all phases of the life of mine. There is a risk of the introduction of invader floral species during rehabilitation, and if not properly managed and control can become a potential negative impact.

9.6 Wetlands

9.6.1 Construction Phase

Although the wetlands on the project site are not regarded as ‘pristine’ from an ecological perspective, potential degradation of these systems should be avoided. Surface infrastructural

development may lead to a direct loss of wetland areas. The associated impacts could potentially be a loss of wetland habitat and a loss of wetland vegetation.

9.6.2 Operational Phase

The greatest impact may be loss of wetland habitat due to open pit mining activities as well as the new proposed railing siding. This may result in a loss of linkage to the greater stream network and possible desiccation of water resources. Further to this, habitat for flora and fauna that are wetland-dependant may be lost.

The issue of a loss of wetland integrity may potentially occur should the wetlands be affected by the proposed development. The resulting impact could potentially be a loss of sensitive species.

9.6.3 Cumulative Impacts

Wetlands are complex, interlinking systems and should be regarded on a large ecosystem-scale. The greatest concern regarding the cumulative impacts of the proposed development is loss of connectivity to other wetlands in the catchment. This has a direct and indirect effect through the puncturing of the existing aquifers.

9.7 Aquatic Ecology

9.7.1 Construction Phase

The clearing of vegetation for the construction of infrastructure, open pits, associated pollution control dams and offices may result in increased sediment loads entering the local aquatic systems resulting in sedimentation which may impact on water quality.

9.7.2 Operational Phase

During the operational phase overburden material may be displaced, transported and stockpiled. Runoff during rainfall events from these stockpiles may allow for the soluble minerals present in the stockpiles to dissolve and subsequently enter the local aquatic system and thereby disrupt natural water chemistry. In addition to the storage of overburden material on site, stockpiling of Run Of Mine (ROM) coal will also be undertaken. The management of this material in particular is of importance due to the potential for water quality degradation. The use of explosives and the presence of sewage on site present the risk for nutrient enrichment in the local aquatic systems.

9.7.3 Closure Phase

After mining is complete exposure of the carbonaceous and pyritic rock may result in the formation of acid mine water. If this acidic water is allowed to enter the nearby aquatic system it may greatly deteriorate the aquatic ecological structures.

9.8 Social

9.8.1 Local Employment

The project has the potential to provide some employment to people within the local and site-specific study area during the construction phase. It should be noted that employment opportunities during the construction phase period may be relatively limited and for a short period of time (6 months), however a much larger workforce may be required during the operational phase. Employment during the operational phase has the potential to be over a longer period (life of mine is 17 years), which may have a considerable, long term, positive impact. Employment will likely improve the income stability and quality of life of those individuals and families who benefit from employment.

A relatively high unemployment rate was noted as an issue in the local study area. The degree to which the unemployed and under-employed will be able to take up employment opportunities at the proposed mine depends largely on their level of skills and work experience as only one third has secondary education.

9.8.2 Economic Multiplier Effects

The project may result in several economic benefits for local communities through direct and multiplier effects that result from capital expenditure during the construction and operational phases.

It is expected that such expenditure may stimulate local manufacturing and service sectors, which are also the regions two strongest economic sectors. Increased expenditure and disposable income usually provide new business opportunities for micro and small businesses in communities within the site-specific study area; provided they are formalised and able to meet the procurement requirements of the proposed mine.

The project will need a wide range of goods and services during its lifetime. The majority of these needs will be highly technical and unlikely to be found in the local study area. These needs are most likely to be sourced from businesses within the neighbouring Province of Mpumalanga where coal mining is an established industry. However, in some cases, Oakleaf may be able to procure goods and services such as cleaning, security, laundry and catering

from businesses within the local study area. This increased and reliable revenue may have a positive impact on these beneficiaries.

The project may also result in macro-economic benefit, although relatively diluted, through royalties and taxes. In accordance with Section 3(2) (b) of the MPRDA mining operations must pay royalties to the state for the permanent loss of non-renewable commodities.

9.8.3 Local Economic and Community Development

In accordance with the MPRDA Oakleaf will submit a SLP as part of its Mining Right Application. One feature of a SLP is to identify and plan for Local Economic Development (LED) and infrastructure development contributions within the proposed project's directly affected communities.

The project has the potential to contribute to local socio-economic development, both through job creation and social investment, with particular reference to vulnerable communities and households (e.g. child-headed households) residing in the vicinity of the project area. This impact may be intensified through aligning development initiatives with existing socio-economic initiatives of other development role players in the area (e.g. ICDD and Sizanani).

9.8.4 Physical and Economic Displacement

Several components of the proposed mine infrastructure will overlap with households, commercial farms, grazing areas and businesses. This may result in the displacement of persons residing on or making use of the affected land. Displacement-related impacts encompass both *physical* displacement (the loss of a home and the necessity of moving elsewhere) and/or *economic* displacement (the loss of productive assets such as cultivated fields or business stands as well as loss of employment due to the loss of these assets). The following displacement impacts may be directly induced by the proposed project:

- With the limited commercially viable agriculture land available in the surrounding area it is unlikely that households will be able to secure enough land to continue commercial farming operations elsewhere and therefore the loss of livelihood may be unavoidable and permanent;
- The viability of Rainbow Chickens Franchise, a large poultry farm, in close proximity to the proposed project area may potentially be jeopardised, which could have an impact on employees and their dependants. It is possible that this business will not be viable in such close proximity to mining activities, largely due to blasting and the possible impact the project may have on water quality;
- A large number of residential structures have the possibility of being affected by the proposed mine. These residential structures are either formal residences of landowners,

or informal housing mostly occupied by farmworker households. Loss of these structures would imply physical displacement, as it would necessitate relocation of the households occupying them. Domestic workers employed at formal residences could also be left unemployment if landowners are forced to move; and

- A considerable number of structures are used for business purposes, mostly commercial farming operations, but for also transport and guesthouse enterprises. Loss of these structures could result in some economic displacement as several employees may potentially lose their only source of income.

9.8.5 Sterilisation of Agricultural Land

The project is likely to sterilise a relatively large land area (approximately 320 ha), with agricultural potential. The land has been extensively developed for commercial farming, and currently produces considerable amounts of maize. When farming operations within and surrounding the project site stop, it is unlikely that they will relocate elsewhere due to a shortage of land and the fact that several affected farmers operate more than one farm, which makes it counterproductive to re-establish another operation further away where land is available. This situation will result in a nett decrease in food supply.

9.8.6 Disruption of Movement Patterns

The R25 road will initially provide the main access for traffic to the proposed project site. The R 907 gravel road transects the north-western quadrant of the proposed mine area and links up with the R25. The road provides access to several commercial farms, small holdings and businesses when traveling from Bronkhorstspruit to the project site. Any additional traffic induced during the construction and operational phases may restrict or disrupt daily movement on these roads.

9.8.7 Population Influx

As news regarding the project spreads, expectations regarding possible employment opportunities will occur. Consequently, the areas surrounding the project might experience an influx of opportunistic job seekers, who are likely to travel from neighbouring towns. The pull factor for job-seekers to the area may be intensified by the relatively high unemployment rate in the local study area. The influx of job-seekers and the mine workforce may potentially impact the local population in various ways. Firstly it is possible that conflict might arise between the newcomers and local residents, the latter potentially baring the bulk of project impacts such as displacement. One reason for such conflict would be the perception among locals that the outsiders are taking up jobs that could have gone to unemployed members of the local communities.

Substantial population influx may place pressure on local infrastructure and services, especially housing, which is already taking strain. The increase in migrants may result in an increased demand for shelter and probably exacerbate any housing shortages in the local study area. An influx of job-seekers may also lead to an increase in various social pathologies, such as drug and alcohol abuse, domestic violence, and the incidence of Sexually Transmitted Diseases (STDs).

9.8.8 Safety Impacts

Safety impacts emanate from the risk of non-mine workers accessing the project site and being exposed to construction and operational activities without personal protective equipment and knowledge of the dangers of these sites. In addition, these sites also pose a risk to the mine workers themselves, while performing their routine duties.

The safety risks associated with blasting activities emanate from the improper use of explosives and fly-rock that may injure passers-by or surrounding land users who are unaware of blasting activities.

The incorrect storage of hazardous products could have potentially fatal consequences as these could explode or seep into the ground, potentially polluting groundwater used for domestic purposes.

The heavy vehicle traffic on local roads, sections of which is also used by private motorists, pose a risk to the road users safety due increased traffic volumes and the presence of Heavy Duty Vehicles (HDV) on the roads. Also, the potential gradual deterioration of roads as a result of HDV also poses a safety risk for motorists.

9.8.9 Nuisance Impacts

The construction and operational phases of the project will represent an intrusion into the surrounding physical environment (especially considering the relatively low baseline industrial activity in the area), which could impact on surrounding communities in various ways, including the following:

- Visual impacts: project infrastructure and stockpiles could affect the quality of the visual environment;
- Acoustic impacts: increased traffic, blasting and other mining activities, as well as activities at the crushing plant will increase noise in the area;
- Air quality and dust: air quality could be affected by blasting activities and excessive dust resulting from mining activities and transporting of coal; and
- Water quantity and quality: blasting and other mining activities may adversely impact on both the [22quantity] and quality of available water in the areas surrounding the project site.

This could impact on downstream users, which rely on the water for domestic and agricultural use.

These potential impacts could possibly affect both the quality of life of people in surrounding communities as well as the viability of businesses (especially Rainbow Chickens, Guesthouses, Property rentals), and should therefore be viewed as constituting indirect social impacts. Such secondary social impacts may come about in the following ways:

- By affecting the area's sense of place. "Sense of place" is a social phenomenon that refers to the identity and character of a landscape felt by local inhabitants, and often visitors. This attribute is derived from the natural environment and a mix of natural and cultural features in the landscape, and it usually includes the people who occupy the place;
- By affecting the health and well-being of surrounding land users and project workers. Several stakeholders expressed concern about the health impact related to excessive black coal dust, they also indicated that noise emanating from mining activities could disturb their sleep, and that they are worried about the future of their businesses located, and property values adjacent the project site, potentially resulting in high levels of stress. Landowners are also concerned about the potential impact of increased traffic; and
- By affecting the profitability of surrounding business enterprises (e.g. guesthouses) and those who incurred large financial cost by investing in property, which may likely depreciate if the proposed development is approved.

9.9 Cultural Heritage

The sources of risk to heritage resources are primarily associated with the project related activities and can be divided into the three categories:

- Direct or primary effects;
- Indirect, induced or secondary effects; and
- Cumulative effects.

The construction of facilities and infrastructure, and the physical alteration of land may have a direct effect on heritage resources that could potentially lead to the damage to and/or total destruction of these resources. This may alter the significance of the resource and result in a loss of the historical fabric of the resource.

Indirect or secondary effects may occur in relation to the battlefield and identified burial ground. The proposed mining activities may dramatically alter the landscape and sense-of-place of the

project site. If the burial ground is to remain in situ an indirect effect could be the restricted or permanent loss of access to the site by next-of-kin.

Cumulatively, the project will potentially result in an increase in industrial expansion within the area, as well as the human footprint through influx of contractors and labourers over the Life of Mine. The increase in individuals may create a higher potential for accidental damage to or deliberate vandalism of tangible heritage resources, including built structures or burial grounds. The effects of this could lead to the ultimate destruction of heritage resources thereby resulting in a loss of historical fabric of the resource and area.

9.10 Traffic

9.10.1 Construction Phase

During the construction phase, traffic may be generated due to construction materials being transported to the project site. This phase of traffic may result in potential impacts such as noise, traffic delays on the roads and generation of dust from movement of heavy vehicles on the road.

9.10.2 Operational Phase

The project may potentially generate approximately 18 additional trips (haul trucks) from and to the proposed project site, during the weekday morning and weekday afternoon. The impact of the proposed development on the adjacent road network, from a traffic engineering viewpoint is expected to be minimal. However, for the first 2 to 3 years of mining, should Oakleaf choose to haul coal from the project site to the existing Bronkhorstspruit rail siding, the number of haul trucks could increase significantly, potentially increasing the traffic on the surrounding road network.

9.10.3 Decommissioning Phase

During the decommissioning phase, traffic may be generated initially due to materials being transported off the project site, however this may reduce over time. This phase of traffic may result in potential impacts such as noise, traffic delays on the roads and generation of dust from movement of heavy vehicles on the road.

However, an increase in traffic may also pose nuisance impacts such as noise and dust.

9.11 Noise

9.11.1 Construction Phase

During the construction phase the clearing of the site, erecting of infrastructure and development of initial box cut are the main activities and may have potential impacts on the ambient noise levels on the surrounding farms and communities. The vehicles and machinery involved in the above mentioned activities will be the main noise sources during the construction phase.

9.11.2 Operational Phase

During the operational phase the truck and shovel, coal beneficiation activities as well rail siding are the main noise causing activities and may impact on the surrounding farms and communities. The beneficiation plant, vehicles and machinery as well as cargo train uploading at the proposed siding involved in the operational phase will be the main noise sources.

9.11.3 Decommissioning Phase

During the decommissioning phase the concurrent backfilling of the mining pits and demolition of infrastructure will be the main noise causing activities and may impact on the surrounding farms and communities. The vehicles and machinery involved in the decommissioning phase will be the main noise sources.

9.12 Visual

9.12.1 Construction Phase

The construction phase will be characterised by the construction of surface infrastructure, development of the mining area, rail siding and water management infrastructure. This phase is expected to have potential negative visual impacts on the receiving environment. The establishment of infrastructure and the related construction activities will draw attention to the project area making receptors aware of the development. The surface infrastructure and rail siding will cover a small part of the project area and are therefore expected to have a minor visual impact. The development of the mining area is expected to have the most significant visual impact. The open pits may result in a scar on the visual landscape. The resultant overburden dumps and topsoil stockpiles are also expected to have a negative visual impact. The height of the dumps may ultimately influence the severity of the visual impact.

9.12.2 Operational Phase

The operational phase is characterised by mining activities. This phase is expected to have major negative visual impacts. The greatest visual impacts are expected from the open pits, the use of the rail siding as well as the resultant dumps. These will cover a large part of the project area and are expected to be visible from the surrounding area. The mining of the open pits will result in a change in topography which will in turn affect the visual/ aesthetic character of the receiving environment. Topography change as a result of mining may degrade the visual/ aesthetic character of the area. However, the proposed project area is situated in a disturbed landscape which is surrounded by small holdings and farmhouses. Therefore the mining activities may exacerbate the negative visual character of the area and surrounds. The mining of the open pits may result in a further loss of scenic quality and sense of place.

9.12.3 Decommissioning Phase

The decommissioning phase is characterised by rehabilitation activities. The removal of surface infrastructure will assist in removing the negative visual impacts on the receiving environment. Rehabilitation is a step in the right direction but it is not expected to affect the overall negative visual impact caused by the mining activities. The resultant open pits, rail siding and dumps are expected to leave a permanent scar on the receiving environment.

10 Cumulative Impacts

The project area is situated on a combination of disturbed agricultural land and undisturbed natural Rand Highveld Grassland. Currently there are no mining activities within a 5 km radius of the project area. There are however a number of small holdings in close vicinity. The nearest operational mines are the Brikor Bronkhorstspruit Open Pit Mine located approximately 7.5 km west of the project area and Ceramic Industries - Houtkop Quarries situated about 9 km south-west of the project area.

These existing mines as well as the development and operation of the small holdings have altered the original aesthetic character of the natural Rand Highveld Grassland vegetation. The visibility of these large developments has resulted in a loss of scenic quality and sense of place. It is expected that the proposed Oakleaf project may continue transforming the natural landscape to an area with an industrial character. The development of this open pit mine is also expected to potentially increase the extent of the visual disturbance of industry on the Grassland setting.

The cumulative impacts associated with the visual environment are primarily characterised by changes to the fabric of the landscape, the landscape character as a whole and, consequently, changes to the visual resource. Activities associated with the construction of the open pit mining areas and vegetation clearing for other surface infrastructure may lead to a transformation in the overall landscape character as man-made features will be constructed which may dominate the landscape more and more, and open expanses of Rand Highveld Grassland may diminish. The construction of the proposed mining infrastructure and rail siding may bring about noisy, abrasive and dust-creating activities, possibly at the same time and in the same vicinity as other similar activities which may lead to a change in the overall sense of place.

11 PLAN OF STUDY FOR EIA

11.1 Purpose

The purpose of the Plan of Study (PoS) is to ensure that the EIA Phase is undertaken to meet the requirements of the NEMA and associated EIA Regulations. The PoS describes the methodology undertaken to assess potential project impacts. Furthermore, a number of specialist studies have been recommended and detailed Terms of Reference (ToR) for these studies are described in this PoS.

11.2 Proposed Specialist Studies

On completion of this scoping exercise, specialist studies have been identified to conduct detailed assessments to determine the significance of impacts associated with the project. The following specialist team has been appointed to undertake detailed investigations related to the project. A list of the specialists studies proposed for the EIA Phase is presented in Table 11-1 below.

Table 11-1: EIA Specialist Studies

Biological	Physical	Social
Fauna and Flora	Soils and Land Capability	Socio-economic
Aquatic Ecology	Wetlands	Public participation
	Surface Water	Closure
	Groundwater	Heritage
	Air Quality	Visual
	Rehabilitation	Traffic
		Noise
		Blasting and Vibration

11.3 Specialist Terms of Reference

The Terms of Reference for each of the specialist studies are discussed below. All specialist assessments will take into account the applicable South African, provincial and local legislation and guidelines.

11.3.1 Soils and Land Capability

A study of the soils present at the site will be conducted during field visits. The site will be traversed by vehicle and on foot. A hand soil auger will be used to determine the soil type and depth. Survey positions will be recorded as waypoints using a handheld GPS. The soil forms (types of soil) found in the landscape will be identified using the South African soil classification system namely; Soil Classification: A Taxonomic System for South Africa (Soil Classification working group, 1991). Several photographs will be electronically recorded as reference information.

Soils, both top (0 – 300 mm) and sub-soils (300 – 600 mm) will be sampled from dominating soil forms during the field visit. The soil samples will be analysed for physical and chemical properties.

The land capability will be assessed at soil survey positions using the soil capability information in combination with the regional climatic information. It is expected that the regional land capability should be classified as arable agriculture.

The land use of the project site will also be recorded at each soil survey point. It is expected that the present land use should be a reflection of the land capability present at the proposed project site. The land use is expected to be dominated by arable agricultural crop production.

11.3.2 Surface Water

The surface water study will involve the following tasks:

- Development of a storm water management plan prepared in line with the Department of Water Affairs (DWA) Best Practice Guideline (BPG) G1: Storm Water Management (DWA, 2006), for implementation throughout the Life of Mine (LoM) phases including construction, operation, decommissioning and post-closure;
- A floodline determination assessment will also be undertaken to determine the 1:50 and 1:100 year floodline of the Bronkhorstspruit. This floodline will be used to determine the buffers of the mine boundary and associated infrastructure;
- Development of a water and salt balance in line with DWA BPG: G2 Water and Salt Balance that will predict the wet Fand dry season volumes;

- Identification of impacts from the proposed project that are likely to impact on the surface water resources indicating the significance of the impacts on both surface water quality and the water quantity;
- Development of mitigation measures for implementation to prevent/reduce the potential identified surface water impacts; and
- Development of a surface water monitoring plan prepared in line with the DWA BPG: G3 Water Monitoring indicating monitoring points located up- and downstream of the site and the frequency of monitoring as well as the database management

11.3.2.1 Water and Salt Balance

To develop the water and salt balance, Digby Wells will undertake the following:

- Review the available information and understanding of the entire mine water system, and explain the drivers of water within the system and management thereof, for example:
  - the mass balance processes;
  - waste storage facilities;
  - water inflows required to be pumped to storage dams for use within the system;
  - pollution control dams and runoff from the polluted areas;
- Undertake a site visit,
  - Undertake water sampling to determine the salt concentrations and establish salt loads.
- Compile water and salt balance model; and
- A technical report will be compiled for the overall integrated water management providing the following:
  - All modelling methodologies and assumptions for the water balance; and
  - Data analysis in the spread sheets and a presentation illustrating the results with recommendations on water management and prioritisation.

11.3.2.2 Storm Water Management Plan (SWMP)

The following will be undertaken to develop the conceptual SWMP:

- Delineate the clean and dirty areas (based on the final layout plans) and determine the volumes to be handled. The SWMP should ensure that temporary drainage installations should be designed, constructed, and maintained for recurrence periods of at least a 25-

year/24-hour event, while permanent drainage installations should be designed for a 100-year/24-hour recurrence period; and

- Site specific assessments to establish the appropriate mitigation measures and surface water monitoring programme.

11.3.3 Groundwater

The groundwater study will be carried out to define the groundwater system of the study area and to determine the extent of an impact on the groundwater resource. An impact assessment will be used to address the possible impacts of all mining related activities (e.g. open pit mining, storage of fuel, waste rock dumps) on the quantity and quality of the groundwater resources in the project area, according to the conceptual model and monitoring data available.

The methodology utilised to obtain quantitative and qualitative information will be site specific. The methodology will entail the acquisition of all relevant hydrogeological background information and data. This normally comprises site specific surveys, intrusive studies (drilling and aquifer testing), data interpretation, numerical flow and contamination modelling and reporting. These steps are described further below.

11.3.3.1 Field Surveys and Intrusive Work

This phase comprises detailed investigations to a definitive level to enable accurate mine and project planning and to comply with regulatory requirements.

11.3.3.1.1 Geophysics

A ground geophysical survey will be conducted to delineate weathered zones and vertical to sub-vertical features adjacent to the workings. This survey will assist in locating preferential groundwater flow paths and in positioning of drilling targets.

The magnetic and electromagnetic geophysical surveying techniques will be applied during this study.

11.3.3.1.2 Drilling

Drilling will be conducted to gain general aquifer characteristics for the study area. The boreholes will be placed across the area to gain a representative understanding of the project area. At least six characterisation boreholes around the site and infrastructure areas are proposed. The number and depths of boreholes may change depending on the infrastructure planned for the mine and will have to be negotiated with the client on an ad hoc basis. A preliminary depth of 40 m per borehole is suggested.

11.3.3.1.3 Aquifer Testing

It is imperative that the most strategic and successful boreholes drilled during this investigation be tested to determine aquifer responses and to calculate the parameters presenting the aquifer hydro dynamics underlying the investigation area. Each borehole will be step-tested, followed by a 12 hour constant drawdown test and recovery test.

Water quality samples will be collected following each aquifer test for chemical analysis and these samples will be sent to a SANAS accredited laboratory in Pretoria.

11.3.3.1.4 Geochemical Testing

During this task, 4 boreholes will be drilled and 12 samples obtained to quantify the potential for acidic drainage. The following tests will be conducted:

- Acid Base Accounting and Net Acid Generation;
- XRF and XRD Tests;
- Leachate Tests and Total Element Analysis; and
- Kinetic Tests.

ABA and NAG Tests

The Acid-Base Accounting (ABA) procedure measures the acid- and alkaline-producing potential of undisturbed soil and rock (overburden) in order to determine if, after disturbance, the material will produce acid and subsequently leach metals, leading to Acid Mine Drainage risks. This procedure includes Net Acid Generation (NAG) tests that evaluate the acid generation and neutralising potential of the material.

XRF and XRD Tests

XRD allows for the measurement of the crystal structures within a sample to determine the mineralogical composition of the material. XRF is an X-ray method used to determine the elemental composition of a material. These two tests are done to evaluate and interpret the origin of any potential environmental contaminants that can leach from the ore and waste rock material on site.

Leachate Tests and Total Element Analysis

The Distilled/Reagent water leachate (DW) tests are done to simulate the heavy metal and anion leachate potential of soils, waste material and waste water left in-situ under normal conditions with only neutral water allowing leaching to occur. These tests will simulate and evaluate the potential of any heavy metal or ion contamination from the waste material that will be produced by the proposed mining project. The distilled/reagent water tests are used to evaluate the leachability of material that will be mono-disposed.

Kinetic Tests

It is generally recommended that the results of the batch leach testing are supplemented by longer term kinetic tests, which provide data on leachate qualities under real-time conditions. This is especially important for rock with elevated sulphide content and which may be potentially acid forming (PAF), as leachate quality will change with on-going exposure to atmospheric conditions. The column leach procedure is recommended, in which representative samples of crushed rock are subjected to periodic leaching under controlled conditions for a period of at least 22 weeks. This will be discussed and confirmed with the client before upon receipt of the above tests.

The lab results received from the laboratory will then be processed and interpreted. The various parameters as prescribed by the NEM: WA will then be classed against the various Total Concentrations Threshold (TCT) and Leachable Concentration Thresholds (LCT) to determine the waste class and the need for which type of liner, if any.

11.3.3.2 Hydrogeological Modelling

11.3.3.2.1 Conceptual Modelling

This is a vital step in the impact assessment process, and the development of a good conceptual model will ensure reasonable results. The conceptual model aims to describe the groundwater environment in terms of the following:

- Aquifers - these are rock units or open faults and fractures within rock units that are sufficiently permeable (effectively porous) to allow water flow;
- Runoff, groundwater head data which yields groundwater flow;
- Hydraulic parameters;
- Recharge and discharge areas, exchange of groundwater and surface water (if any); and
- Geochemical data.

11.3.3.2.2 Numerical Modelling

The conceptual hydrogeological model will be encoded into a numerical model. Contaminant transport will be assessed utilising MT3D. The model domain will extend to the closest groundwater boundaries not expected to be impacted by the proposed mining activity.

The model will incorporate the mine workings. The model will be calibrated to the latest water levels (steady state), as well as historic water level monitoring (transient). Once calibrated the model will be utilised to run the required scenario's to determine the likely impacts of mining.

The scenario modelling will cover all current and future mining plans, as well as a period after closure.

11.3.3.3 Monitoring Network Design and/or Dewatering

Recommendations and proposed methodology for monitoring and dewatering will be provided based on the results of the groundwater study, latest mine plan and the numerical model results. Frequency of sampling and reporting will be a function of the ESIA and the life of mine and its effect on the receiving environment.

A groundwater monitoring plan will be compiled based on the conditions and activities on site and will include the location of the monitoring boreholes, frequency of monitoring, list of chemical parameters to be monitored, sampling methodology, description of data capturing and reporting requirements.

11.3.4 Air Quality

The objective of the air quality study is to ensure that point source and fugitive air emissions are identified and proactive management measures are adopted in accordance with South African regulatory requirements. These requirements are geared towards environmental quality and effluent emissions, aimed at control and maintenance of acceptable levels of pollutants in the environment. The approach to the air quality scope of work will consists of a number of phases. These phases are as follows:

- Baseline Assessment;
- Dust Fallout Monitoring;
- Emissions Inventory;
- Dispersion Modelling; and
- Air Impact Assessment.

11.3.4.1 Baseline Assessment

A baseline assessment was carried out to determine the regional climate and to assess the local (site-specific) prevailing weather conditions, and its influence on the climatic and atmospheric dispersion and dilution potential of pollutants released into the atmosphere (if available).

11.3.4.2 Dust Fallout and PM_{10} Monitoring

To determine the background dust fallout for the project area, prior to development, a dust monitoring network has been established, comprising of eight single dust fallout buckets. The

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

The standard procedure accepted internationally is the American Society for Testing and Methods (ASTM) D1739:1998 (Reapproved 2010) and Standard Test Method for Collection and Measurement of Dust fall (Settleable Particulate Matter). South Africa now has its own standard (SANS 1137:2012, which is the identical implementation of ASTM D1739:1998) which will be used in this study.

Single dust bucket samplers were used to measure the fugitive dust levels which will make it possible to interpret the baseline dust levels at the relevant sensitive receptors around the mining and plant area. The results could also be used at a later stage to ascertain whether the activities at the mine and processing plant have an effect on the air quality of the area.

The locations of the dust buckets were determined taking into account predominant wind direction and location of sensitive receptors. The proposed dust monitoring sites are depicted in Plan 12 in Appendix A. The buckets were placed at the relevant receptors and positioned to capture impact of dust to the surrounding environment. The monitoring units will be left out on site for a period of 6 months. The buckets are collected and replaced with new ones on a monthly basis and transported to a certified laboratory for analysis. The dust monitoring network was commissioned in November 2014and measurement of dust deposition rates is ongoing in the area.

The results of dust fallout monitoring will be analysed and compared with the proposed acceptable rates as per the draft national dust control regulations, together with the analysis of available meteorological data.

An E-Sampler monitor will be installed on the project site to quantify the current PM_{10} baseline concentrations of the project area. Sampling will be undertaken for one month and results thereof will be analysed against the National Ambient Air Quality Standards.

11.3.4.3 Emissions Inventory

This phase of the study will require the establishment of an emissions inventory based on the mining, processing and ancillary activities at the proposed mine. With an open pit mine, the removal of top soil, and overburden and the subsequent transport of material, is a major source of dust emission. Activities such as drilling, blasting, and truck dumping materials all have implications for air quality. The storage of the coal product is also recognised as a significant source of coal dust emissions. These sources will need to be determined and the amount of emissions quantified to determine the potential contributions to PM_{10} and $PM_{2.5.}$ This quantification will be done by completing dispersion modelling.

11.3.4.4 Air Quality Dispersion Modelling

The dispersion model aims to determine the zone of impact from the potential air emissions and will thus determine how far dust emissions may travel from the project site.

Dispersion models compute ambient concentrations as a function of source configurations, emission strengths and meteorological characteristics, thus providing a useful tool to ascertain the spatial and temporal patterns in the ground level concentrations arising from the emissions of various sources. All emission scenarios would be simulated using the USA Environmental Protection Agency's Preferred/Recommended Models: AERMOD modelling system (as of December 9, 2006, AERMOD is fully promulgated as a replacement to ISC3 model).

11.3.4.5 Impact Assessment - Analysis and Interpretation

The air quality study will contain:

- Identification of existing sources of emissions and characterisation of ambient air quality within the airshed using available monitoring data;
- Review of the current South African legislative and regulatory requirements;
- Detailed literature review of emissions from all activities on site. Where information is not available on emission rates, US EPA AP42 emission factors or Australian NPI emission factors will be used. Other emission sources in the area will also be included in the emission inventory (client to assist in the provision of this information);
- Define the potential sensitive receptors areas, such as local communities, as well as environmental constraints relative to air quality including fauna, flora and surface water;
- Dispersion simulations of ground level concentrations (GLC) of particulate matter (PM_{10}, and $PM_{2.5}$), emissions and dust deposition will be carried out. The baseline and anticipated cumulative impacts of the activities on the ambient air quality of the mine area will also be identified and discussed;
- Analysis of the dispersion modelling will highlight:
  - Predicted zones of maximum ground level impacts (PM_{10}, $PM_{2.5}$ and nuisance dust);
  - Frequency with which guidelines (standards) for criteria pollutants will be exceeded; and
  - Recommendations of buffer zones and impact management zones.

Recommendations will be provided regarding the mitigation and management of the identified potential impacts on air quality. These will include preparation of a mitigation and management plan that mitigates or manages all potential environmental, health and social risks, and includes a management plan for the on-going monitoring of relevant air quality aspects.

11.3.5 Flora

11.3.5.1 Desktop Assessment

For vegetation, broad habitats were defined using aerial imagery for the desktop component. In addition, the following literature and databases were used to generate expected species lists and to ascertain the likelihood of the presence of Species of Special Concern (SSC) on site:

- PRECIS (Pretoria Computerised Information System). This database provides taxonomic information for plant species occurring in southern Africa and follows the format of Germishuizen and Meyer, 2003. It is updated every two months and is supplied by SANBI. It is accessed on the Plants of Southern Africa (POSA) website;
- SIBIS: SABIF - South African Biodiversity Information Facility established by the Department of Science and Technology (DST); and
- Threatened Species Programme (TSP) listing in collaboration with the National Botanical Institute (NBI)].

11.3.5.2 Field Investigation

The methodology for the detailed study is stratified random sampling. Once the broad habitats were delineated on aerial imagery, sample plots were used to determine vegetation distribution in the field. The Braun-Blanquet floristic-sociological approach recognises units by the floristic composition and abundance. This methodology is easier and quicker to use than the alternative point-survey or wheel-point methodology. This methodology results in a reliable estimate of cover abundance and it is the most widely used approach for vegetation studies. The Braun-Blanquet method incorporates seven cover-abundance categories as listed in Table 11-2. A general species list will also be compiled from random traversing through the project site.

Table 11-2: Braun-Blanquet Analysis Cover Abundance

Cover Abundance	Category
One or few individuals	r
Occasional and less than 5 % of total plot area	+
Abundant and with very low cover, or less abundant but higher cover; in any case less than 5 % cover of total plot area	1
Very abundant and less than 5 %, or 5-25 % cover, of a total plot area: • 2m – Very abundant • 2a – 5-12.5 % cover, irrespective of number of individuals • 2b – 12.5-25 % cover, irrespective of number of individuals	2

Cover Abundance	Category
25-50 % cover of total plot area, irrespective of number of individuals	3
50-75 % cover of total plot area, irrespective of number of individuals	4
75-100 % cover of total plot area, irrespective of number of individuals	5

11.3.6 Fauna

11.3.6.1 Desktop Assessment

A desktop study will be undertaken to compile a list of fauna species that are found within the greater study region. The list of possible fauna species will be generated using various sources, listed below.

- The SIBIS online interactive species distribution map will be used to obtain data for the distribution of mammals, reptiles, amphibians and terrestrial invertebrates within the greater study area. Data will be acquired for the Quarter Degree Squares (QDS) in which the study is located;
- The potential occurrence of mammals will be supplemented by the species distribution maps in Friedman and Daly (2004);
- Lists of birds found in the QDS for the study area will be determined using online data from the South African Bird Atlas Project (SABAP 2) for 2011;
- The Convention on International Trade of Endangered Species (CITES) species database;
- The IUCN Red-Data List for South African fauna;
- The International IUCN Red-Data List; and
- National Environmental Management Biodiversity Act (NEMBA 10 of 2004) listed species.

11.3.6.2 Field Investigation

The surveys are to confirm and identify fauna and faunal activity on the site area and around the site area. The survey included small mammals, large mammals, birds, reptiles and amphibians and invertebrates.

Small mammals on sight are recorded through opportunistic sightings and through the use of non-fatal, Sherman traps. The best location for the placement of Sherman traps is identified to yield the best chance of capturing the mammals (as represented in Figure 11-1). The traps are placed in areas close to water or dense vegetation cover and were baited with peanut butter/biltong. The traps are put out for two nights and checked in the early morning and late

afternoon, any animals caught were released. Large mammals are recorded using tracks and signs found on site and also through opportunistic sightings. Motion-sensitive cameras are positioned in areas where animal activity is expected and were baited.

Figure 11-1: Sherman Traps (A: located in the natural grassland and B: located on a rocky outcrop)

Birds are recorded at several preferred areas, as well as generally throughout and adjacent to the site. Points are also chosen near avifaunal zones of influence such as areas where bird parties are evident, as well as in areas of less impacted vegetation type. All opportunistic sightings are also recorded throughout the project area.

Reptiles and amphibians are searched for on-site in areas of most likely to occur such as near water sources and rocky areas. Butterflies are spotted in flight, photographed or captured for identification and released.

11.3.7 Wetlands

The delineation of the wetland areas will be done in accordance with the DWAF (2005) guidelines. Soil mottling will be used as the primary wetland indicator. These guidelines apply four key indicators when delineating wetland areas, they are:

- Terrain Unit Indicator;
- Soil Form Indicator;
- Soil Wetness Indicator; and
- Vegetation Indicator.

Each of the identified wetland areas will be classified according to their hydrogeomorphic (HGM) determinants based on modification of the system. The wetland areas will then be delineated

and a buffer area assigned to each wetland area dependant on the health and sensitivity of the areas surveyed.

The integrity of the wetland areas will be determined to establish baseline health for the associated wetlands (Wet-Health). A Level II functional assessment of the associated wetland areas will be conducted. This methodology provides for a scoring system to establish the services of the wetland ecosystem (Wet-EcoServices).

Selected minimum requirements which are considered a priority for this specialist component and which will be adopted include the following:

- Delineations must be undertaken according to "DWAF, 2005: A Practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones";
- If the wetland is degraded, a rehabilitation plan must be included (all wetlands must be conserved and rehabilitated if necessary; their destruction for development purposes will not be supported; and
- A plan indicating how the stormwater that will be generated by the proposed development will be managed.

The HGM Unit system of classification focuses on the hydro-geomorphic setting of wetlands which incorporates geomorphology; water movement into, through and out of the wetland; and landscape / topographic setting. Once wetlands have been identified, they are categorised into HGM Units as in Table 11-3. HGM Units are then assessed individually for habitat integrity. The wetland health (PES) and functionality will be assessed as part of the EIA-phase of this project.

Table 11-3: HGM Unit System of Classification

Floodplain		Valley bottom areas with a well-defined stream channel stream channel, gently sloped and characterised by floodplain features such as oxbow depression and natural levees and the alluvial (by water) transport and deposition of sediment , usually leading to a net accumulation of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.
Valley bottom with a channel		Valley bottom areas with a well-defined stream channel but lacking characteristic floodplain features. May be gently sloped and characterized by the net accumulation of alluvial deposits or may have steeper slopes and be characterised by the net loss of sediment. Water inputs from the main channel (when channel banks overspill) and from adjacent slopes.

Valley bottom without a channel		Valley bottom areas with no clearly defined stream channel usually gently sloped and characterised by alluvial sediment deposition, generally leading to a net accumulation of sediment. Water inputs mainly from the channel entering the wetland and also from adjacent slopes.
Hillslope seepage linked to a stream channel		Slopes on hillsides, which are characterised by colluvial (transported by gravity) movement of materials. Water inputs are mainly from sub-surface flow and outflow is usually via a well-defined stream channel connecting the area directly to a stream channel.
Isolated hillslope seepage		Slopes on hillsides that are characterised by colluvial transport (transported by gravity) movement of materials. Water inputs are from sub-surface flow and outflow either very limited or through diffuse sub-surface flow but with no direct link to a surface water channel.
Pan/Depression		A basin-shaped area with a closed elevation contour that allows for the accumulation of surface water (ie. It is inward draining). It may also receive subsurface water. An outlet is usually absent and so this type of wetland is usually isolated from the stream network.

According to the NWA, Regulation GN R.1199, development within a 500 m radius from the boundary of any wetland will require a Water Use Licence. In the local Gauteng legislation and regulations (Gauteng Conservation Plan, GDACE (2006) and GDARD (2011)), it states that the edge of the wetland must be clearly demarcated and a 30 m buffer zone is to be delineated as sensitive (30 m for areas within the urban edge; 50 m outside the urban edge).

The 500 metre radius stipulated in the NWA is not considered as a protection buffer, therefore in the absence of national protocol, a generic 100 m buffer is recommended to be established around wetlands as best practise to ensure protection of these systems. This is in accordance with Regulation 704, whereby material and activities with the potential to impact on a water resource, within 100 m of a watercourse or within the relevant floodline, should be licenced.

11.3.8 Aquatic Ecology

Surveys will be conducted to assess the ecological integrity, and status of any rivers (Brokhorstspruit) and streams in the project area and along the railway route. To determine the ecological integrity of the aquatic environment, individual biophysical attributes of the streams will be assessed. These biophysical attributes refer to the drivers and biological responses of an aquatic ecosystem.

Selected minimum requirements which are considered a priority for this specialist component and which will be adopted include the following:

- An ecological study, with specific emphasis on ecological processes and connectivity at the landscape level;
- Delineation of a 100 m buffer zone from the edge of the riparian zone for rivers/streams;
- Impact assessment of the proposed development on the hydrological regime and the change thereof, including the effect of that change on the downstream habitat and integrity of the system;
- Surface runoff and stormwater management plan indicating the management of all surface runoff generated as a result of the development prior to entering any natural drainage system;
- An EcoStatus Level 3 determination study according to “Dwaf 2008: River Ecoclassification: Manual for Ecostatus Determination (Version 2), WRC Report No: TT329/08; and
- The minimum tools required for EcoStatus Level 3 determination must be applied i.e. IHI, AI, FRAI, MIRAI, VEGRAI and SASS5.

11.3.9 Social

11.3.9.1 Data collection

Data collection activities will include:

- A ***desktop review*** of available documents to obtain relevant baseline socio-economic information on the different study areas. Documents include the following:
  - Municipal IDPs, LED Plans and SDFs;
  - Socio-economic and demographic statistics sourced from Statistics South Africa’s (StatsSA) Census 2011 and Community Survey 2007 data;
  - Previous studies and reports concerning the proposed project, specifically the SLP and Mine Works Programme (MWP); and

- Available maps and satellite imagery.

- ***Investigative site visit*** to:
  - Verify information obtained from secondary sources on the socio-economic characteristics of the receiving environment; and
  - Gather spatial and photographic data of the site-specific and immediately surrounding areas to a.) allow for high-level mapping of the area, and b.) determine the extent of any physical or economic displacement.

- ***Interviews with key informants*** to:
  - Assess stakeholders' perceptions, concerns and expectations regarding the project;
  - Verify baseline socio-economic information collected during the desktop review; and
  - Identify potential impacts of the proposed project on the socio-economic environment.

11.3.9.2 Compilation of a Socio-economic Baseline Profile

On the basis of the information collected through the desktop review and interviews with key informants, a socio-economic baseline profile will be compiled for the regional, local and site-specific study areas. Topics considered as part of this profile include the following:

- Demographics, including population size and growth, as well as the population distribution in terms of age, gender, race and education;
- Economic conditions and development;
- Levels of employment and employment sectors;
- Spatial development and land use;
- Infrastructure and services, including housing, household energy, water, sanitation, transport, and health; and
- Community needs and development.

11.3.9.3 Social Impact Assessment

The EIA will include a SIA that will assess the anticipated impacts of the project on the socio-economic environment and to formulate appropriate mitigation measures to avoid or ameliorate negative socio-economic impacts and enhance positive ones. The development of an SIA will

require follow-up data collection through one-on-one and focus group meetings with a range of local stakeholders including, but not limited to landowners, farm workers, ward councillors, municipal IDP and/or LED managers.

The investigations that should be undertaken to characterise and, where possible, quantify impacts are listed in Table 11-4 below.

Table 11-4: Issues to be investigated to Assess Potential Impacts

Impact Description	Issue to be investigated
Creation of employment opportunities	Projected construction and operational workforce
	Skills levels of the local population, influencing its ability to take advantage of new employment opportunities
Economic benefits through multiplier effects	Projected capital and operational expenditure Capacity of local population and business to take advantage of opportunities
Local economic and community development	Corporate Social Investment programme; Planned investment in infrastructure and services in the surrounding area Existing LED Initiatives
Physical and economic displacement	Current on-site land uses, vulnerability of households, extent of displacement
Decrease in food security due to sterilisation of agricultural land	Current on-site land uses, vulnerability of households, current contributions
Disruption of daily movement patterns, increase in road accidents and deterioration of local road conditions	Expected traffic volumes and routes, community movement patterns, access to residential and business properties as well as services
Influx of job seekers, increase in social pathologies, added pressure on services and infrastructure, increased demand for housing	Existing migration trends in the local area
Damage or disturbance to archaeological and cultural heritage	Nature and extent of damage and the social implications thereof
Decreased quality of life due to nuisance effects related to blasting, noise, dust, etc., impact on water	Expected vibration, noise, air quality and water-related impacts

11.3.10 Cultural Heritage

The South African Heritage Resources Agency (SAHRA) issued a letter on the NID and Heritage Statement (Case ID: 6669) wherein the Agency requires a Heritage Impact Assessment (HIA) to be completed for the project. The various tasks associated with the HIA are discussed below.

11.3.10.1 Data Collection

Data collection is aimed at collating information through a combination of both primary and secondary sources to contextualise and identify a representative sample of heritage resources within the project area. The various methodologies are outlined below.

11.3.10.1.1 Literature Review

Secondary data within the Heritage Statement will be reviewed. Where necessary, an update of previously collected information pertaining to the historical context of the local study area will be undertaken. This will require an extensive review of credible sources including books, peer reviewed articles, databases and where appropriate, other specialist studies and websites. A sound understanding of the context allows for the better rating of the significance value and assessment of potential impacts on the heritage resources.

11.3.10.1.2 Desktop Palaeontological Study

A review of relevant information sources will be completed, inclusive of geological maps, palaeontological databases, published and unpublished records, and peer-reviewed literature. The objectives are to:

- Define the palaeontological sensitivity of the project area;
- Determine the likelihood of fossils occurring in the project area; and
- Identify any significant palaeontological resources that may have been recorded previously.

11.3.10.1.3 Archival Research

Archival research will be undertaken for the farm Wachtenbietjieskop 506 JS. Documentation contained within relevant archives will be reviewed to obtain written documentation of the events that occurred on the property and surrounds, as well as provide greater detail to the historical context of the identified structures within the project boundaries.

11.3.10.1.4 Consultation

Section 30(11)(b) of the NHRA requires that potential alteration to or development affecting a place listed in the heritage register must be conveyed to conservation bodies prior to the issuing of consent.

Utilising the current established Stakeholder Engagement Framework for the Oakleaf Coal Mine Project and SAHRIS, conservation bodies and interested and affected parties (I&APs) will be engaged directly with regards to the identified heritage and proposed project related activities. Groups that may be included are:

- Association of Southern African Professional Archaeologists (ASAPA);
- Rock Art Research Institute (RARI);
- Archaeological Society (ArcSoc);
- Heritage South Africa;
- Historical Association of South Africa;
- South African Military History Society;
- National Museum of Cultural History;
- Simon van der Stel Foundation; and
- Ezemvelo Nature Reserve.

11.3.10.1.5 Reconnaissance

Secondary data collection will be verified through primary data collection. Primary data collection will entail detailed field surveys by a qualified archaeologist focussing on the proposed project area, and the identified First Anglo-Boer War Battle of Bronkhorstspruit battlefield. The survey will be primarily pedestrian comprising a site walk down to identify, document and record all tangible heritage resources as far as possible.

11.3.10.2 Assessment

The significance or values of heritage resources need to be determined to assess the magnitude of impact on these resources. Digby Wells has developed a heritage assessment matrix to determine the values of heritage as objectively as possible.

11.3.10.2.1 Statement of Cultural Significance

The value or cultural significance (CS) of a heritage resource, or cultural landscape, must be evaluated to determine the magnitude of change on a resource or landscape. Individual resources have unique values: even similar resources may have different values due to several

factors discussed below. The result is that every identified heritage resource requires separate evaluation. Types of heritage resources with similar values will be grouped and the impact on these categories assessed.

The evaluation of CS uses criteria contained in Section 3(3) of the NRHA that are grouped together. The importance of a heritage resource is then ranked in terms of aesthetic, historic, scientific and social value. In addition, the integrity of a resource further contributes to its CS.

Formula to determine CS

CS = importance x integrity

where

Importance = aesthetic + historic + scientific + social value

11.3.10.2.2 Impact Assessment

Assessing impacts on heritage resources must consider the CS of heritage resources and the level of change to the resource resulting from project activities. The impact assessment will rate the level of change / impacts and apply it to pre- and post-mitigation scenarios. The ideal is to remove all impacts to a heritage resource.

Formula to determine impact rating

magnitude of impact = consequence x probability

where

consequence = (duration + extent + intensity) x type (positive or negative)

Information gathered will be collated into a draft HIA report within which recommendations of appropriate mitigation and management plans will take into account criteria contained within the NHRA as well as minimum mitigation practices required by SAHRA and PHRA-G.

11.3.11 Traffic

The traffic impact study will be executed in accordance with the following guideline documents:

- Department of Transport, 1995, Manual for Traffic Impact Studies; and
- Committee of Transportation Officials (COTO), TMH 17, September 2012, South African Trip Data Manual (Draft).

The extent of the study will be determined by identifying the intersections near the development on which the traffic generated by the development may have a significant impact. The existing

traffic flow patterns will be surveyed, after the functioning of the intersections has been analyzed.

The study will also consider the impact of other developments (latent rights) already approved or submitted to the local road authority for approval.

Using the extent of the development and the applicable trip generation rates, the expected number of trips that will be generated will be determined. The trip distribution of the traffic that will be generated by the proposed development will be derived from the existing traffic flow patterns, the location as well as the potential market area of the development in relation to the road network.

Using the trip distribution, the generated traffic will be assigned to the road network together with the existing traffic demand. The functioning of the intersections will be analysed again and recommendations will be made on the need for additional road upgrading necessary, due to the proposed development.

As part of the study, the existing public transport infrastructure will also evaluate the need to upgrade the existing infrastructure.

11.3.12 Noise

The environmental noise impact assessment will assess, via baseline noise measurements what the current pre-mining ambient noise levels are as well as predictive noise modelling, the potential impact of the noise emissions from the proposed construction and operational activities on the surrounding soundscape.

The baseline noise measurements will be carried out to provide the noise levels of the existing soundscape at the relevant surrounding receptors. The scope of work will be carried out in the following steps.

11.3.12.1 Receptor Identification

For the detailed assessment of the focus area, potentially Noise Sensitive Receptors (NSRs) such as surrounding communities and businesses such as Rainbow Chickens will be identified. The co-ordinates of these receptors will be captured using a Geographic Information System (GIS) and then plotted on a map.

11.3.12.2 Field Work and Noise Measurements

A site visit will be organised in conjunction with the client and local landowners, during which baseline noise monitoring will be conducted at the selected NSRs surrounding the proposed activities.

All measurements will be taken in accordance with the National Noise Control Regulations, R.154 (10 January 1992) in terms of Section 25 of the Environmental Conservation Act, 1989 (Act No. 73 of 1989) as well as the SANS 10103:2008 guidelines. Measurements will be for a period 24 hours at the recommended localities. A Cirrus, Optimus Green, precision integrating sound level meter will be used for the measurements. The instrument will be field calibrated with a Cirrus, sound level calibrator.

11.3.12.3 Baseline Interpretation

Recordings from the sound level meter are then plotted in graphical format and then analysed in relation to the SANS 10103:2008. The comparison to the SANS day and night-time standards for rural districts will provide a noise baseline for the area, indicating how much noise currently exists in the area. This baseline will also be used in the noise dispersion model.

11.3.12.4 Noise Dispersion Modelling

The propagated noise levels will be calculated by means of the dispersion modelling software 'Soundplan'. This model will depict in detail, what the expected noise levels are to be at sensitive receptors, and can predict, per receptor, the intensity of the noise impact. An example of predicted propagated noise levels can be seen in Figure 11-2.

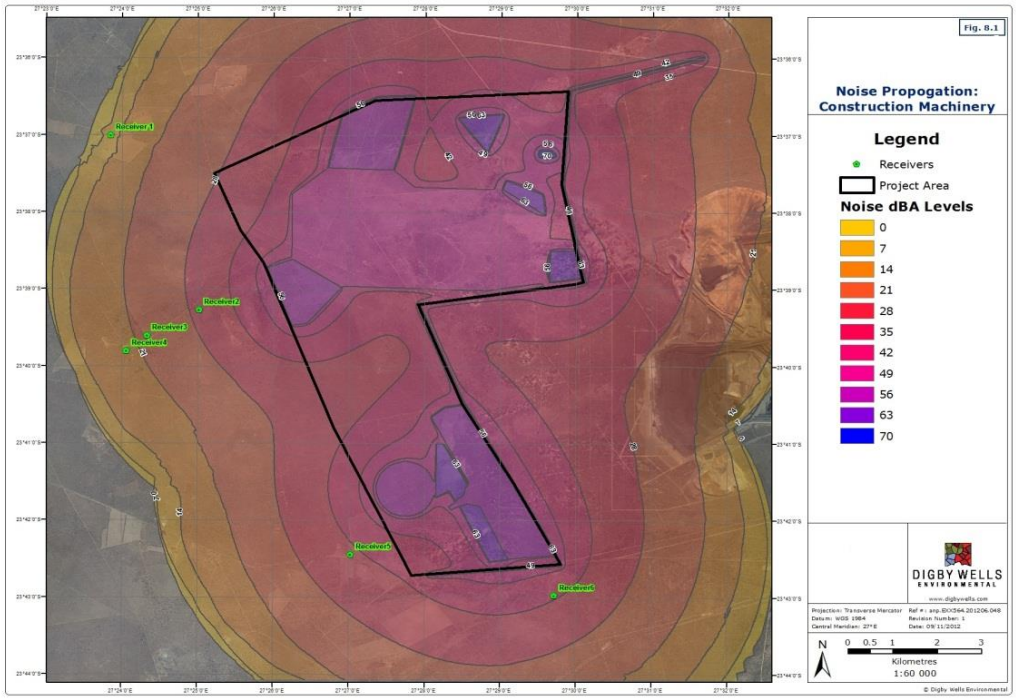


Figure 11-2: Noise Model Plot

The significance of the noise impact of both options will be rated by comparing the expected noise levels from the models to the existing ambient noise levels as well as by comparing it to the SANS 10103:2008 limit guidelines for the various districts surrounding the project areas of both options.

The environmental noise impact assessment report will include the dispersion models and the significance rating along with the rating methodology used. Mitigation measures as well as management programme will also be detailed in the report.

11.3.13 Topography and Visual

Contour and point relief data will be used as input features to create a Digital Elevation Model (DEM). The resulting DEM will be further manipulated to create slope rise and slope direction (aspect) models. Assessing the topography of this project area is an important component since the proposed project will be in the form of an open pit mine and is expected to impact on the topography and visual landscape.

A Visual Impact Assessment (VIA) is a specialist study performed to identify the visual impacts of the proposed project on the surrounding landscape.

Infrastructure sizes, locations and heights will be used together with the DEM created during the topography assessment, as input features, to create a theoretical viewshed which will help determine locations within the surrounding landscape where the development is likely to be visible. ArcGIS 10 Spatial Analyst Extension will be used to run this model.

A site visit will be conducted to verify and evaluate the results of the model. Photographs will be taken on site to capture the essence of the area; and topographical features (both natural and man-made), overall visual resources, the variety of landscape characters and sense of place attributes will also be noted.

11.3.14 Blasting and Vibration

The blasting and vibration study will take cognisance of internationally accepted standards, the United States Bureau of Mines (USBM) criteria for safe blasting and ground vibration and recommendations on air blast. Additional criteria as required by various institutions in South Africa i.e. Eskom, Telkom, Transnet, Rand Water Board etc. will also be taken into consideration. For general houses of proper construction built according the National Home Builders Registration Council (NHBRC) the USBM criteria is used and as structures are more friable the limit is reduced.

The blasting and vibration study will include the following steps:

- Site visit: Intention to understand location of the site and its surroundings;

- Site structure profile: Identifying surface structures / installations that are found within the 3 500 m possible influence area. A list of POI's are created that will be used for evaluation; and
- Site evaluation: This consists of evaluation of the mining operations and the possible influences from blasting operations. The methodology consists of modelling the expected impact based on expected drilling and blasting information for the project. Various accepted mathematical equations are applied to determine the attenuation of ground vibration, air blast and fly rock. These values are then calculated over distance investigated from the site and shown as amplitude level contours. An overlay of these contours with the location of the various receptors provides an indication of the possible impact and expected result of potential impact. Evaluation of each receptor according to the predicted levels will give an indication of possible mitigation measures to be done or not.

11.3.15 Closure

The closure cost liability assessment is a critical component to the EMP required for environmental authorisation. To complete this, a number of tasks need to be completed. These tasks are explained separately below.

The closure cost assessment will be done in accordance with the requirements contained in the MPRDA and its associated regulations. The specific section in the MPRDA dealing with closure cost assessment is Section 41 *'Financial provision for remediation of environmental damage'* and supporting MPRDA Regulations including section 60-62.

11.3.15.1 Measurements

Digby Wells will measure off plan all items of infrastructure or associated structures of the proposed project. These measurements will be standardised to ensure that the costs calculated are easily updatable and that they are consistent.

To provide detailed costs, plans need to be generated for the proposed project.

11.3.15.2 Rates

Current market related rates will be sourced from contractors for the rehabilitation of the facility. The rates will be in a format compatible with the system to be used for the liability assessment. Contingency costs and costs associated with specialist studies will not be incorporated into the rates themselves, but will rather be included once a cost for rehabilitation has been calculated and before VAT is added.

11.3.15.3 Cost Calculations

Once the rates have been finalised the costs for closure and rehabilitation will be calculated. As well as providing a cost based on the agreed rates, the DMR template will be used to calculate the closure costs. The principle to be used for all of these determinations is a “snapshot in time” approach i.e. the cost of closure at an agreed date.

11.3.16 Rehabilitation

All information applicable to the site will be reviewed as well as any specialist studies that have/will be conducted for the proposed project. The information review will enable the setting of objectives for rehabilitation and environmental monitoring. These objectives will take into consideration the following:

- Post-mining landforms and soil;
- Hydrology;
- Waste material characteristics; and
- Biodiversity aspects.

11.3.16.1 Topography Assessment

Using GIS, the pre-mining topography will be plotted against the mining topography to determine the post-mining topography. This is needed to ensure that the post-mining topography is as close as possible to the original topography of the area and that the final landform is stable. To complete this exercise accurately, the volumes of overburden dumps expected for each year of open pit mining is required as well as the Life of Mine (LoM) plan.

11.3.16.2 Rehabilitation Plan

The rehabilitation plan will contain the location of soil types that can be stripped and stockpiled together and stripping depths of different soil types.

Progressive monitoring of the stripping, stockpiling, shaping of spoil surfaces, backfilling and replacing of topsoil will need to take place to ensure successful post-mining land and soil reclamation. Assessing post-mining soil characteristics and associated land capability and land uses is necessary, but lack the opportunity to correct failures during the rehabilitation process.

A rehabilitation plan will be compiled for the proposed project and will detail the following:

- Specific actions to be undertaken during construction, operation, decommissioning and closure phases of the mining operation;

- Soil and overburden materials handling, to ensure that materials favourable to vegetation establishment, as well as potential problem materials (such as acid generating, high metal level, saline soils or potentially dispersive material), are placed in the correct sequence;
- Topsoil and subsoil handling procedures, especially those designed to conserve plant, nutrients and soil biota;
- Soil amelioration techniques to create conditions favourable for growth, such as the application of lime or gypsum;
- Any techniques for conserving and reusing vegetation, including mulch, brush matting for erosion protection and introduction of seed and log piles for fauna habitat;
- Landscaping procedures, including the construction of erosion control and water management structures;
- Post mining topography plan;
- Vegetation establishment techniques;
- Weed control measures prior to and following rehabilitation;
- Fertilizer application; and
- Follow-up planting and maintenance programs.

The plan provisions will be time-bound and will take into account opportunities for progressive rehabilitation and closure. From a biodiversity conservation and re-establishment perspective, it is particularly important that the extent of planned disturbed areas is minimised at any point in time.

The plan will also detail a re-vegetation program, which will include details of topsoil sources, stripping depths, volumes, handling methods, placement and scheduling. Areas where soil amelioration is needed will be mapped, and details of what is required described. It will describe what plant species and vegetation communities should be established, so that the most appropriate species are used.

From the topography assessment details in terms of the construction of stable landforms will be compiled. Landform stability is essential for the long-term sustainability of rehabilitation.

The final topography proposed will be dependent on the amount of available material to fill the voids that may be left from the mining operations. As a minimum the final topography that is achieved should mimic the surrounding topography. There are many factors as stated above, that influence the potential final topography that is achievable and all of these aspects need to be taken into consideration. A different or unique topography maybe an option and this is dependent on what the latent impacts could be after closure, thus the final topography that is

proposed may be aligned with management of surface and groundwater related aspects, such as having a small final void to manage post mining water related impacts. If material is not available to fill voids then other options for the post mining topography will need to be considered and this may take into account shaping of final voids etc.

The rehabilitation plan will also address soil handling, including the volumes and handling equipment needed, re-spreading depth and any follow-up treatment (such as scarifying prior to seeding). The types and methods of application of nutrients will be based on the soil characterisation studies.

11.3.16.3 Environmental Monitoring

An environmental monitoring plan for rehabilitated areas will be compiled taking the following environmental aspects into consideration:

- Surface water and Groundwater;
- Aquatic and Wetlands ecology;
- Soil erosion;
- Waste management;
- On-going land rehabilitation and monitoring;
- Fauna; and
- Flora.

The findings from the specialist studies undertaken during the EIA/EMP phase and other information available for the project area will be used to compile the monitoring programme and propose the locations of the relevant monitoring points. The various monitoring programmes will consider relevant legislative requirements, Best Practise Guidelines and the proximity of water resources and sensitive receptors to the proposed mine.

11.4 IMPACT ASSESSMENT METHODOLOGY

To clarify the purpose and limitations of the impact assessment methodology, it is necessary to address the issue of subjectivity in the assessment of the significance of environmental impacts. Even though Digby Wells, and the majority of environmental impact assessment practitioners, propose a numerical methodology for impact assessment, one has to accept that the process of environmental significance determination is inherently subjective. The weight assigned to each factor of a potential impact, and also the design of the rating process itself, is based on the values and perception of risk of members of the assessment team, as well as that of the stakeholders and authorities who provide input into the process. Whereas the determination of the spatial scale and the duration of impacts are to some extent amenable to scientific enquiry,

the severity value assigned to impacts is highly dependent on the perceptions and values of all involved.

It is for this reason that it is crucial that all EIA's make reference to the environmental and socio-economic context of the proposed activity to reach an acceptable rating of the significance of impacts. Similarly, the perception of the probability of an impact occurring is dependent on previous experience, perceptions, aversion to risk and availability of information.

It has to be stressed that the purpose of the EIA process is not to provide an incontrovertible rating of the significance of various aspects, but rather to provide a structured, traceable and defendable methodology of rating the relative significance of impacts in a specific context. The methodology employed for environmental impact assessment is divided into two distinct phases, namely, impact identification and impact assessment.

11.4.1.1 Impact Identification

Impact identification will be performed by use of an Input-Output model which serves to guide Digby Wells 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, closure and post-closure phases of the project.

Outputs may generally be described as any changes to the biophysical and socio-economic environments, both positive and negative in nature, and also included the product and anticipated waste produced by the proposed underground mining activities. Negative impacts could include, dust, noise, vibration, water pollution, safety issues and changes to the bio-physical environment such as destruction of habitats. Positive impacts may include 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 and water quality) is considered.

During consultation with stakeholders, perceived impacts will be identified. These perceived impacts will be included in the impact assessment and significance rating to differentiate between probable impacts and perceived impacts.

11.4.1.2 Impact Rating

The impact rating process is designed to provide a numerical rating of the various environmental impacts identified by use of the Input-Output model. As discussed above, it has to be stressed that the purpose of the EIA process is not to provide an incontrovertible rating of the significance of various aspects, but rather to provide a structured, traceable and defendable methodology of rating the relative significance of impacts in a specific context. This will give Oakleaf a greater understanding of the impacts of his project and the issues which need to be

addressed by mitigation. It will also give the regulators information on which to base their decisions.

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

***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 matrix calculates the rating out of **147,** whereby **Severity, Spatial Scale, Duration** and **Probability** is rated out of seven. Please refer to Table 11-5 for the parameter ratings which will be used to assign a weighting for both positive and negative impacts.

The significance of an impact is determined and categorised into one of eight categories, as indicated in Table 11-6, which is extracted from Figure 11-3:.

Impacts are rated prior to mitigation and again after consideration of the proposed mitigation measure included in the Environmental Management Programme (EMP).

Table 11-5: Impact Assessment Parameter Ratings

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	**Social, cultural and heritage**			
7	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or eco system. Persistent severe damage. The positive impact will result in a significant improvement to the initial/post disturbance environmental status and will benefit ecological and natural resources.	Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order. The positive impact will be of high significance which will result the improvement of the socio-economic status of a greater area beyond the boundary of the directly affected of the community and/or promote archaeological and heritage awareness and contribute towards research and documentation of sites and artefacts through phase two assessments.	International The effect will occur across international borders	Permanent: No Mitigation No mitigation measures of natural process will reduce the impact after implementation.	Certain/ Definite. The impact will occur regardless of the implementation of any preventative or corrective actions.
6	Significant impact on highly valued species, habitat or ecosystem. The positive impact is of high significance which will result in a vast improvement to the environment such as ecological diversification and/or rehabilitation	Irreparable damage to highly valued items of cultural significance or breakdown of social order. The positive impact will be of high significance and will result in the upliftment of the surrounding community and/or contribute towards	National Will affect the entire country	Permanent: Mitigation measures of natural process will reduce the impact.	Almost certain/Highly probable It is most likely that the impact will occur.

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	**Social, cultural and heritage**			
	of endangered species	research and documentation of sites and artefacts through phase two assessments			
5	Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate The positive impact will be moderately high and will have a long term beneficial effect on the natural environment	Very serious widespread social impacts. Irreparable damage to highly valued items The positive impact will be moderately high and will result in visible improvements on the socio-economic environment of the local and regional community, and/or promote archaeological and heritage awareness through mitigation	Cercle/ Region Will affect the entire Cercle or region	Project Life The impact will cease after the operational life span of the project.	Likely The impact may occur.
4	Serious medium term environmental effects. Environmental damage can be reversed in less than a year The positive impact on the	On-going serious social issues. Significant damage to structures / items of cultural significance The positive impact on the socio-economic environment will be of a	Commune Area Will affect the whole municipal area	Long term 6-15 years	Probable Has occurred here or elsewhere and could therefore occur.

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	**Social, cultural and heritage**			
	environment will be moderate with visible improvement to the natural resources and regional biodiversity	moderate extent and benefits should be experience across the local extent and/or potential benefits for archaeological and heritage conservation			
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. The positive impact will be moderately beneficial to the natural environment, but will be short lived.	Ongoing social issues. Damage to items of cultural significance. The positive impact will be moderately beneficial for some community members and/or employees, but will be short lived and/or there will be a moderate possibility for archaeological and heritage conservation	Local Local extending only as far as the development site area	Medium term 1-5 years	Unlikely Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur.
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. Minor positive impacts on the	Limited Limited to the site and its immediate surroundings	Short term Less than 1 year	Rare/ improbable Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the project but has

Rating	Severity		Spatial scale	Duration	Probability
	Environmental	**Social, cultural and heritage**			
	The positive impacts will be minor and slight environmental improvement will be visible.	social/cultural and/ or economic environment			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	Limited damage to minimal area of low significance, (e.g. ad hoc spills within plant area). Will have no impact on the environment. The positive impact on the environment will be insignificant and will not result in visible improvements	Low-level repairable damage to commonplace structures. The positive impact on social and cultural aspects will be insignificant	Very limited Limited to specific isolated parts of the site.	Immediate Less than 1 month	Highly unlikely/None Expected never to happen.

Figure 11-3: Relationship between Consequence, Probability and Significance Ratings

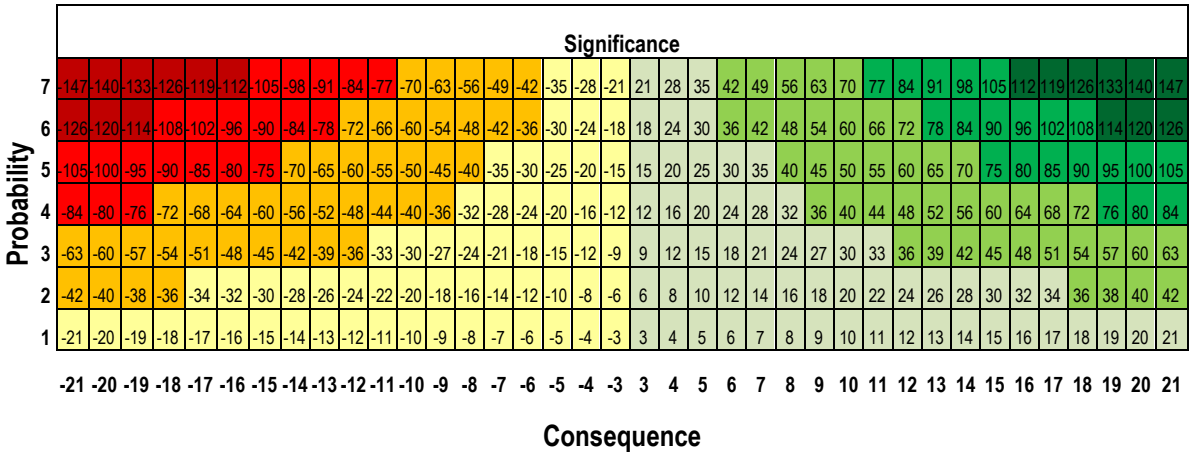


Table 11-6: Significance Ratings

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

Score	Description	Rating
-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)

11.4.2 Environmental Management Programme

The EMP is aimed at addressing all environmental impacts identified in the EIA phase and providing achievable mitigation measures to reduce the possible impacts on the environment.

As the EIA indicates the relative significance of the various environmental impacts associated with mining activities, it serves to focus the allocation of resources on environmental aspects and specific impacts requiring mitigation. The aim of the mitigation measures is to minimise the negative impacts and enhance the positive aspects of the project, as well as to inform, involve and improve the local communities through the process.

The main objective of the EMP is to:

- Recommend management or mitigation measures that will be taken to address the environmental impacts that have been identified including cumulative impacts;
- Provide detailed description of the mining activities that are covered by the EMP;
- Identify required monitoring programmes; and
- Determine associated costs required for rehabilitation and / mitigation.

The EMP section is divided into the setting of objectives and the planning of management measures. The monitoring and performance assessment section of the EMP details the annual monitoring and audits that will be implemented to ensure the effectiveness of mitigation measures.

11.4.3 EIA REPORTING

The Draft EIA Report will be submitted to project stakeholders for review and consideration. Public meetings and key stakeholder meetings will be scheduled to review and discuss the findings of the EIA Report. Once the commenting period has concluded, the Draft EIA Report will be finalised into a Final EIA Report and disclosed to project stakeholders once more for review and comment. On conclusion of this commenting period, the Final EIA Report will be finalised with comments and submitted to the GDARD and DEA for consideration and decision.

12 CONCLUSION

The aim of this Final Scoping Report is to identify the key environmental and social risks and potential impacts associated with the proposed Oakleaf open pit coal mine and to focus the environmental assessment on key issues and ensure that reasonable and feasible project alternatives have been identified.

Based on the initial investigation of potentially significant issues, it has been concluded that there are no clear environmental or social fatal flaws which could prevent the development of the proposed Project; however, the potential environmental and social sensitivities highlighted in this report will need to be further investigated and assessed during the EIA phase.

12.1 Public Participation Process: Next Steps

For the Scoping Phase, the Draft Scoping Report (DSR) was made available to the public for review and comment between 02 March and 05 May 2015. A public meeting was held on Thursday, 19 March 2015 between 3 and 5 pm at the NG Church Hall in Bronkhorstspruit where the content of the DSR was presented and discussed. Furthermore, a landowners meeting was held on Wednesday, 18 March 2015 between 10 and 12 pm at the NG Church Hall.

Comments and questions received during the commenting period were captured in a Comment and Response Report (CRR) and incorporated in this Final Scoping Report. The public commenting period for this Final Scoping Report commences on ***03 June 2015 and concludes on 24 June 2015.*** This Final Scoping Report is available for public review at:

- Bronkhorstspruit Public Library;
- Eskia Mphahle Library; and
- Digby Wells Environmental Website - www.digbywells.com (Public Documents).

Please remember to submit your comments on this Final Scoping Report by **24 June 2015**. All comments must be forwarded to the following:

Nestus Bredenhann or **Vanessa Viljoen** of Digby Wells Environmental:

Fax Number: 086 583 5715

Email: nestus.bredenhann@digbywells.com / vanessa.viljoen@digbywells.com

Website: www.digbywells.com

Postal Address: Private Bag X10046, Randburg, 2125

All comments received on this Final Scoping Report will be incorporated into the Draft Environmental Impact Assessment Report / Environmental Management Programme which will be made available to all project stakeholders for a period of 60 days. The Draft Environmental Impact Assessment Report / Environmental Management Programme with comments received from project stakeholders will be submitted to the Gauteng Department

of Agriculture and Rural Development (GDARD) and the Department of Environmental Affairs (DEA) for consideration and decision making.

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