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# DRAFT SCOPING REPORT FOR THE PROPOSED BLOCK Z PROJECT AT ISIBONELO COLLIERY (MDEDET REFERENCE: 17/2/3N-362)

Anglo Operations Limited

2014/08/07

# Quality Management

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| **Prepared by** | Zaffar Hussain and Janna Bedford-Owen | | | |
| **Signature** | | | | |
| **Checked by** | Caroline Henderson | | | |
| **Signature** | | | | |
| **Authorised by** | Kim Allan | | | |
| **Signature** | | | | |
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# Draft Scoping Report for the Proposed Block Z project at Isibonelo Colliery (MDEDET Reference: 17/2/3N-362)

## Anglo Operations Limited

2014/08/07

## Client

Anglo Operations (Pty) Ltd: Isibonelo Colliery
Head Office
17th Floor, 55 Marshall Street
Marshalltown, Johannesburg
2107

Isibonelo Colliery
Private Bag X 701,
Trichardt,
2300
South Africa

Location: 26° 20’ 41.32’’ S 29° 16’ 00.67’’ E
Contact: Kenneth Mokoena
Tel: +27 17 620 2714
Email: kenneth.mokoena@angloamerican.com

## Consultant

WSP Environmental (Pty) Ltd
WSP House
Bryanston
199 Bryanston Drive
Bryanston
2191

Tel: +27 11 361 1392
Fax: +27 11 361 1381
www.wspenvironmental.co.za

## Registered Address

WSP Environmental (Pty) Ltd
1995 / 008790 / 07
WSP House, Bryanston Place, 199 Bryanston Drive,
Bryanston, 2191, South Africa

# List of Abbreviations

## General

| Abbreviation | Full term |
|---|---|
| AAC | Anglo American Coal |
| AQIA | Air Quality Impact Assessment |
| AQMP | Air Quality Management Plan |
| AEL | Atmospheric Emissions Licence |
| BA | Basic Assessment |
| BBBEE | Broad Based Black Economic Empowerment |
| BID | Background Information Document |
| CBD | Convention on Biological Diversity |
| CBO | Community-Based Organisations |
| DEA | Department of Environmental Affairs |
| DEAT | Department of Environmental Affairs and Tourism |
| DMR | Department of Mineral Resources |
| DSR | Draft Scoping Report |
| DWA | Department of Water Affairs |
| EAP | Environmental Assessment Practitioner |
| EIA | Environmental Impact Assessment |
| EMPR | Environmental Management Programme Report |
| EMPr | Environmental Management Programme reports |
| EIR | Environmental Impact Report |
| ESA | Early Stone Age |
| FSR | Final Scoping Report |
| GIS | Geographical Information System |
| GNR | Government Notice Regulation |
| HIA | Heritage Impact Assessment |
| I&AP | Interested and Affected Party(ies) |
| ICMM | International Council for Mining and Minerals |
| IEM | Integrated Environmental Management |
| IUCN | International Union for Conservation of Nature |
| IWWMP | Integrated Waste Water Management Plan |
| LIA | Late Iron Age |
| LoM | Life of Mine |
| LSA | Late Stone Age |
| MDEDET | Mpumalanga Department of Economic Development, Environment and Tourism |
| MEC | Minister (or member) of the Executive Committee |
| MSA | Middle Stone Age |

| Abbreviation | Full term |
|---|---|
| MTPA | Mpumalanga Tourism and Park Agency |
| NBSAP | National Biodiversity Strategy and Action Plan |
| NEPAD | New Partnership of Africa's Development |
| NGO | Non-Governmental Organisations |
| NSBA | National Spatial Biodiversity Assessment |
| PoS | Plan of Study |
| SABS | South African Bureau of Standards (SABS) |
| SAHRA | South African Heritage Resources Agency |
| SAMBF | South African Mining and Biodiversity Forum |
| SANBI | South African National Biodiversity Institute |
| SANS | South African National Standards |
| SASS | South African Scoring System v.5 |
| SDS | Safety Data Sheets |
| S&EIR | Scoping and Environmental Impact Reporting |
| SIA | Social Impact Assessment |
| SLP | Social Labour Plan |
| SSF | Sasol Synthetic Fuels |
| SWDC | Stormwater Diversion Channel |
| SWMP | Stormwater Management Plan |
| WML | Waste Management Licence |
| WUL | Water Use License |
| WULA | Water Use License Application |

## Legislation

| Abbreviation | Full term |
|---|---|
| CARA | Conservation of Agricultural Resources Act (No. 43 of 1983) |
| MPRDA | Minerals and Petroleum Resources Development Act (No. 28 of 2002) |
| NEMA | National Environmental Management Act (No. 107 of 1998)) |
| NEM:AQA | National Environmental Management: Air Quality Act (No. 39 of 2004) |
| NEM:BA | National Environmental Management: Biodiversity Act (No. 10 of 2004) |
| NEM:PAA | National Environmental Management Protected Areas Act (No. 57 of 2003) |
| NEM:WA | National Environmental Management: Waste Act (No. 59 of 2008) |
| NHRA | National Heritage Resources Act (No. 25 of 1999) |
| NVFFA | National Veld and Forest Fire Act (No. 101 of 1998) |
| NWA | National Water Act (No 36 of 1998) |
| SABS | South African Bureau of Standards (SABS) |

| Abbreviation | Full term |
| --- | --- |
| SAHRA | South African Heritage Resources Agency |
| SEMA | Specific Environmental Management Acts |

## Measuring Units / Chemicals

| Abbreviation | Full term |
| --- | --- |
| COD | Chemical Oxygen Demand |
| ha | Hectares |
| hPa | Hectopascal |
| Kg | Kilogram |
| km | Kilometre(s) |
| Kt | kilo tons |
| kV | Kilo volts |
| l / s | Litres per second |
| m | Metre(s) |
| masl | Metres above sea level |
| mbgl | Metres below ground level |
| mS / m | Milli Siemens per metre |
| Mtpa | Mega tons per annum |
| MVA | Mega Volt- Ampere |
| PM | Particulate Matter |
| µm | Micro metres |
| VAC | Visual Absorption Capacity |
| pH | Acidity |
| $^{o}C$ | Temperature – Degree Celsius |
| TDS | Total Dissolved Solids |
| EC | electrical conductivity |
| SS | Turbidity, Suspended Solids |
| **Elements / Chemical Compounds** | |
| Al | Aluminium |
| $NH_4$ | Ammonia |
| Ca | Calcium |
| Cd | Cadmium |
| Cl | Chloride |
| Cr | Chrome |
| Co | Cobalt |
| Cu | Copper |
| Fe | Iron |

| Abbreviation | Full term |
|---|---|
| $H_3PO_4$ | Orthophosphates |
| Mg | Magnesium |
| Mn | Manganese |
| Na | Sodium |
| Ni | Nickel |
| $NO_2$ | Nitrites |
| $NO_3$ | Nitrates |
| NOX | Nitrogen Oxides |
| Pb | Lead |
| $SO_2$ | Suplphur Dioxide |
| $SO_4$ | Sulphates |
| Zn | Zinc |

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# 1 Introduction

## 1.1 Purpose of this Report

The purpose of this Draft Scoping Report (DSR) is to provide stakeholders with an overview of the Anglo American Coal (AAC): Isibonelo Colliery's (Isibonelo Colliery) proposed Block Z project, characterise the environmental and social context, identify potential environmental, social and health aspects and impacts associated with the proposed Block Z project and invite early input from stakeholders in the identification of key issues and areas of concern, in order to inform the Scoping and Environmental Impact Reporting (S&EIR) process. The main objectives of the scoping phase are to:

- Describe the methodology applied to conduct the S&EIR process;
- Provide a description of the proposed Block Z project area;
- Identify and describe reasonable land use or development alternatives to the proposed Block Z project;
- Describe the existing status of the biophysical and socio-economic environment;
- Identify and describe the anticipated environmental, social and cultural impacts associated with the proposed Block Z project and outline supporting studies included within the S&EIR process to address these issues further;
- Describe the process of engagement with stakeholders, including their views and concerns; and
- Describe the nature and extent of further investigations required in the Environmental Impact Report (EIR) phase.

## 1.2 Structure of this Draft Scoping Report

The DSR has been drafted in accordance with the National Environmental Management Act (No. 107 of 1998) as amended, (NEMA) Environmental Impact Assessment (EIA) Regulations (Government Notice Regulation [GNR] 543 of 2010) and GNR 527 of the Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA). The DSR has been compiled in a diligent and independent manner, and includes the following:

- An introduction to the proposed Block Z project, the project proponent, the Environmental Assessment Practitioner (EAP) and specialists, as well as competent authorities (**Section 1**);
- Description of the legislation applicable to the proposed Block Z project (**Section 2**);
- Approach to the scoping phase and stakeholder engagement (**Section 3**);
- Project need and desirability (**Section 4**);
- Project description including existing and proposed (**Section 5**);
- Project alternatives including 'no-go' alternatives (**Section 6**);
- Description of the baseline biophysical and socio-economic conditions of the proposed Block Z project area (**Section 7**);
- Identification of potential environmental and socio-economic impacts, including cumulative impacts (**Section 8**);
- Plan of study for EIR (**Section 9**); and
- The Way Forward (**Section 10**).

## 1.3 Isibonelo Colliery

Isibonelo Colliery established an opencast mine to supply Sasol's Synthetic Fuel (SSF) plant located in Secunda. Isibonelo Colliery acquired a mining right in 2003 that covered an area of 2188.55 hectares (ha), and the first coal was supplied to SSF in July 2005.

Isibonelo Colliery primarily utilizes the dragline strip-mining method as a means of coal removal from the coal seams encompassed in the Highveld coalfield. Bituminous coal seams hosted by the sedimentary strata in the Isibonelo Colliery Mining Licence area include, from the base up, the No 1, 2, 3, 4 and 5 seams. Only the No 4 seam is presently considered to be economically viable, with an average opencast depth of 40m and a thickness of 5,6 m.

In order for Isibonelo Colliery to fulfil contractual agreements for the continued supply of coal to SSF, they need to mine the proposed Block Z area.

Isibonelo Colliery is situated in the Mpumalanga Province, approximately 60km south of Witbank and 8km south of the town of Kriel in the Mpumalanga Province. More specifically, Isibonelo Colliery is located between the towns of Kinross, Secunda, Bethal and Kriel (**Figure 1-1**). The area falls within the Nkangala District and the Emalaheni Local Municipalities. The Isibonelo Colliery mine lease area is located on the following properties (**Figure 1-2**):

1. Alexander 12 IS;
2. Witbank 102 IS;
3. Boschmanskraal 113 IS;
4. Brakfontein 117 IS;
5. Aangewys 81 IS;
6. Onverwacht 70 IS;
7. Vlaklaagte 83 IS;
8. Rietfontein 100 IS; and
9. Rietfontein 101 IS.

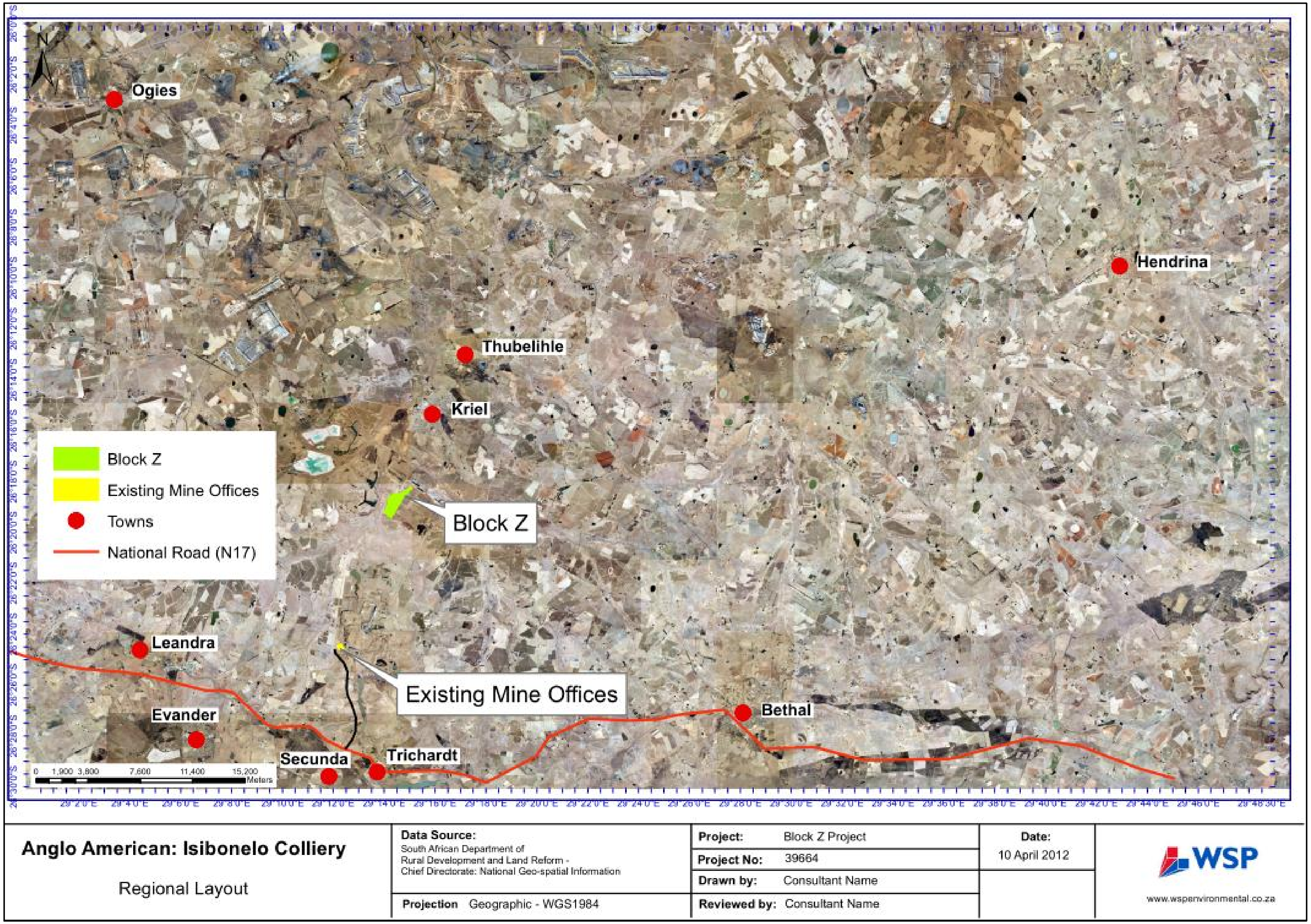



Figure 1-1: Isibonelo Colliery Regional Map (ArcView GIS, 2014)

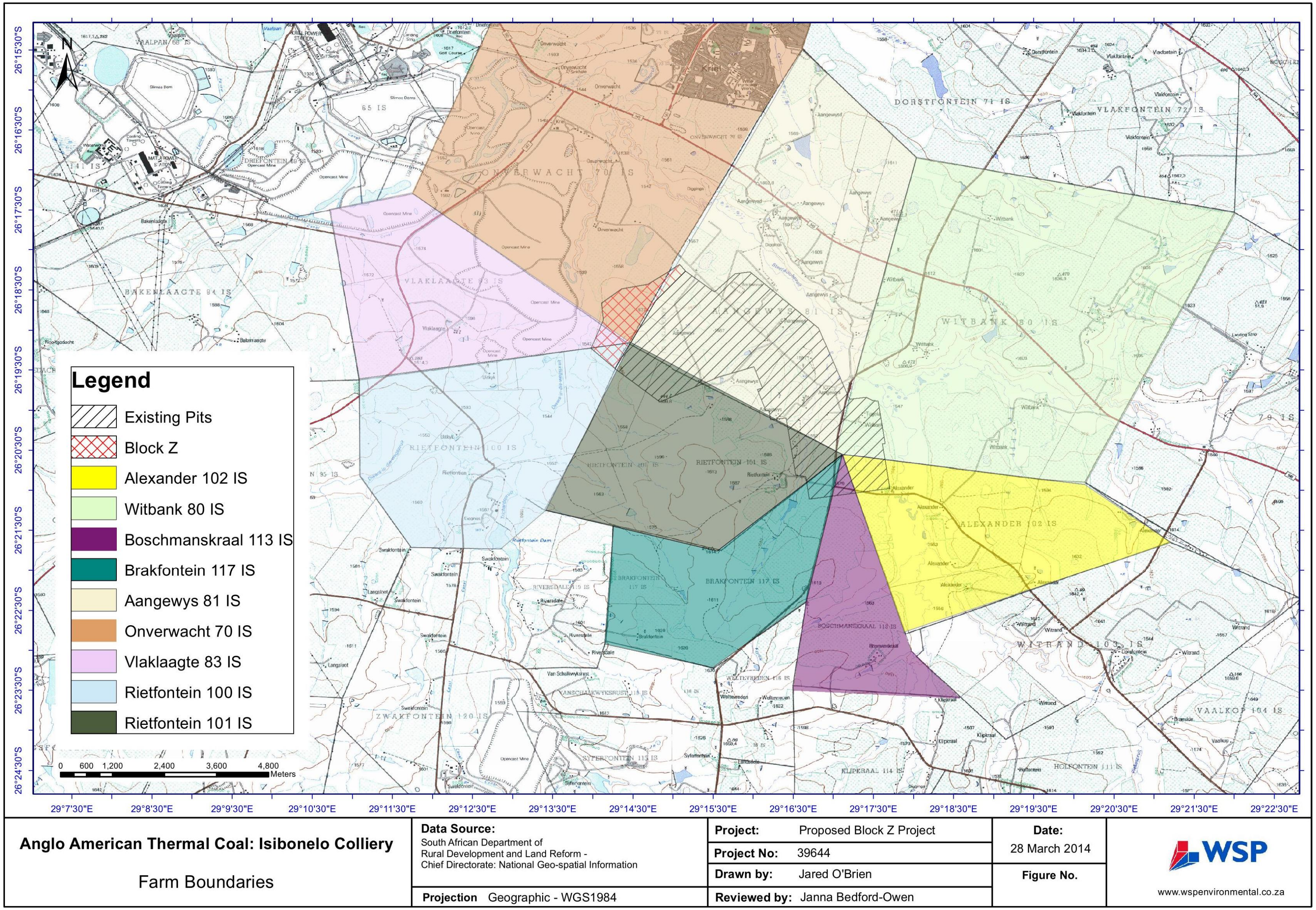



**Figure 1-2: Indicates the (above noted) farm boundaries on which Isibonelo Colliery is situated (ArcView GIS, 2014)**

## 1.4 Terms of Reference

Isibonelo Colliery currently operates its opencast mine in accordance with the recently consolidated and approved Environmental Management Programme Report (EMPR) (Department of Mineral Resources (DMR) reference number: OT6/2/2/447MP30/5/1/2/3/2/1) (130) EM) and has an estimated thirteen year life of mine (LoM) remaining.

The proposed Block Z project was not included in the above approved EMPR and therefore, in order to commence with the proposed mining activities at Block Z, Isibonelo Colliery is required to obtain the following:

- Environmental authorisation for activities identified in terms of GNR 544 and 545 (December 2010) published in terms of the NEMA from the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET);
- A water use license (WUL) in terms of the National Water Act (No. 36 of 2004) (NWA) from the Department of Water Affairs (DWA); and
- A mining right transfer and amendment application and an EMPR Amendment in terms the MPRDA from the DMR.

An integrated S&EIR process will need to be completed in order to meet the abovementioned legal requirements. **Figure 1-3** provides a graphical representation of this integrated process.


**Figure 1-3: Integrated Authorisation Process**

## 1.5 Role Players

### 1.5.1 Project Proponent

The Project Proponent is Anglo Operations Limited: Isibonelo Colliery. **Table 1-1** provides the contact details of the Isibonelo Colliery environmental co-ordinator, the Isibonelo Colliery mine manager and the land manager at AAC head office.

**Table 1-1: Project Proponent Contact Details**

| Environmental Co-ordinator: | Details: |
|---|---|
| **Company Registration:** | Anglo Operations Limited |
| **Contact Person:** | Mr Kenneth Mokoena |
| **Postal Address:** | Private Bag X 701,<br>Trichardt,<br>2300<br>South Africa |
| **Telephone:** | 017 620 2714 |
| **Fax:** | 017 620 2759 |
| **E-mail:** | Kenneth.mokoena@angloamerican.com |
| **Mine Manager:** | **Details:** |
| **Company Registration:** | Anglo Operations Limited |
| **Contact Person:** | Mr Dirk Miller |
| **Postal Address:** | Private Bag X 701,<br>Trichardt,<br>2300<br>South Africa |
| **Telephone:** | 017 620 2700 |
| **Fax:** | 017 620 2759 |
| **E-mail:** | Dirk.miller@angloamerican.com |
| **Land Manager:** | **Details:** |
| **Company Registration:** | Anglo Operations Limited |
| **Company VAT Number:** | 4710102072 |
| **Contact Person:** | Fanie Kitching |
| **Postal Address:** | Property & Estates<br>House 105, Landau Village,<br>Old Landau Colliery Rd,<br>Witbank,<br>1034 |
| **Telephone:** | 013 691 5488 |
| **Fax:** | 013 691 5660 |
| **E-mail:** | fanie.kitching@angloamerican.com |

## 1.5.2 Environmental Assessment Practitioner

WSP Environment and Energy (WSP) was appointed by Isibonelo Colliery to fulfil the role of the independent EAP to facilitate the environmental authorisation process. **Table 1-2** details the relevant contact details of the EAP while **Table 1-3** provides the details of the supporting specialist.

WSP Global Inc. is a global, world-class multi-disciplinary consultancy, with combined revenues of £1.1 billion and approximately 14,500 employees working in over 300 offices in 35 countries, with stated strategic ambitions to further diversify and grow.

In Africa, WSP is a leading environmental consultancy with a broad range of expertise and over 20 years' experience in the regional market. As part of a global business, we provide the marketplace with a dynamic blend of local knowledge and global expertise. We offer independent, insightful and professional advice to our clients to achieve a balance between environmental protection, social desirability and economic development.

At WSP we have a reputation for delivery and excellence and provide a diverse range of integrated and innovative solutions to both public and private sector clients across the industrial, mining, infrastructure and financial sectors. WSP is committed to transformation in our operational region, with 26% Broad Based Black Economic Empowerment (BBBEE) ownership and having achieved Level 4 BBBEE certification in South Africa.

**Table 1-2: Details of the Environmental Assessment Practitioner**

| Environmental Assessment Practitioner (EAP) | |
|---|---|
| **Company** | WSP Environmental (Pty) Ltd |
| **Company Registration:** | 1995 / 08790 / 07 |
| **Contact Person:** | Janna Bedford-Owen |
| **Postal Address:** | P O Box 98867<br>Sloane Park<br>2152 |
| **Telephone:** | 011 361 1371 |
| **Fax:** | 086 55 66 336 |
| **E-mail:** | Janna.Bedford-Owen@wspgroup.co.za |

**Table 1-3: List of the Specialists**

| Component | Company | Contact person | Telephone | Email |
|---|---|---|---|---|
| Air quality & Noise | WSP | Patricia Mathabathe | 011 361 1370 | Patricia Mathabathe@wspgroup.co.za |
| | | Nicola Enslin | 011 361 1479 | Nicola.enslin@wspgroup.co.za |
| Hydrology | | Greg Matthews | 031 240 8866 | greg.matthews@wspgroup.co.za |
| | | Andrew Gemmel | 031 240 8889 | Andrew.gemmel@wspgroup.co.za |
| Social | | Danielle Michel | 031 240 8869 | Danielle.michel@wspgroup.co.za |
| Blasting and Vibration | Blast management | Danie Zeeman | 012 662 1945 | danie@blastmanagement.co.za |
| Heritage (archaeology) | Archaetnos CC | Dr Anton van Vollenhoven | - | antonv@archaetnos.co.za |
| Biodiversity and Wetlands | Natural Scientific Services CC | Kathy Taggart | 011 787 7400 | Kathy@nss-sa.co.za |
| | | Susan Abell | 011 787 7400 | susan@nss-sa.co.za |
| Geohydrology | JMA Consulting | Jaco van der Berg | 013 665 1788 | Jaco@jmaconsult.co.za |
| Land capability & land use | Earth Science Solutions | Ian Jones | 013 753 2746 | ian@earthscience.co.za |

### 1.5.3 Competent Authorities

The MDEDET is the delegated competent authority for the environmental authorisation application in terms of the NEMA while the DWA is the delegated competent authority for consideration of the WUL Application and the DMR is the competent authority for consideration of the mining right amendment application and EMPR Amendment. **Table 1-4** provides the contact details of the authorities involved with the decision-making processes associated with the proposed Block Z project.

**Table 1-4: Competent Authorities**

| **Mpumalanga Department of Economic Development, Environment and Tourism** | |
|---|---|
| **Contact Person:** | Charity Mthimunye |
| **Postal Address:** | Corner Rosemead and Ryan Road<br>Klipfontein<br>Witbank |
| **Telephone:** | 013 692 6300 |
| **Fax:** | - |
| **E-mail:** | cmthimunye@mpg.gov.za |
| **Department of Mineral Resources** | |
| **Contact Person:** | Fhatuwani Muronga |
| **Postal Address:** | Province House,<br>Corner Paul Kruger & Botha Street,<br>eMalaheni,<br>1035 |
| **Telephone:** | 013 653 0500 |
| **Fax:** | - |
| **E-mail:** | Fhatuwani.Muronga@dmr.gov.za |
| **Department of Water Affairs** | |
| **Contact Person:** | Pinky Monyela |
| **Postal Address:** | No 22 Rooth Street<br>Erasmus<br>Bronkhorspruit<br>1020 |
| **Telephone:** | 013 932 2061 |
| **Fax:** | 013 932 2071 |
| **E-mail:** | monyelap@dwa.gov.za |

# 2 Regulatory Context

## 2.1 The Constitution of South Africa (No. 108 of 1996)

Since 1994 South African legislation, including environmental legislation has undergone a large transformation and various laws and policies were promulgated with a strong emphasis on environmental concerns and the need for sustainable development. The Constitution of South Africa (No. 108 of 1996) (The Constitution) provides environmental rights (contained in the Bill of Rights, Chapter 2 (Section 24)) and includes implications for environmental management. The environmental rights are guaranteed in Section 24 of the Constitution, and state that:

> *"Everyone has the right –*
>
> - *To an environment that is not harmful to their health or well-being and*
> - *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:*
>   - *Prevent pollution and ecological degradation;*
>   - *Promote conservation and*
>   - *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."*

The Constitution cannot manage environmental resources as a stand-alone piece of legislation hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations are designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld on an on-going basis throughout the country. In terms of Section 7, a positive obligation is placed on the State to give effect to the environmental rights.

## 2.2 Minerals and Petroleum Resources Development Act (No. 28 of 2002)

### 2.2.1 Objectives

In terms of the previous mining legislation in South Africa (The Minerals Act (No. 50 of 1991)), mineral rights were held privately and in some instances, by the state. The MPRDA now vests all mineral rights in the State.

The MPRDA concerns equitable access to, and sustainable development of, South Africa's mineral and petroleum resources. The MPRDA makes provision for sustainable mining and requires:

- That every person who has applied for a mining right must conduct an EIA, determine the environmental baseline, and submit an Environmental Management Programme to the DMR;
- That every holder of a mining reconnaissance permit, prospecting right, mining right, mining permit or retention permit must assess and communicate the impacts of the activity on the environment;
- The need to rehabilitate the environment affected by prospecting or mining operations to its natural or predetermined state; and
- That the directors of the mining company are liable for unacceptable impacts on the environment.

### 2.2.2 Applicability

In terms of Section 5 of the MPRDA no person may mine any area without:

- A mining right;
- An approved EMPR; and
- Notifying and consulting with the landowner.

Isibonelo Colliery is currently in possession of a mining right and an approved consolidated EMPR for the existing opencast operations (DMR ref no. OT6/2/2/447MP30/5/1/2/3/2/1) (130) EM). The requirements of the MPRDA have therefore been met by Isibonelo Colliery in terms of the existing mining operations.

However, the proposed Block Z project is not included in the above mining right or approved EMPR. Isibonelo Colliery is therefore required to complete the below prior to the commencement of Block Z project activities:

- Lodge a mining right transfer application with the DMR in terms of Section 22 of the MPRDA;
- Lodge a mining right application with the DMR in terms of Section 11 of the MPRDA;
- Conduct an S&EIR process and compile an EMPR in terms of Section 39 and 102 of the MPRDA and Section 47 – 55 of the GNR 527, and submit such to the DMR;
- Notify and consult with the landowner in terms of Section 27 of the MPRDA.

In the case of the proposed Block Z project, the NEMA and the MPRDA requirements will be aligned to prevent reporting duplication to the competent authority.

The Mpumalanga DMR will be responsible for reviewing the mining right (new and transfer) applications and EMPR Amendment for the proposed Block Z project.

## 2.3 National Environmental Management Act (No. 107 of 1998)

### 2.3.1 Objectives

The NEMA is South Africa's overarching environmental legislation and has, as its primary objective, to provide for co-operative governance by establishing principles for decision making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state and to provide for matters connected therewith.

The NEMA provides for the Constitutional right to an environment that is not harmful to the health and well-being of South African citizens, the equitable distribution of natural resources, sustainable development, environmental protection and the formulation of environmental management frameworks.

### 2.3.2 Applicability

In terms of Section 24(2) of the NEMA the Minister of the Department Environmental Affairs (DEA) may identify activities which may not commence without prior authorisation from the Minister or Member of the Executive Committee (MEC) and may also identify geographical areas in which specified activities may not commence without prior authorisation from the Minister or MEC. The Minister of the DEA thus published listed activities in GNR 544 (Listing Notice 1), 545 (Listing Notice 2) and 546 (Listing Notice 3) (18 June 2010 as amended 2013) that may not commence prior to authorisation from the Minister or MEC. The regulations outlining the procedures required for authorisation are published in GNR 543 (EIA Regulations) (18 June 2010), namely:

- GNR 544 identifies activities that require a Basic Assessment (BA) process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity;
- GNR 545 identifies activities that require an S&EIR process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity; and
- GNR 546 identifies activities within specific geographical areas that require a BA process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity.

WSP reviewed the NEMA EIA listed activities (GNR 544, 545 and 546) and identified potential activities that may be relevant to the proposed Block Z project. These potentially applicable activities are listed in **Table 2-1.**

**Table 2-1: Applicable listed activities in terms of GNR 544 and 545**

| Reguation | Activity Description | Relevance |
|---|---|---|
| **GNR 544 (18 June 2010)** | *Activity 9:*<br><br>The construction of facilities or infrastructure exceeding 1000m in length for the bulk transportation of water, sewage or stormwater:<br><br>i) with an internal diameter of 0.36m or more<br><br>ii) with a peak throughput of 120 litres per second or more | The proposed mining of Block Z will require additional infrastructure, which may include the construction of a pipeline for the transportation of water that may exceed a 1000m in length or have an internal diameter of 0.36m or more. |
| | *Activity 10:*<br><br>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 proposed Block Z area adjacent to the Dwars-in-die-wegspruit. While efforts will be undertaken to ensure that construction of infrastructure remains further than 32m from the watercourse; the potential exists for construction activities to occur within the 32m line. |
| | *Activity 11:*<br>The construction of:<br>i. canals;<br>ii. channels;<br>iii. bridges;<br>iv. dams;<br>v. weirs;<br>vi. bulk storm water outlet structures;<br>vii. marinas;<br>viii. jetties exceeding 50 square metres in size;<br>ix. slipways exceeding 50 square metres in size;<br>x. buildings exceeding 50 square metres in size; or<br>xi. infrastructure or structures covering 50 square metres or more<br>where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line. | The proposed Block Z area lies adjacent to a watercourse. While efforts will be undertaken to ensure that construction of infrastructure remains further than 32m from the watercourse; the potential exists for construction activities to occur within the 32m line. |
| | *Activity 37*<br>The expansion facilities or infrastructure for the bulk transportation of water, sewage or storm water, where:<br>i. the facility or infrastructure is expanded by more than '1000 metres in length.<br>ii. where the throughput capacity of the facility or infrastructure will be increased by 10% or more.<br>excluding where such expansion:<br>- relates to transportation of water, sewage or storm water within a road reserve.<br>- where such expansion will occur within urban areas but further than 32 metres from a watercourse, measured from the edge of the watercourse. | Isibonelo Colliery is an established coal mine with existing infrastructure for the transportation of water, sewage and storm water. Depending on the final mine plan design, it is possible that the established pipelines may be extended by a length greater than 1000m to accommodate the proposed Block Z mining area. |
| | *Activity 47:*<br><br>The widening of a road by more than 6m, or the lengthening of a road by more than 1km - | The proposed Block Z area lies outside an urban area and does not currently have an access road. An existing mine access road may be extended by greater than 1km and / or widened by greater than 6m to reach the Block Z area. |

| Reguation | Activity Description | Relevance |
|---|---|---|
| | i) where the existing reserve is wider than 13.5m; or<br>ii) where no reserve exists, where the existing road is wider than 8m | |
| **GNR 545 (18 June 2010)** | *Activity 15:*<br>Physical alteration of undeveloped land for industrial use where the total area to be transformed is greater than 20 hectares (ha). | The proposed mining of the Block Z area will require the transformation of an area greater than 20ha (approximately 67.7ha). |
| | *Activity 20:*<br>Any activity which requires a mining right or renewal thereof as contemplated in sections 22 and 24 respectively of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002). | Isibonelo Colliery will require a mining right for the proposed open cast mining of the proposed Block Z Area. |

Therefore S&EIR process is required in accordance with the NEMA EIA Regulations, namely GNR 544 and 545. An application to undertake a S&EIR process was submitted to the competent authority (MDEDET) which subsequently issued a letter of acknowledgement and reference number (17/2/3N-632) dated 27 May 2014 (**Appendix A**).

## 2.4 National Environmental Management Waste Act (No. 59 of 2008)

### 2.4.1 Objectives

The National Environmental Management Waste Act (No. 59 of 2008) (NEM:WA) serves to reform the law regulating waste management in order to protect human health and the environment. This is managed by providing reasonable measures for the prevention of pollution and ecological degradation. The NEM:WA aims to secure ecologically sustainable development while promoting justifiable economic and social development. The NEM:WA provides national norms and standards for regulating the management of waste by all spheres of government, for specific waste management measures and for matters incidental thereto.

The Act also promotes:

- Economic and sustainable development;
- Effective delivery of waste services;
- Remediation of contaminated land; and
- Integrated waste management.

### 2.4.2 Applicability

Section 20 of the NEM:WA states that no person may commence, undertake or conduct a waste management activity except in accordance with a Waste Management License (WML). A list of waste management activities that require a WML was published in GNR 921 (29 November 2013). GNR 921 states that a person who wishes to commence with a waste management activity must undertake the required BA or S&EIR process in accordance with NEMA EIA Regulations GNR 543 or conduct such activities in accordance with relevant / applicable National Norms and Standards. GNR 921 provides for:

- Category A identifies activities that require a Basic Assessment (BA) process to be undertaken in terms of the NEMA EIA Regulations, prior to commencement of that activity;
- Category B identifies activities that require an S&EIR process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity; and

- Category C identifies activities that require adherence to the relevant National Norms and Standards as published.

Following review of the listed activities contained in GNR 921, WSP ascertained that the proposed Block Z project will not include Category A or B waste management activities and will therefore not require a WML. Where applicable, the National Norms and Standards will be adhered to by Isibonelo Colliery including but not limited to:

- GNR 635 - National Norms and Standards for the Assessment of Waste for Landfill Disposal;
- GNR 636 - National Norms and Standards for the Disposal of Waste to Landfill;
- GNR 926 - National Norms and Standards for the Storage of Waste; and
- GNR 331 - National Norms and Standards for the Remediation of Contaminated Land and Soil Quality.

## 2.5 National Environmental Management Air Quality Act (No. 39 of 2004)

### 2.5.1 Objectives

The National Environmental Management Air Quality Act (No. 39 of 2004) (NEM:AQA) states that its primary objective is to reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government, for specific air quality measures, and for matters incidental thereto.

### 2.5.2 Applicability

The NEM:AQA requires the Minister of the DEA to publish a list of activities which results in atmospheric emissions which may have a detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage. Section 22 of NEM:AQA requires that an Atmospheric Emissions Licence (AEL) be obtained for such listed activities.

In terms of GNR 893 (22 November 2013), category 5 (mineral processing, storage and handling), subcategory 5.1 (storage and handling of ore and coal) requires an AEL only in the event that these facilities are "not situated on the premises of a mine or works as defined in the Mines Health and Safety Act 29 / 1996". Therefore an AEL is not applicable to the proposed Block Z project as it will occur within a mine lease area and coal will be fed into the existing operations for storage, handling and transfer as required.

### 2.5.3 Highveld Priority Area

The Minister of Environmental Affairs and Tourism formally declared the eastern part of Gauteng and western part of Mpumalanga an air pollution hotspot, to be known as the "the Highveld Priority Area", a national air pollution hotspot in terms of Section 18(1) of the NEM:AQA . By declaring a priority area, authorities recognise that Air Quality within these areas are generally regarded as being poor, and frequently meet or exceed ambient air quality standards.

The Highveld Priority Area extends from the eastern parts of Gauteng, to Middelburg in the north and the edge of the escarpment in the south and east. Major towns occurring within this region include Witbank, Middelburg, Secunda, Standerton, Edenvale, Boksburg, Benoni and Balfour. The area incorporates portions of the Gauteng and Mpumalanga Provinces. The area is contained within 1 metropolitan municipality (Ekurhuleni) and 3 district municipalities (Sedibeng, Gert Sibande and **Nkangala**) and more specifically 9 local municipalities: Lesedi Local Municipality (Sedibeng); Govan Mbeki Local Municipality (Gert Sibande); Dipaleseng Local Municipality (Gert Sibande); Lekwa Local Municipality (Gert Sibande); Msukaligwa Local Municipality (Gert Sibande);

PrixleykaSeme Local Municipality (Gert Sibande); Delmas Local Municipality (Nkangala); **eMalahleni Local Municipality** (Nkangala); and Steve Tshwete Local Municipality (Nkangala).

The proposed Block Z project is located within the Nkangala District and the eMalehleni Local Municipalities, and therefore falls within the boundaries of the Highveld Priority area. This implies that authorities may impose measures on Isibonelo Colliery and other mines and industries within this area in order to allow for the improvement of the Air Quality.

## 2.6 National Water Act (No. 36 of 1998)

### 2.6.1 Objectives

The NWA provides for fundamental reformation of legislation relating to water resources and use. The preamble to the Act recognises that the ultimate aim of water resource management is to achieve sustainable use of water for the benefit of all users and that the protection of the quality of water resources is necessary to ensure sustainability of the nation's water resources in the interests of all water users. The purpose of the NWA is stated, in Section 5 as, *inter alia*:

- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Facilitating social and economic development;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources; and
- Meeting international obligations.

### 2.6.2 Applicability

Section 22(1) of the NWA states that a person may only use water if the water use is authorised by a licence under NWA or if the responsible authority has dispensed with a licence requirement if it is satisfied that the purpose the NWA will be met by the granting of a licence, permit or other authorisation under any other law.

A person may only use water without a licence if the water use is permissible:

- Under Schedule I of NWA;
- As a continuation of an existing lawful use; and
- In terms of a general authorisation issued under Section 39 of NWA.

Isibonelo Colliery was issued a WUL (Ref: 16/2/7/B101/C32/1, License Number: 24084884) for the existing operations on 21 November 2008. However, the water use activities proposed for Block Z will not occur on the same properties as the existing operations and as listed in the WUL.

Therefore, a WUL is required in terms of Section 41 of the NWA for activities listed in Section 21 of the same Act. The water uses potentially applicable to the proposed Block Z project are included in **Table 2-2**.

**Table 2-2: Water use activities potentially applicable in terms of Section 21 of the NWA**

| Listed Activity | Water Use Description | Relevance |
|---|---|---|
| **Section 21(c):** | Impeding or diverting the flow of water in a water course. | The proposed Block Z project is located in close proximity to the Dwars-in-die-wegspruit and thus may impede, divert flow and / or alter the bed, bank course or characteristics of a water course. |
| **Section 21(i):** | Altering the bed, bank, course or characteristics of a watercourse. | |
| **Section 21(j):** | Removing, discharging or disposing of water found underground if it is necessary for the efficient | The proposed Block Z open cast pit may require removal of water during construction and operation |

| | | |
|---|---|---|
| | continuation of an activity or for the safety of people. | to provide for safe working conditions. |
| **Section 21(g)** | Disposing of waste in a manner which may detrimentally impact on a water resource | Any water removed from the proposed Block Z open cast pit may be considered dirty and require storage by Isibonelo Colliery. |

### 2.6.3 Government Notice Regulation 704

GNR 704 (4 June 1999) of the NWA provides regulations on the use of water for mining and mining related activities aimed at the protection of water resources. GNR 704 further places restrictions on mining activities including *inter alia*:

- Regulation 4: Restrictions on locality;
- Regulation 5: Restrictions on use of material;
- Regulation 6: Capacity requirements of clean and dirty water separation systems;
- Regulation 7: Protection of water resources;
- Regulation 8: Security and additional measures;
- Regulation 9: Temporary or permanent cessation of mine or activity;
- Regulation 11: Additional regulations for rehabilitation of coal residue deposits; and
- Regulation 12: Technical investigation and monitoring.

Following from the above, Isibonelo Colliery will be required to ensure that the requirements of GNR 704 are adhered to for the proposed Block Z project particularly in relation to Regulation 4 which states the no person in control of a mine may:

- Locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year flood line or within a horizontal distance of 100m from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on water-logged ground, or on ground likely to become water-logged, undermined, unstable or cracked;
- Place or dispose of any residue or substance which causes or is likely to cause pollution of a water resource, in the workings of any underground or opencast mine excavation, prospecting diggings, pit or any other excavation; and
- Use any area or locate any sanitary convenience, fuel depots, reservoir or depots for any substance which causes or is likely to cause pollution of a water resource within the 1:50 year flood line of any watercourse or estuary.

Further to the above, Isibonelo Colliery is required to ensure that clean and dirty water areas are located within the mine lease area (including the proposed Block Z project) and ensure continued clean and dirty water management. The design, construction, maintenance and operation of the clean and dirty water management system will need to consider the 1:50 year flood event and the requirement for an adequate freeboard.

The clean and dirty water management system design plans, incorporating the proposed Block Z project, will be submitted to the competent authority as part of the WULA and EIR for consideration (DWA will be required to comment and approve these designs).

## 2.7 National Environmental Management Biodiversity Act (No. 10 of 2004)

### 2.7.1 Objectives

The National Environmental Management Biodiversity Act (No. 10 of 2004) (NEM:BA), in line with the Convention on Biological Diversity (CBD), aims to legally provide for biodiversity conservation, sustainable use and equitable access and benefit sharing. The NEM:BA creates a basic legal framework for the formation of a national biodiversity strategy and action plan and the identification of biodiversity hotspots and bio-regions which will then be given legal recognition. The NEM:BA imposes obligations on landowners (state or private) governing alien invasive species as well as regulating the introduction of genetically modified organisms.

The NEM:BA ensures that provision is made to remove any aliens which have been introduced to the site or are present on the site. Furthermore, the NEM:BA serves to regulate bio-prospecting, making provision for communities to share the profits of any exploitation of natural materials involving indigenous knowledge. The South African National Biodiversity Institute (SANBI) was established to enforce the objectives as set out in the NEM:BA.

### 2.7.2 Applicability

Sections 52(1)(a) and 56(1) of the NEM:BA state that the Minister may publish national lists of species and ecosystems, respectively, that are threatened or are in need of protection. A list of species that are threatened or are in need of protection was published in GNR 151 (23 February 2007), with GNR 152 (23 February 2007) detailing the regulations relating to such species. These regulations are imposed where restricted activities involve specimens of listed threatened or protected species. GNR 152 defines the requirements of permitting and the process related thereto. At this stage the presence of any threatened or protected species cannot be confirmed. The biodiversity and wetland impact assessment, to be completed as part of the EIR Phase, of the S&EIR process will confirm whether or not the proposed Block Z project may require permitting in accordance with NEM:BA.

## 2.8 National Environmental Management Protected Areas Act (No. 57 of 2003)

### 2.8.1 Objectives

The National Environmental Management Protected Areas Act (No. 57 of 2003) (NEM:PAA) concerns the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes, and includes *inter alia*:

- The establishment of a national register of all national, provincial and local protected areas;
- The management of those areas in accordance with national standards; and
- Inter-governmental co-operation and public consultation in matters concerning protected areas.

### 2.8.2 Applicability

Sections 48 to 53 of the NEM:PAA lists restricted activities that may not be conducted in a protected area. Section 48 states that no person my conduct commercial prospecting or mining activities in a:

- Special nature reserve or nature reserve;
- Protected environment without the written permission of the Minister and the Cabinet member responsible for minerals and energy affairs; and

- Protected area referred to in Section 9:
  - (b) world heritage sites; and
  - (d) specially protected forest areas, forest nature reserves and forest wilderness areas declared in terms of the National Forests Act (No. 84 of 1998);

The proposed Block Z project is zoned mining and therefore not located with a protected area as defined in the above listed legislature.

It is not anticipated that any protected areas lie within the proposed Block Z area, however this will be verified through the completion of a biodiversity and wetland impact assessment during the EIR phase of the S&EIR process.

## 2.9 National Heritage Resources Act (No. 25 of 1999)

### 2.9.1 Objectives

The National Heritage Resources Act (No. 25 of 1999) (NHRA) aims to protect heritage resources of national significance. The NHRA provides for an integrated and interactive system for the management of the national heritage resources and empowers civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations. Furthermore, the Act established the South African Heritage Resources Agency (SAHRA) which was established in 1999 to fulfil the objectives of the NHRA.

### 2.9.2 Applicability

Section 38 of the NHRA details specific activities that require a heritage impact assessment be completed and submitted to the SAHRA for consideration prior to commencement. The listed heritage activities identified as potentially applicable to the proposed Block Z project are contained within **Table 2-3**.

Section 48(2) requires a permit from the SAHRA to perform such actions at such time and subject to such terms, conditions and restrictions or directions as may be specified in the permit. The actions applicable to this project are outlined in **Table 2-3**.

The NHRA further provides for the processes where human remains are identified and subdivides graves and burial grounds into the following:

a) ancestral graves;

b) royal graves and graves of traditional leaders;

c) graves of victims of conflict;

d) graves designated by the Minister;

e) historical graves and cemeteries; and

f) human remains;

In terms of Section 36(3) of the NHRA, no person may, without a permit issued by the relevant heritage resources authority, undertake the identified activities as listed in **Table 2-3**:

**Table 2-3: NHRA Sections 34, 38 and 48**

| Section in NHRA | Activity | | Relevance to the Block Z project |
|---|---|---|---|
| **Section 36** | a) | Destroy, damage, alter, exhume or remove from its original position of otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves; | During the proposed Block Z establishment, there is a potential that graves may be encountered in which case Section 36 will be applicable. |
| | b) | Destroy, damage, alter, exhume or remove from | |

| Section in NHRA | Activity | Relevance to the Block Z project |
|---|---|---|
| | its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or<br>c) Bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation, or any equipment which assists in the detection or recovery of metals. | |
| **Section 38** | 1(a) The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length. | The Block Z project may involve the construction and alteration of a linear development in the form of a road(s), a powerline, a pipeline, a cannel and a stormwater berm therefore this activity may be applicable. |
| | 1(c) Any development or other activity which will change the character of a site:<br>▪ Exceeding 5 000$m^2$ in extent.<br>▪ Involving three or more existing erven or subdivisions. | The Block Z project will impact an area of approximately 677408 $m^2$, therefore this activity is applicable. |
| | 1(d) The re-zoning of a site exceeding 10 000$m^2$ in extent. | The Block Z project will involve the re-zoning of the site, therefore this activity will be triggered. |
| **Section 48** | 2. Any development of the site where "development" means any physical intervention, excavation, or actions, other than those caused by natural forces, which results in a change to the nature, appearance or physical nature of a place, or influences its stability and future well-being, including:<br>▪ Construction, alteration, demolition, removal or change of use of a place or a structure at a place.<br>▪ Carrying out any works on or over or under a place.<br>▪ Any change to the natural or existing condition or topography of land.<br>▪ Any removal or destruction of trees, or removal of vegetation or topsoil. | During the construction phase of the Block Z project, the project will result in the following:<br>▪ Construction of supporting infrastructure and the alteration of undeveloped land.<br>▪ Carrying out any works on a place.<br>▪ The removal of vegetation and topsoil in order to establish the site.<br>During the operational phase of the Block Z project, the project will result in the following:<br>▪ A change to the topography of the land due to the extraction of overburden and the underlying coal seam.<br>▪ The removal of vegetation and topsoil depending on the progress made during the construction phase. |

All graves older than 60 years are called heritage graves and should be handled by an archaeologist. This includes archaeological graves, which are older than 100 years. Unidentified / unknown graves (which refers to date of death) are also handled as older than 60 until proven otherwise.

Human remains that are less than 60 years old are subject to provisions of the Human Tissue Act (Act 65 of 1983) and to local regulations. Exhumation of graves must conform to the standards set out in the Ordinance on Excavations (Ordinance no. 12 of 1980) (replacing the old Transvaal Ordinance no. 7 of 1925).

Permission must also be gained from the descendants (where known), the National Department of Health, Provincial Department of Health, Premier of the Province and local police. Furthermore, permission must also be gained from the various landowners (i.e. where the graves are located and where they are to be relocated) before exhumation can take place.

Human remains can only be handled by a registered undertaker or an institution declared under the Human Tissues Act (Act 65 of 1983 as amended).

Following from the above, as the proposed Block Z project will undertake activities above the listed thresholds provided in Section 38 of the NHRA, a Heritage Impact Assessment is required.

Should a Section 36 or 48 permit be required (as identified as necessary following completion of the Heritage Impact Assessment [HIA]), Isibonelo Colliery will be required to submit such the SAHRA for approval prior to commencement of the actions contained in **Table 2-3**. The permit may contain conditions and restrictions which will direct the manner in which these actions are performed as part of the proposed Block Z project and will inform the EMPR as applicable.

## 2.10 Conservation of Agricultural Resources Act (No. 43 of 1983)

### 2.10.1 Objectives

The Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA) includes the use and protection of land, soil, wetlands and vegetation and the control of weeds and invader plants. This is the only legislation that is directly aimed at conservation of wetlands in agriculture.

In 1984, regulations were passed in terms of the CARA regulations declaring about 50 species "weeds" or "invader plants". On 30 March 2001 the Minister of Agriculture promulgated an amendment to these regulations. This amendment now contains a comprehensive list of species that are declared weeds and invader plants dividing them into three categories. These categories are as follows:

- Category 1: Declared weeds that are prohibited on any land or water surface in South Africa. These species must be controlled, or eradicated where possible;
- Category 2: Declared invader species that are only allowed in demarcated areas under controlled conditions and prohibited within 30m of the 1:50 year floodline of any watercourse or wetland; and
- Category 3: Declared invader species that may remain, but must be prevented from spreading. No further planting of these species are allowed.

In terms of the amendments to the regulations under the CARA, landowners are legally responsible for the control of alien species on their properties. Various Acts administered by the DEA and DWA, as well as other laws (including local by-laws), spell out the fines, terms of imprisonment and other penalties for contravening the law. Although no fines have yet been placed against landowners who do not remove invasive species, the authorities may clear their land of invasive alien plants and other alien species entirely at the landowners cost and risk.

### 2.10.2 Applicability

The protection of land, soil, wetlands and vegetation and the control of weeds and invader plants is currently a commitment in Isibonelo Colliery's' approved EMPR. Furthermore, Isibonelo Colliery has implemented an off-site rehabilitation plan to compensate for the damage to on-site wetland areas as a result of previous and current mining activities. Specific management measures for the conservation of agricultural resources and the prevention of the establishment of weed species will be included in the project EMPR Amendment Report and the areas disturbed from mining activities will be rehabilitated to a predefined land use concurrent to mining activities.

## 2.11 National Veld and Forest Fire Act (No 101 of 1998)

### 2.11.1 Objectives

The purpose of the National Veld and Forest Fire Act (No. 101 of 1998) (NVFFA) is to prevent and combat veld, forest and mountain fires throughout South Africa. More specifically, Chapter 4 places a duty on owners to prepare and maintain firebreaks, as well as lays out the procedures, the role of adjacent land owners and the fire protection association(s). Chapter 5 of the NVFFA further places a duty on all owners to acquire and have available equipment and personnel to fight fires. In addition, this Act allows certain persons / officials permission to enter land and fight fires in an emergency and provides for integration between owners, fire protection associations and the Minister in the case of fire.

### 2.11.2 Applicability

Isibonelo Colliery has already established and continues to maintain firebreaks as applicable to its properties, and ensures continued liaisons with surrounding land owners in this regard. The proposed Block Z project is to be located south west of the existing operation and will require that the land on which it is located adheres to the NVFFA in terms of firebreak development, maintenance and engagement with adjacent land owners.

## 2.12 Fencing Act (No. 31 of 1963)

### 2.12.1 Objectives

The aim of the Fencing Act (No. 31 of 1963) (Fences Act) is to consolidate the laws relating to fences and the fencing of farms and other holdings. When a landowner erects a fence in a designated area, he / she may insist that the adjacent owner make a contribution towards the erection or maintenance costs. In areas where contributions are not mandatory / have not been published in the Government Gazette, a contribution can be claimed from the adjacent owner if the fence offers beneficial use for such a person. The Act also makes provision for a mechanism to deal with disputes between adjacent owners regarding a contribution towards erecting or repairing a fence.

### 2.12.2 Applicability

Section 17 requires that any person erecting a boundary fence may clear any bush along the line of the fence up to 1.5 metres on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to the protection of flora.

The proposed Block Z project will require either the erection of new or the upgrade to existing in order to prevent unauthorised access to the proposed mining activities. Where applicable, Isibonelo Colliery will be cognisant of the requirements as stipulated in the Fences Act.

## 2.13 Hazardous Substances Act (No. 15 of 1979)

### 2.13.1 Objectives

The object of the Act is *inter alia* to ‘provide for the control of substances which may cause injury or ill health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature or the generation of pressure thereby in certain circumstances; for the control of electronic products; for the division of such substances or products into groups in relation to the degree of danger; for the prohibition and control of such substances.’

In terms of the Act, substances are divided into schedules, based on their relative degree of toxicity, and the Act provides for the control of importation, manufacture, sale, use, operation, application, modification, disposal and dumping of substances in each schedule.

### 2.13.2 Applicability

Dangerous substances contained on-site during the construction phase of the proposed Block Z project will need to be managed in accordance with the Act and safety data sheets (SDS) will need to accompany all dangerous goods (hydrocarbon fuels, cleaning chemicals, paints, etc.).

## 2.14 South African Bureau of Standards (SABS)

### 2.14.1 Objectives

The South African National Standards (SANS) 10328:2008 "Methods for environmental noise impact assessments" is in accordance with the current National Environmental Management Act (NEMA) and prescribes the steps to follow in the process of conducting an Environmental Noise Impact Assessment. An EIA is being conducted as part of the Tumela Central Shaft Project and thus Section 8 should be followed "Environmental noise impact investigation and assessment", and the key points listed in section 8.7 should be addressed in the report:

> *h) an explanation, either by a brief description or by brief reference, of all measuring and calculation procedures that were followed, as well as any possible adjustments to existing measuring methods that had to be made, together with the results of the calculations;*
>
> *i) an explanation, either by a brief description or by brief reference, of all measuring or calculation methods (or both) that were used to determine existing and predicating rating levels, as well as other relevant information, including a statement of how the data were obtained and applied to determine the rating level of the area in question;*

### 2.14.2 Applicability

The noise levels stipulated in the SANS 10103:2008 - Typical Rating Levels for Noise in Districts guidelines are presented in **Table 2-4**. These values should be viewed as guidelines of typical noise levels that are likely to be experienced in the various land use zones. Noise levels within the direct vicinity of the mine will be assessed against the guideline for industrial districts, whilst the noise levels within communities (residential areas) will be assessed against the suburban guideline. Although these communities are not typically suburban, this is the most representative guideline as these communities cannot be classified as rural or urban.

**Table 2-4: Typical rating levels for noise in districts (adapted from SANS 10103:2008)**

| Type of District | Classification | Equivalent Continuous Rating level for Noise ($L_{Req,T}$) (dBA) Outdoors | | |
|---|---|---|---|---|
| | | Day – Night ($L_{R,dn}$) | Day-time ($L_{req,d}$) | Night-time ($L_{req,n}$) |
| a) Rural | A | 45 | 45 | 35 |
| b) Suburban (with little road traffic) | B | **50** | **50** | **40** |
| c) Urban | C | 55 | 55 | 45 |
| d) Urban (with one or more of the following: workshops, business premises and main roads) | D | 60 | 60 | 50 |
| e) Central Business Districts | E | 65 | 65 | 55 |
| f) Industrial District | F | **70** | **70** | **60** |
| Those guidelines highlighted in red and bold are the guidelines applicable to this noise assessment | | | | |

## 2.15 Provincial Ordinances and Municipal By-laws

In addition to national legislation, some of South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution of South Africa.

As noted in Sections 2.7 and 2.8 above, the proposed Block Z project is located in an area zoned for mining and therefore it is not anticipated that any protected areas or species lie within the same area; however this will be verified during the EIR phase and following the completion of a biodiversity and wetland impact assessment. The below legislation was considered during the scoping phase and if determined applicable, will be incorporated into the EIR phase for further consideration during the EMPRs compilation.

#### 2.15.1.1 Mpumalanga Parks Board Act (No. 6 of 1995)

The Mpumalanga Parks Board was established in terms of the Mpumalanga Parks Board Act (No.6 of 1995) as amended. The objectives of this Act are *inter alia* as follows:

- To provide effective conservation management of natural resources of the Mpumalanga Province;
- To promote the creation of economic and employment opportunities in pursuit of nature conservation and biodiversity;
- To ensure that natural systems, biodiversity and ecological functions and processes in the Mpumalanga Province are maintained;
- To determine and enforce limits to sustainable utilization of natural resources;
- To contribute to the advancement of scientific knowledge, and facilitate Technology transfer in respect of conservation; and
- Provide information and extension services to the public on conservation management, problem species, legal aspects of conservation and other conservation matters.

This Act makes provisions for the appointment of the Board of Directors to be responsible for the administration of the Mpumalanga nature conservation and biodiversity.

#### 2.15.1.2 Mpumalanga Conservation Act (No. 10 of 1998)

To consolidate and amend the laws relating to nature conservation within the Province and to provide for matters connected therewith. Aspects included in the Act include, but are not limited to, administration of wild animals, administration of fisheries, administration of indigenous plants, endangered and rare species of fauna and flora (including protected ecosystems, plants and unique communities).

#### 2.15.1.3 Mpumalanga Parks and Tourism Agency Act (No. 5 of 2005)

This Act provides for the establishment of the Mpumalanga Tourism and Parks Agency and for the management thereof by a Board; to provide for the sustainable development and improvement of the tourism industry in Mpumalanga; to provide for conservation management of the natural resources of Mpumalanga; to confer powers and functions upon the Agency; to provide for the registration of certain persons and entities directly involved in tourism; to provide for transitional arrangements; and to provide for matters incidental thereto.

## 2.16 Applicable Guidelines and Forums

Following from the above sections highlighting the potentially relevant national and provincial legislation, WSP also considered the following guidelines in terms of the activities associated with the proposed Block Z project.

## 2.16.1 Water

### 2.16.1.1 Best Practise Guideline Series

DWA developed a number of best practice guidelines for water resource protection in the South African mining industry. The best practice guidelines include international principles and approaches towards sustainability. There best practice guidelines include *viz.*:

- A water management hierarchy;
- General water management strategies, techniques and tools; and
- Guidelines for mining related activities and aspects.

The guidelines define and document best practices for water and waste management associated with mining and will be considered throughout the S&EIR Process and reporting.

## 2.16.2 Environmental Processes

### 2.16.2.1 Publication of Need and Desirability Guideline in terms of the Environmental Impact Assessment Regulations, 2010

This guideline provides a basic guide to the assessment of alternatives and impacts which are key components of an EIA process. The purpose of the document is to create a common understanding amongst the different role-players as to what is required in the assessment of alternatives and impacts.

### 2.16.2.2 EIA Guideline and Information Document Series: Guideline on Public Participation

In light of the promulgation of the amended EIA Regulations in terms of Chapter 5 of NEMA, on 18 June 2010, this guideline was developed, which forms part of the EIA Guideline and Information Document Series provides information and guidance for applicants, authorities and interested and affected parties on the public participation requirements in terms of NEMA, the EIA Regulations, the NEM:AQA, and the NEM:WA.

This guideline must be read together with the NEMA, the EIA Regulations, the relevant Specific Environmental Management Acts (SEMA) and its Regulations, and is not intended to be a substitute for the provisions of the NEMA, the SEMAs or the Regulations, in any way.

Both the guideline for public participation and the legislated requirements as set out in GNR 543 have been considered and will continue to be considered for the remainder of the proposed Block Z project. The requirements of GNR 543 were viewed as the minimum requirements and the guideline was considered where deemed pertinent to the proposed Block Z project.

### 2.16.2.3 Integrated Environmental Management Information Series: Impact Significance

This document is one of a series of overview information reports on the concepts of, and approaches to, integrated environmental management (IEM). This document focuses on the concept of significance in the identification, prediction and evaluation of impacts. The aim is to provide an overview of the key literature sources on the topic. Various definitions of the concept of significance are provided. An overview of formal methods to determine impact significance is given. Selected generic approaches to determine impact significance and thresholds of significance are described. This document does not prescribe or recommend specific methods, but rather provides an overview of the key criteria to consider in determining significance.

WSP have developed an impact significance rating methodology which takes into account the following aspects prior to formalising the overall impact significance rating: severity, duration, extent, frequency and probability. The five determinants are consolidated via the use of a predetermined calculation to provide a fully encompassing rating of significance per impact identified. This methodology will be implemented during the EIR phase and reported in the EIR and EMPR.

#### 2.16.2.4 Integrated Environmental Management Information Series 2: Scoping (Department of Environmental Affairs and Tourism)

This document was written to serve as an initial reference text during the scoping phase of the environmental assessment process. It includes a definition of scoping and an overview of its purpose and various methods available. The aim of this document is not to provide detailed guidelines on how to implement scoping but rather provide introductory information on the scoping process for government authorities, environmental practitioners, advocacy groups, non-governmental organizations (NGOs), industry, project proponents, academics, students and other stakeholders. This DSR was compiled in accordance with the regulations as stipulated in both NEMA GNR 543 and MPRDA GNR 527 and giving consideration to this guideline.

### 2.16.3 Biodiversity

As noted in Sections 2.7 and 2.8 above, the proposed Block Z project is located in an area zoned for mining and therefore it is not anticipated that any protected areas or species, areas of high ecological value or biodiversity occur within the same area. Nonetheless, the below management plans and forums were considered as part of this DSR and will be further considered during the EIR phase if relevant.

#### 2.16.3.1 Action Plan of the Environmental Initiative of the New Partnership of Africa's Development

This initiative was established in 2003 and encourages sustainable development and associated conservation and wise use of biodiversity in Africa. It has been recognised that a healthy and productive environment is a prerequisite for the success of New Partnership of Africa's Development (NEPAD), together with the need to systematically address and sustain ecosystems, biodiversity and wildlife. Six areas have been identified:

- Combating land degradation, drought and desertification;
- Conserving Africa's wetlands;
- Preventing and controlling invasive alien species;
- Conservation and sustainable use of coastal and marine resources;
- Combating climate change in Africa; and
- Cross-border conservation and management of natural resources.

As the proposed Block Z project may affect the local biodiversity, this action plan will be considered.

#### 2.16.3.2 Mining and Biodiversity Guideline

In Mining and Biodiversity Guideline (2013) was founded on six fundamental principles namely:

- Apply the law;
- Use the best available biodiversity information;
- Engage relevant stakeholders thoroughly;
- Use best practice in EIA to identify, assess and evaluate impacts on biodiversity;
- Apply the mitigation hierarchy when planning any mining-related activities and develop robust Environmental Management Programme reports (EMPr); and
- Ensure effective implementation of EMPrs, including adaptive management.

The guideline stipulates the requirements for both utilising and integrating biodiversity information and informants into the assessment of impacts (i.e. this S&EIA process) of mining on biodiversity and ecosystem services, and recommends good practice throughout the mining life cycle.

As the proposed Block Z project may affect the local biodiversity, this guideline document will inform the impact assess process to be completed as part of the EIR phase.

#### 2.16.3.3 The Mining and Biodiversity Forum of South Africa

The South African Mining and Biodiversity Forum (SAMBF) was established in 2005 to provide a platform for cross-sectorial interaction and co-operation in order to improve biodiversity conservation and management in the mining sector. A review of the status of biodiversity management in the mining industry in South Africa was recently published (Kuntonen-van't Riet, 2007). A need for the establishment of biodiversity guidelines was identified.

The good practice guidance on mining and biodiversity, published by the International Council for Mining and Minerals (ICMM) in consultation with the International Union for the Conservation of Nature (IUCN), was prepared for an international audience, and was therefore generic in nature, whilst the need for a guideline document specific to South Africa was identified by the South African mines. This draft guideline document was therefore compiled to incorporate local biodiversity information and best practice guidelines, specific to South Africa.

#### 2.16.3.4 National Spatial Biodiversity Assessment

The National Spatial Biodiversity Assessment (NSBA) was completed in 2004 and its main focus was on mainstreaming biodiversity priorities throughout the economy, and making links between biodiversity and socio – economic development. It is the first ever comprehensive spatial assessment of biodiversity throughout the country and has four components, dealing with the terrestrial, freshwater, estuarine and marine environments.

There are several possible approaches to biodiversity planning. The approach used most often in South Africa, including in the NSBA, is systematic biodiversity planning. It is based on three key principles:

- The need to conserve a representative sample of biodiversity pattern, such as species and habitats (the principle of representation).
- The need to conserve the ecological and evolutionary processes that allow biodiversity to persist over time (the principle of persistence).
- The need to set quantitative biodiversity targets that tell us how much of each biodiversity feature should be conserved in order to maintain functioning landscapes and seascapes.

#### 2.16.3.5 South Africa's National Biodiversity Strategy and Action Plan

According to the Minister of DEA in 2005, the National Biodiversity Strategy and Action Plan (NBSAP) is based on the recognition that South Africa is extremely rich in terms of biodiversity, but is also a developing country where the majority of the population resides in poverty. The NBSAP recognises that Biodiversity should be managed in the context of ensuring equitable benefits to people – both current and future generations. The NBSAP highlights five strategic objectives with a number of outcomes linked to five-year targets, indicators, and activities to achieve the outcomes.

Through the NSBA, it is recognised that biodiversity cannot be conserved through protected area networks only. All stakeholders, from private landowners and communities to business and industry must get involved in biodiversity management. NBSAP further identified mining as one of the activities that causes habitat transformation and degradation, and seriously threatens aquatic and terrestrial biodiversity. The strategy therefore promotes the inclusion of biodiversity considerations in mining regulations, guidelines and best practice codes to mitigate negative impacts and encourage sustainable mining practices through partnerships.

#### 2.16.3.6 Mpumalanga Parks and Tourism Agency Guidelines for Biodiversity Management

To promote national uniform standards in Environmental Management Programmes the Mpumalanga Tourism and Parks Agency (MTPA) have set minimum standards that need to be conformed to in terms of Biodiversity Assessments for development applications. These guidelines cover flora, fauna, aquatic and wetland systems.

#### 2.16.3.7 Mpumalanga Conservation Plan

Mpumalanga's Conservation Plan Version 2 (C-Plan 2) database (MPB, 2006), is intended to guide conservation and land-use decisions in support of sustainable development at a strategic level, have been identified. The C-Plan 2 maps the distribution of the Province's known biodiversity into categories according to ecological and biodiversity importance and their contribution to meeting the quantitative targets set for each biodiversity feature.

# 3 Approach to scoping phase

## 3.1 Process and Methodology

WSP is completing the scoping phase of the S&EIR process which has included a review of existing information, the gathering of baseline data (with the assistance of relevant specialists), stakeholder engagement and the compilation of a DSR (this report). Note that WSP has taken cognisance of the requirements of the MPRDA and NEMA when compiling the DSR. This is to ensure a comprehensive process in line with legislation and best practise.

Although a single DSR has been compiled to satisfy the requirements of both the MPRDA and the NEMA, the timeframes associated with public and government review and respective authorisation periods differs. In order to ensure a comprehensive and transparent process, WSP will be following the public review periods stipulated in the NEMA (i.e. 40 days for public review) which meets the MPRDA requirements. **Figure 1-3** illustrates the overall S&EIR process to be followed.

The objectives of the scoping phase are to:

- Comply with the relevant environmental legislation (legislation and guidelines);
- Ensure that the process is open and involves the applicant, authorities and a wide variety of stakeholders;
- Provide details of the EAP who compiled the report and the relevant experience to carry out scoping procedures;
- Describe the need for and desirability of the project;
- Describe the property and location on which the activity is to be undertaken;
- Describe the proposed activity;
- Identify feasible and reasonable alternatives that can be selected for further assessment;
- Identify and describe the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environmental may be affected;
- Describe the environmental issues and potential impacts, including cumulative impacts;
- Provide information on the methodology that will be adopted in assessing the potential impacts during the EIA process;
- Provide details of the stakeholder consultation process followed (see below); and
- Provide a plan of study for the EIA.

All requirements as contemplated in NEMA GNR 543, Section 28, and the MPRDA Regulation No. 26275, section 49, have been included in the Scoping Report. The Scoping Report:

- Includes details of the EAP responsible for preparing the report and the expertise of the EAP to carry out the Scoping procedures (GNR 543, Section 28 (a)) (**Section 1**);
- Identifies all legislation and guidelines that have been considered in the preparation of the Scoping Report (GNR 543, Section 28 (f)) (**Section 2**);
- Describes the methodology applied to conduct scoping (GNR 527, Regulation 49(1)(a)) (**Section 3**);
- Describes the existing and proposed activities and reasonable alternatives, including the advantages and disadvantages of the alternatives (GNR 543, Section 28 (b, c and j)) (**Section 6**);
- Identifies and describes reasonable land use or development alternatives to the proposed operation, alternative means of carrying out the proposed operation and the consequences of not proceeding with the proposed operation (GNR 527, Regulation 49(1)(d)) (**Section 8**);
- Describes the property on which the activity(s) is to take place (GNR 543, Section 28 (d)) (**Section 5** and **Section 7**);

- Describes the most appropriate procedure to plan and develop the proposed mining operation (GNR 527, Regulation 49(1)(e)) (**Section 5**);
- Describes the need and desirability of the activity(s) (GNR 543, Section 28 (i)) (**Section 4**);
- Describes the environment (at a screening level) that may be affected by the activity(s) and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the activity(s) (GNR 543, Section 28 (e)) (**Section 7**);
- Describes the existing status of the environment prior to the mining operation (GNR 527, Regulation 49(1)(b)) (**Section 7**);
- Describes the environmental issues and potential impacts, including cumulative impacts that have been identified (GNR 543, Section 28 (g)) (**Section 8**);
- Identifies and describes the anticipated environmental, social and cultural impacts, including the cumulative effects, where applicable (GNR 527, Regulation 49(1)(c)) (**Section 8**);
- Indicates the methodology that will be adopted in assessing the potential impacts that have been identified, including any specialist studies or specialised processes that will be undertaken (GNR 543, Section 28 (n)) (**Section 8**);
- Details the public participation initiation phase for the S&EIR process (GNR 543, Section 28 (h)) (**Section 4**);
- Describes the process of engagement of identified interested and affected persons. Including their views and concerns (GNR 527, Regulation 49(1)(f)) (**Section 4**);
- Includes a Plan of Study (PoS) for the EIR phase (GNR 543, Section 28 (n)) (**Section 9**); and
- Describes the nature and extent of further investigations required in the environmental impact assessment report (GNR 527, Regulation 49(1)(g)) (**Section 9**).

## 3.2 Application phase

In order to comply with all relevant environmental authorisations pertaining to the proposed project, WSP submitted a number of applications and formal notification letters to relevant departments. **Table 3-1** illustrates applications and notification letters that have been submitted. A copy of all application forms and proofs of acknowledge (where available) are available in **Appendix A**.

**Table 3-1: Authority Application and Notification Letter(s)**

| Department | Application / Notification Letter | Date submitted | Refer Number |
|---|---|---|---|
| **MDEDET** | Application for environmental authorisation in line with the NEMA EIA Regulations of 2010 | 16 May 2014 | 17/2/3N-362 |
| **DWA** | Notification letter and request for pre-application consultation | 31 March 2014 | - |
| | WULA as required by the NWA | January 2015 | |
| **DMR** | Notification letter and request for pre-application consultation | 26 May 2014 | - |
| | Mining Right Application | September 2014 | - |

All commenting authorities were notified of the proposed Block Z project by email, fax and telephone as part of the stakeholder notification process detail in **Section 3.4**.

Furthermore, the WULA and mining rights applications will be submitted to the DWA and DMR, respectively, in due course (during the S&EIR process).

## 3.3 Technical scoping

### 3.3.1 Process Initiation

The S&EIA process was initiated on 28 January 2014 between Isibonelo Colliery and WSP, followed by a specialist initiation meeting on 12 February 2014. The initiation process confirmed the S&EIA approach, project scheduling, baseline data collation and reporting requirements necessary for completion of the scoping phase. In addition, the competent authorities responsible for reviewing the reporting and authorisation processes were identified and pre-application meetings were held (**Table 3-2**) with each to provide proposed project detail and ratify the way forward.

**Table 3-2: Competent Authority Communication and Meetings**

| Authority | Email | Telephonic | Meeting |
|---|---|---|---|
| **MDEDET** | 17 and 27 February, and 31 March 2014 | May 2014 | DNR* |
| **DWA** | 17 February 2014 | April 2014 | 24 April and 13 June 2014 |
| **DMR** | 17 February 2014 | April 2014 | 16 April 2014 |

**Meeting was requested but did not receive a response from MDEDET.*

### 3.3.2 Preliminary investigation

The scoping phase of the S&EIR process aims to identify what information and data will be required in order to assess in detail the environmental (including socio-economic) impacts of a project. The scoping phase is designed to focus subsequent data collection and investigations on issues of concern and importance. The scoping phase therefore includes not only a thorough review of environmental baseline data relevant to the project site and receiving environment, but also a preliminary identification of environmental issues and impacts, including direct, indirect and cumulative impacts.

The preliminary investigations undertaken during the scoping phase included aspects such as the physical, biological and social environment. The information in the DSR was compiled from various sources, including Isibonelo Colliery, site visits, interviews and meetings with authorities and stakeholders, and literature reviews. Both the positive and negative potential impacts that the proposed mining operations may have on the environment are identified and discussed.

For the proposed Block Z project, a number of specialist baseline site surveys and desktop studies were commissioned during the scoping phase, results of which are incorporated into the environmental baseline (**Section 7**) and used to identify potential impacts (**Section 8**). WSP appointed an independent and specialised team of scientists to undertake these relevant studies, comprising both of in-house and external sub consultants. All of these specialists will be engaged during the EIR phase to provide further assessment of impacts and provide recommendations for management and mitigation. The specialist studies scopes of work to be completed in the EIR phase is further detailed in **Section 9**).

**Table 3-3** details the site visit, and initial investigation and baseline reporting undertaken by the EAP and specialists during the scoping phase.

**Table 3-3: EAP and specialist site visit and baseline reporting**

| Component | Company | Contact person | Site Visit | Baseline Reporting |
|---|---|---|---|---|
| S&EIA | WSP | Janna Bedford-Owen | A preliminary site visit was performed by the WSP S&EIA and Air Quality and Noise project teams on 28 February 2014. | - |
| | | Zaffar Hussain | | - |
| Air quality & Noise | | Patricia Mathabathe | | 3 April 2014 |
| | | Nicola Enslin | - | |

| Component | Company | Contact person | Site Visit | Baseline Reporting |
|---|---|---|---|---|
| Hydrology | | Greg Matthews | 2 and 3 April 2014 | 4 April 2014 |
| | | Andrew Gemmel | | |
| Social | | Danielle Michel | A preliminary site visit was performed by the WSP Social Specialist team on 28 February 2014 | 11 April 2014 |
| Blasting and Vibration | Blast management | Danie Zeeman | April 2014 | 25 March 2014 |
| Heritage (archaeology) | Archaetnos CC | Dr Anton van Vollenhoven | 31 March – 4 April 2014 | 1 April and updated on 14 April 2014 |
| Biodiversity and Wetlands | Natural Scientific Services CC | Kathy Taggart | 31 March – 4 April 2014 | 31 March and update 3 June 2014 |
| | | Susan Abell | | |
| Geohydrology | JMA | Jaco van der Berg | May 2014 | TBC |
| Land capability & land use | Earth Science Solutions | Ian Jones | April 2014 | 24 March and updated 2 June 2014 |

The stakeholder engagement process is central to the investigation of environmental impacts as it is important to provide interested and / or affected stakeholders with an opportunity to identify issues relevant to them and to ensure that local knowledge, needs and values are understood and utilised. The views of stakeholders are included in the DSR and will be assessed to either validate the appropriateness of the specialist studies that are being undertaken or to indicate where additional specialist studies may be required to ensure that issues are adequately addressed. Issues and impacts identified in the DSR will be described in detail and assessed during the EIR phase and mitigation methods will discussed in detail (within the EMPR). The EMPR will also include the implementation and monitoring of the management / mitigation measures.

## 3.4 Stakeholder Engagement

The stakeholder engagement process was undertaken by WSP in a comprehensive inclusive and transparent manner. Although requirements of both the MPRDA and NEMA have been taken into consideration, WSP perceives that the requirements of the NEMA pertaining to stakeholder engagement process are more stringent comprehensive than the requirements of the MPRDA. Therefore WSP has followed the NEMA GNR 543 requirements for stakeholder engagement.

The NEMA EIA Regulations (Sections 54 – 57) require that an inclusive, transparent process of engagement – sharing of information, receipt of comments, expression of issues and concerns, and response and feedback regarding issues and concerns – be undertaken that allows participation by any and all persons and entities who may be affected by and / or have an interest in a proposed Block Z project. Full details of the process undertaken are presented in Chapter 10 of this report.

The following activities are undertaken as part of the scoping phase and subsequent stakeholder engagement, and a further detailed in the sections below:

- Stakeholder identification;
- Authority notification;
- Stakeholder notification;
- Stakeholder meetings;
- Compilation of an Issues Trail; and
- Public review of the DSR.

### 3.4.1 Stakeholder Identification

The identification and registration of stakeholders has and will be an ongoing process during the course of this S&EIR process. Neighbouring farms as well as other stakeholders were identified as interested and / or affected parties. Specific attention will be paid to the local organisations, commenting government departments and other active organisations in the area.

These stakeholders were, where possible, individually notified of the proposed Block Z project. WSP also notified the public of the proposed Block Z project through the erection of site notices and publication of newspaper advertisements. WSP considers that an effective notification process has been undertaken to date which satisfies the requirements of the NEMA.

WSP has developed an electronic database for the proposed Block Z project which includes details of all stakeholders who have requested to be notified of the progress of the S&EIR process. A copy of the stakeholder database is included in **Appendix B1**.

Please note that contact details of all stakeholders have not been included in the database for confidentiality reasons.

Stakeholders were identified and will continue to be identified through several mechanisms. These include:

- Utilising the existing Isibonelo Colliery database from other projects at the mine;
- Networking with local business owners, non-governmental agencies, community based organisations, and local council representatives;
- Field work in and around the project area;
- Advertising in the press;
- Placement of community notices;
- Distribution of background information documents;
- Discussions with local community and relevant ward councillors;
- Completed comment sheets; and
- Attendance registers at meetings.

All stakeholders identified to date have been registered on the project stakeholder database. The EAP endeavoured to ensure that individuals / organisations from referrals and networking were notified of the proposed Block Z project. Stakeholders were identified at the horizontal (geographical) and vertical extent (organisations level). Refer to **Appendix B1** for a list of stakeholders captured in the project database.

It should be noted that only registered stakeholders are entitled to comment, in writing, on all written submissions made to the competent authority by the applicant or the EAP managing an application, and to bring to the attention of the competent authority any issues which that party believes may be of significance to the consideration of the application, provided that comments are submitted within the timeframes that have been approved or set by the competent authority or any extension of a timeframe agreed to by the applicant or EAP.

#### 3.4.1.1 Roles and Responsibilities of Registered Stakeholders

Registered stakeholders have the right to bring to the attention of the competent authority any issues that they believe may be of significance to the consideration of the application. The rights of stakeholder are qualified by certain obligations, namely:

- Stakeholders must ensure that their comments are submitted within the timeframes that have been approved by the DEA, or within any extension of a timeframe agreed by the Proponent, EAP or competent authorities;
- Serve a copy of the comments submitted directly to the competent authorities, the Proponent or the EAP; and

- Disclose to the EAP any direct business, financial, personal or other interest that they might have in the approval or refusal of the application.

The roles of stakeholders in the process usually include one or more of the following:

- Assisting in the identification and prioritisation of relevant issues that need to be investigated;
- Making suggestions on alternatives and means of preventing, minimising and managing negative impacts and enhancing the proposed Block Z project benefits;
- Assisting in or commenting on the development of mutually acceptable criteria for the evaluation of decision options;
- Give timeous responses to correspondence;
- Contributing information on public needs, values and expectations;
- Contributing local and traditional knowledge; and
- Verifying that their issues have been considered.

### 3.4.2 Stakeholder Notification

#### 3.4.2.1 Newspaper Advertisements

The NEMA EIA Regulations (GNR 543) require that the proposed Block Z project is advertised in a local newspaper to notify the public about the project and invite stakeholders to register. WSP published three advertisements (one in English, Afrikaans and Zulu) in a local and regional newspaper as detailed in **Table 3-4.** Copies of the advertisements and as published in the said newspapers are contained in **Appendix B2**.

Table 3-4: Date on which the Adverts were published

| Newspaper | Publication Date | Language |
| --- | --- | --- |
| The Sowetan | 23 June 2013 | English, Afrikaans and IsiZulu |
| The Echo | 25 June 2014 | English, Afrikaans and IsiZulu |
| The Ridge | 25 June 2014 | English, Afrikaans and IsiZulu |

#### 3.4.2.2 Site Notices

The NEMA EIA Regulations (GNR 543) require that a site notice be fixed at a place conspicuous to the public at the boundary or on the fence of the site where the activity to which the application relates is to be undertaken. WSP erected site notices on 23 June 2014. All site notices erected were in English, Afrikaans and Zulu.

**Table 3-5** and **Figure 3-1** provides the detail concerning these locations. Copies of the site notices are included in **Appendix B3**.

Table 3-5: Site Notice Locations

| Site Notice | Address | Co-ordinates | Photographs |
|---|---|---|---|
| **Site Notice 1** | Main entrance to Isibonelo Colliery offices. | 26°24'35.71"S<br>29°12'03.70"E |  |
| **Site Notice 2** | Trichardt (Intersection of Barney Molokwane & unnamed road) | 26°29'05.41"S<br>29°13'33.33"E |  |
| **Site Notice 3** | eMalahleni Local Municipality (Quintin Street, Kriel, South Africa) | 26°14'50.85"S<br>29°15'47.99"E |  |

| Site Notice | Address | Co-ordinates | Photographs |
| --- | --- | --- | --- |
| **Site Notice 4** | Isibonelo Colliery Reception notice board | 26°24'34.32"S<br>29°12'16.94"E |  |
| **Site Notice 5** | Secunda Public Library | 26°30'11.80"S<br>29°11'04.81"E |  |

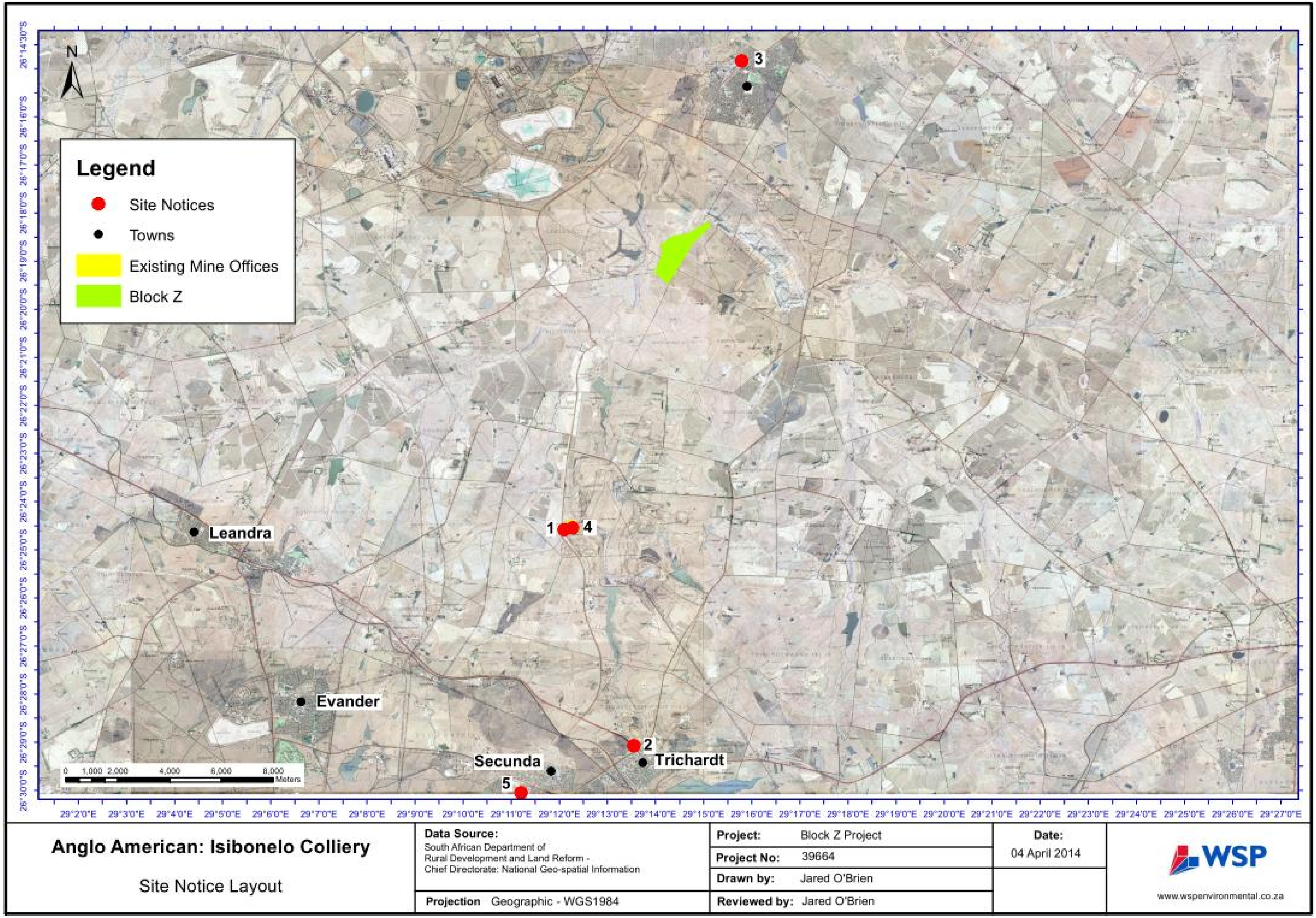



**Figure 3-1: Site Notice location (June 2014)**

#### 3.4.2.3 Background Information Document

The NEMA EIA Regulations (GNR 543) require written notice must be given to the:

a) Owner or person in control of the land if the applicant is not the owner;

b) Occupiers of the site where the activity is to be undertaken;

c) Owners and occupiers of land adjacent to the site where the activity is to be undertaken;

d) The municipal councillor of the ward in which the activity is to be undertaken as well as any organisation of ratepayers that represent the community in the area;

e) The municipality which has jurisdiction in the area;

f) Any organ of state having jurisdiction in respect of any aspect of the activity; and

g) Any other party as required by the competent authority.

The purpose of a background information document (BID) was to provide stakeholders with introductory information on the applications, the S&EIR process and the public participation process. The BID also provided stakeholders who were interested in the proposed Block Z project with the opportunity to register by way of completing the registration sheet distributed with the BID. Information on the registration sheet was used to register stakeholders in a stakeholder database so that they continue to receive future project-related information and invitations to meetings. The registration sheet included a section for comments and issues, which allowed stakeholders the opportunity to provide the EAP with written comments and feedback. Furthermore, letters of invitation were also compiled and sent with the BIDs.

As with the other stakeholder notification materials, the BID was translated into English, Afrikaans and Zulu. Copies of the BIDs are contained in **Appendix B4**.

In order to ensure an encompassing notification process, BIDs and notification letters were distributed via:

- Email, on 20 June 2014;
- Facsimile, on 20 June 2014
- Hand delivery, on 23 June 2014; and
- Registered post, on 24 June 2014.

In addition to the above, copies of the BID were distributed placed at the following locations:

- Isibonelo Colliery reception;
- eMalahleni Local Municipality; and
- Secunda Public Library.

See **Figure 3-1** for locations.

### 3.4.3 Public Meeting

One public meeting is to take place for the proposed Block Z project during the scoping phase, specifically during the DSR public review process. The aim of the meeting is to detail the proposed Block Z project and provide an opportunity for stakeholders to raise issues, concerns and queries related thereto. The meeting will be presented in English and any questions, concerns and issues will be recorded. Copies of the meeting minutes will be circulated to meeting attendees and contained as an appendix to the Final Scoping Report for submission to the competent authorities.

### 3.4.4 Comments and Responses

All concerns, comments, viewpoints and questions (collectively referred to as 'issues') received from stakeholders and the associated responses from WSP and the project team, have and will continued to be, recorded in the comments and response table. WSP has recorded all comments received, to date, for the proposed Block Z project; including:

- List of all issues raised;
- Record of who raised the issues;
- Record of where the issues were raised;
- Record of the date on which the issue was raised; and
- Response to the issues.

A copy of the comments and response report / table is included in **Appendix B1**.

### 3.4.5 Public Review of the Draft Scoping Report

The DSR has been made available to stakeholders and authorities for review, prior to finalisation and submission of the final report for review by the competent authorities. All registered stakeholders and authorising / commenting state departments have been notified of the public review period as well as the locations of the DSRs via fax and email, post, hand-outs. All stakeholders and authorities have been allocated 40 days to review the DSR.

The DSR was made available for public review from **8 August – 12 September 2014**, at the following venues:

- Isibonelo Colliery Reception;
- Bethal Public Library (Danie Nortje road, Bethal);
- Secunda Public Library (Lourens Muller Street, Secunda 2302);
- WSP Website (http://secol1web01.se.wspgroup.com/en/WSP-Africa/What-we-do/Services/All-Services-A-Z/Technical-Reports/)

A copy of the public review notification letter is included in **Appendix B5**.

### 3.4.6 Ongoing Consultation and Engagement

In addition to the public documents distributed to stakeholders, there will be ongoing communication between the proponent, WSP and stakeholders throughout the S&EIR process. These interactions include the following:

- In addition to the project announcement letters, a letter will be sent out to all registered stakeholders providing them with an update of the proposed Block Z project once the FSR has been approved;
- Interactions with stakeholders will take place in English and Afrikaans as required;
- Feedback to stakeholders, individually and collectively;
- Written responses (email, faxes or letters) will be provided to stakeholders acknowledging issues and providing information requested (dependent on availability); and
- As per the GNR 543, particular attention will be paid to landowners, and neighbouring communities, specifically where literacy levels and language barriers may be an issue.

The consultation with all stakeholders will continue into the EIR phase. Consultation will continue and will include:

- Distribution of all project information and findings to stakeholders;
- Review of the draft EIR;
- EIA feedback via a public meeting; and
- Publication of commencement of the EIA phase in local and regional newspapers.

## 3.5 Submission and decision-making

The competent authorities will be allocated 30 days to review the Final Scoping Report (FSR). The FSR will be placed on stakeholder review for a reasonable time period during the competent authority's final review and decision-making process. Any comments received during this period will be forwarded to the delegated authority by means of an "updated comment and response report". If the delegated competent authorities do not accept or reject the report within 30 days, they will receive an additional 60 days to evaluate the FSR and issue a decision to proceed onto the next phase, the EIR phase.

# 4 Need and Desirability

In South Africa AAC wholly owns and operates seven mines, of which six of the mines collectively supply 23 million tonnes per annum (Mtpa) of thermal coal to both export and local markets. Isibonelo Colliery produces 5 Mtpa of coal for SSF as part of a 20 year supply contract.

SSF operates the world's only commercial coal-based synthetic fuels manufacturing facility, producing synthesis gas (syngas) through coal gasification and natural gas reforming. Simply, the coal is crushed, blended to a satisfactory standardised quality, and gasified at a temperature of 1300°C. (Sasol n.d.).

Sasol converts this syngas into synthetic fuel components, pipeline gas and chemical feedstock for the downstream production of solvents, polymers, comonomers and other chemicals. Carbon is produced for the recarburiser, aluminium, electrode and cathodic production markets.

Isibonelo Colliery was officially opened in April 2005 and was established following the signing of contractual agreements between AAC and Sasol to jointly develop the Kriel South coal reserve. The infrastructure and employees of the operation were acquired from Sasol resulting in the first successful complete transfer of equipment, assets and labour force.

Following discussions between Sasol and Isibonelo Colliery, it was agreed that the area previously proposed for mining by Isibonelo Colliery (south of the Central Pit) will instead be mined by Sasol at a future date. Subsequently, Isibonelo Colliery was forced to identify a new feasible alternative to mine. The new area identified by Isibonelo Colliery is the proposed Block Z area which is anticipated to provide similar volumes of coal at a comparable operational cost.

Although, it is understood that the proposed mining of Block Z will not increase Isibonelo Colliery's existing life of mine (LoM); it will increase its annual production rate and ensure that contractual obligations to SSF are fulfilled. By ensuring that these contractual arrangements are fulfilled, Isibonelo Colliery will continue to contribute to AAC and indirectly ensure the SSF continues to operate. The continued and improving operation of these two large global companies has numerous economic benefits, especially in the South African market.

Isibonelo Colliery currently employs 316 permanent staff; while a further 887 individuals are employed on a contractual basis. **Table 4-1** presents the percentage of the current Isibonelo Colliery employees comprising previously disadvantaged individuals (as of June 2014). Isibonelo Colliery noted that an estimated 27% of the current workforce will be dedicated to the proposed Block Z project.

**Table 4-1: Isbonelo Colliery HDSA Employee Percentages**

| Position | Isibonelo Colliery HDSA % | Mining Charter Requirement |
|---|---|---|
| Senior Management | 40% | 40% |
| Professionally Qualified | 48% | 40% |
| Junior Management | 58% | 40% |
| Skilled | 64% | 40% |
| Unskilled | 94% | 40% |

The mining activity will also realise several advantages for the local communities in the region by allowing Isibonelo Colliery to implement the (approved) Social and Labour Plan (SLP); as well as by providing business opportunities for secondary industries such as contractors, manufacturers and suppliers including, *inter alia*:

- Continued employment of contractors and existing staff;
- Continued utilisation of local businesses to supply the operation e.g.:
  - Fuel;
  - Machinery and equipment; and
  - Supplies viz. fertilizer, food, chemicals etc.
- Contribution to the local economy; and

- Undisrupted operation at SSF.

Following on from the above, Isibonelo Colliery through the mining of the proposed Block Z, is and will be able to demonstrate alignment of its operations with the Broad Based Socio Economic Empowerment Charter for the South African Mining Industry (2010) (GNR 838), hereafter referred to as "the Mining Charter". This is a government instrument designed to effect sustainable growth and meaningful transformation of the mining industry. The Mining Charter objectives are detailed below along with a brief statement noting how Isibonelo Colliery and the proposed Block Z fulfil such:

- "*To promote equitable access to the nations mineral resources to all the people of South Africa*" – Isibonelo Colliery and Sasols agreement to develop the Kriel reserve was a first of its kind and demonstrates mineral resource sharing;
- "*To substantially and meaningfully expand opportunities for Historically Disadvantaged South Africans (HDSA) to enter the mining and metals industry and to benefit from the exploitation of the nation's mineral resources*" – Isibonelo Colliery's HDSA is presented in **Table 4-1** and shows continual improvement through implementation of the SLP objectives and action plans;
- "*To utilise and expand the existing skills base for the empowerment of HDSA and to serve the community*" – Isibonelo Colliery provides in-house training and skills transfer as part of its certified ISO Integrated Management System, more specifically the procedures developed in support of this system e.g. IIMS SP 1.006 Training, Competency & Awareness procedure;
- "*To promote employment and advance the social and economic welfare of mine communities and major labour sending areas*" – as previously mentioned, Isibonelo Colliery employs 316 direct staff from the local area. In addition, the SLP seeks to advance the socio-economic welfare of Isibonelo Colliery employees and local communities;
- "*To promote beneficiation of South Africa's mineral commodities*" – the supply agreement between Isibonelo Colliery and Sasol provide for this;
- "*Promote sustainable development and growth of the mining industry*" AAC roll-out of $ECO_2$MAN or the energy and $CO_2$ management programme aimed at managing energy consumption, greenhouse gas footprint and climate change objectives. Further to this, AAC is proposing to develop more solar power installations aimed at reducing the carbon footprints of its collieries in the Mpumalanga Province. Kriel Colliery, Greenside Colliery and Goedehoop Colliery have already started such initiatives, demonstrating continued investment in new, more sustainable technologies by AAC (Kotze, 2014).

# 5 Project Description

## 5.1 Background

Isibonelo Colliery is situated in the Mpumalanga Province between the towns of Kinross, Secunda, Bethal and Kriel near the northern margin of the Highveld coalfield of Mpumalanga (**Figure 5-1**).

Bituminous coal seams hosted by the sedimentary strata in the Isibonelo Colliery Mining Licence area include, from the base up, the No 1, 2, 3, 4 and 5 seams. Only the No 4 seam is presently considered to be economically viable, with an average opencast depth of 40m and a thickness of 5,6m.

Mine development began in early 2005 with the excavation of a box cut 100m behind a berm using the truck and shovel method, and a dragline was relocated from the Syferfontein mine. The dragline walkway was originally developed adjacent to the Sasol's overland conveyor servitude. This dragline walkway was subsequently developed into the service and pit access roads presently still operational. Once the box cut was established a second dragline was incorporated into the mining operations.

Isibonelo Colliery currently operates three open cast pits, namely the North Pit, Central Pit and South Pit.

### 5.1.1 Proposed Block Z Area

The proposed Block Z area is approximately 141 ha with a coal capacity of 9 million tons, and is located adjacent to the current Isibonelo Colliery mining operations, more specifically west of the North Pit, north of Sasols underground mine, east of the Dwars-in-die-weg-spruit and AAC: Kriel Colliery (Kriel Colliery) operations.

### 5.1.2 Sasol Coal Reserve Swap

Isibonelo Colliery has an existing long term contract with SSF for the supply of a fixed volume of coal per annum. Isibonelo Colliery initially proposed to mine an area that lies south of the Central Pit to fulfil these contractual obligations. Following discussions between Sasol and Isibonelo Colliery, it was agreed that this area previously proposed for mining by Isibonelo Colliery (south of the Central Pit) will instead be mined by Sasol at a future date and Isibonelo Colliery would identify another area for mining.

The new area identified by Isibonelo Colliery is the proposed Block Z area as it is anticipated to provide similar volumes of coal at a comparable operational cost, as covers a similar surface area. The proposed Block Z area was previously proposed for underground mining by Kriel Colliery.

Once it was established that the Block Z area could not be economically mined by Kriel Colliery, a decision was made by AAC to perform a coal reserve swap. The swap entailed the transfer of the mining right for proposed Block Z area from Kriel Colliery to Isibonelo Colliery.

It is understood that the proposed mining of Block Z will not increase Isibonelo Colliery's existing life of mine (LoM) however it will increase its annual production rate and ensure contractual obligations to SSF are fulfilled.

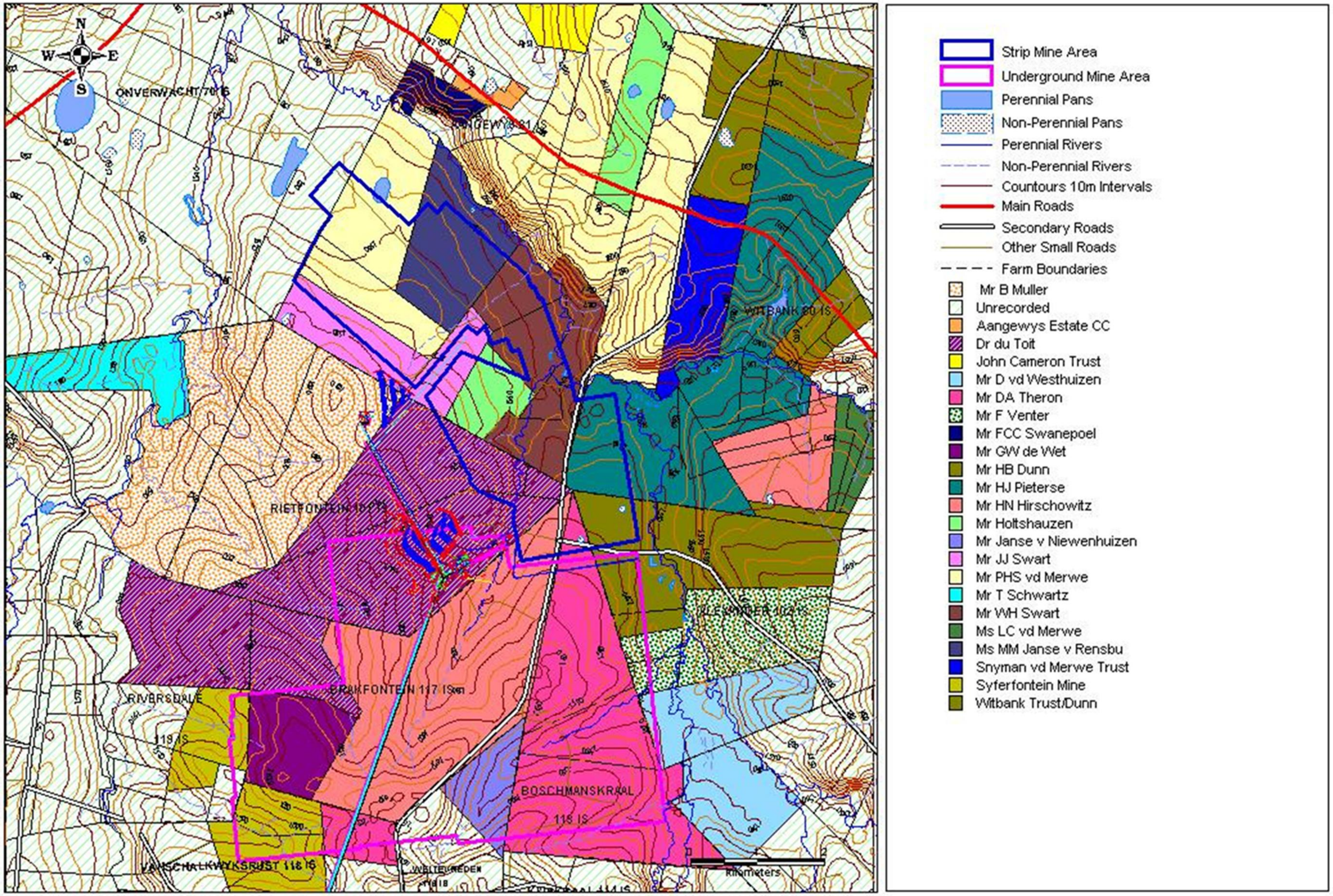


**Figure 5-1: Existing surface and mineral rights area as per the mining license (Consolidated EMPR for Isibonelo Colliery, 2012)**

## 5.2 Mining Methodologies

### 5.2.1 Typical Mining Methodologies

There are various methods employed by mining operations to extract minerals from the earth, including underground and surface mining. Surface mining is predominantly employed when the ore body proposed for extraction is located close the surface and several techniques can be implemented to expose the desired ore body, namely strip mining and contour mining, as well as open cast / pit mining.

Strip mining is the process of removing overburden (surface material covering the mineral deposit i.e. coal) in long strips in order to expose the coal for extraction. The overburden removed is then stored before being placed into the previously excavated strip prior to rehabilitation.

Open cast / pit mines are usually dug on benches and gradually expanded. The pit walls are stepped downward until the required depth is reached. This is usually the depth at which the resource material (coal) is exhausted or it becomes economically unviable to continue mining. The incline or vertical section of a pit wall 'step' is referred to as a batter while the horizontal section is referred to as the bench. The bench is used to describe vertical levels of the pit and are dug at the desired intervals as dictated by ground stability and the selected machinery or equipment to be utilised. In many case, the pit walls are dug at an angle less than vertical so as to prevent / minimise damage from potential collapse.

The mining methodologies employed by IC are a combination of strip and open cast pit mining.

IC further categorises its' overburden material into hard or soft (below refers); this categorisation ultimately determines which mining technique and what equipment will be used for its removal.

- Softs overburden: lesser composition of rock and easier to remove (free digging); and
- Hards overburden: higher composition of rock making it more difficult to remove.

Isibonelo Colliery's' existing mine infrastructure and mining methodologies have been further detailed in Sections 5.2.2, while the proposed Block Z infrastructure and mining methodologies are detailed in Section 5.2.3.

As noted in the section above, Isibonelo Colliery operates three open cast pits and employs a combination of strip and open cast mining methodologies.

### 5.2.2 Isibonelo Colliery Current Mining Methodology

#### 5.2.2.1 Strip Mining

Coal is exposed by removing the overburden via dragline or truck and shovel operations; prior to removing the overburden, the topsoil is stripped and stored separately for re-use later during rehabilitation of the pit(s).

The dragline (**Figure 5-3: f**) (a large scale digging machine) is used by Isibonelo Colliery to remove hard overburden through bench striping, while truck and shovel techniques are used to remove softer overburden materials (**Figure 5-3: i – j**). One dragline mines on either side of the ramp in the South Pit, and the second dragline mines the North and Central Pits. The Central Pit is typically mined from South to North while the north and south pit typically follow a southerly mining direction (away from the Steenkoolspruit).

A 'chop' limit of 15m and a maximum dig depth of 42m is applied for the draglines, along with double benching in order to maximise draglines' utilisation during stripping, over and above the more expensive truck and shovel techniques, during the removal of hard overburden materials. Isibonelo Colliery typically follows two approaches during stripping and benching, namely:

- Method 1: Is a single bench operation where all soft overburden is stripped by truck and shovel equipment and the hard overburden is bench stripped by the dragline. Some hard overburden can also be stripped in the isolated deep overburden blocks.

- Method 2: Is a double bench operation applied in the deep portions (where the dragline hard overburden bench exceeds the 42m depth / dig limit for the Marion 8200) of the pit.

As with many mining operations implementing open cast, strip, benching etc. mining methods, IC completes a multi-phased approach in that construction, operation, decommissioning and rehabilitation are undertaken concurrently. For purposes of this report, these phases have been generically defined below.

- Construction / Preparation: the preparatory works / activities typically associated with the development / establishment of a new pit but not including the extraction of coal;
- Operation: the activities associated with the extraction of coal from an open cast / pit;
- Decommissioning: the activities associated with the removal / dismantling of machinery / equipment / infrastructure no long necessary to the operation;
- Rehabilitation: the activities associated with the initial backfilling, levelling and placement of topsoil to agreed level(s) (as per EMPR), fertiliser, re-vegetation and maintenance thereof;
- Closure: Cessation of mining operations in totality and the closure certificate has been applied for or issued.

All the above phases include continued monitoring and management of environmental aspects throughout.

#### 5.2.2.2 Soil Handling

Overburden comprises the surface materials overlaying the mineral deposit / coal that require removal, while inter-burden refers to the materials located between mineral deposits. Spoils refers to the excavated materials (i.e. removed overburden) that will be used during rehabilitation.

In order to facilitate rehabilitation of open pits, IC undertakes sequential stripping and rehabilitation practices (**Figure 5-3: k**):

- Topsoil (the most fertile soils usually containing the vegetation seed bank) is removed first and is either stored in designated areas, or undergoes live placement. Live placement is the process of removing topsoil and immediately relocating this soil to a backfilled and levelled pit for rehabilitation purposes. IC removes topsoil sequentially along the high wall side in winter (in advance of mining) and places it on the levelled spoils. Topsoil is placed to minimum depth of 0.6m, shaped, fertilised and sown with an appropriate grass seed mix.
- Overburden / spoils is removed via the dragline or truck and shovel and stockpiled for reuse as fill material during pit closure. The backfilled pit is then levelled, using a dragline and bulldozer, and ready to receive topsoil as part of the rehabilitation plans.

#### 5.2.2.3 Topsoil Berms

Prior to the commencement of the open cast / pit operations at Isibonelo Colliery, a berm was constructed along the Steenkoolspruit for the purpose of flood management. The berm was constructed from wetland soils stripped to a depth of 500mm from the spoils laydown area. The berm is approximately 3m high with an average slope of 1:5 on the Steenkoolspruit side, with the foot slope approximately 1:7 rising to a crest slope of 1:3.

During the initial mining operations, spoils / overburden removed from the open cast / pit were placed between this berm and the edge of the open cast / pit, ensuring that it does not encroach over the top of the berm into the river. No carbonaceous or potentially polluting material was used for berm construction and the berm has subsequently been re-vegetated to prevent erosion.

Topsoil stripped ahead of mining which cannot undergo live placement is stored in designated areas within the mine lease area (**Figure 5-4**). Isibonelo Colliery understands the importance of topsoil in rehabilitation and as such the volumes and stockpile location, as well as the quantities placed for rehabilitation, are monitored and recorded regularly.

#### 5.2.2.4 Drilling and Blasting

Following from the above stripping, the exposed coal is drilled and blasted, before being placed into haul trucks for transportation to the crushed plant.

In some instances, the drilling and blasting of hard overburden materials is required. In these, instances, the drilling and blasting of hard overburden and inter-burden (material occurring in-between ore bodies, in this case between coal) occurs in advance of the dragline.

- Overburden and Inter-burden Blasting

All overburden and inter-burden blasting is sequential, meaning the initiation of a blast within a single hole is delayed until the hole before has already been initiated and blasted i.e. during a blast event only a single hole will fire at a time.

The blast hole diameters do not exceed 271mm and the charge mass per hole does not exceed 1200kg. If the proposed holes are so deep that the charge mass will exceed 1200kg then the charge density or the hole diameter will be reduced to limit the charge mass per hole to 1200kg.

To minimise air blast, new technologies such as electronic detonators are being tested by mining operations. Furthermore, holes are set to fire progressively to the south away from sensitive areas to the north.

- Coal blasting

Hole diameters for coal blasting do not exceed 127mm. In areas where 20 hole diameters of stemming cannot be applied because the holes are too short, hole diameters are reduced accordingly.

#### 5.2.2.5 Coal processing – Crusher Plant

The extracted coal is delivered to the primary in-pit sizing plant prior to placement on the overland conveyor and relocation to the IC surge bunker and emergency stockpile area located near IC’s offices and SSF conveyor system. The coal in the said bunker is then handed over to Sasol and transported to the SSF Secunda Complex via Sasol’s overland conveyor (**Figure 5-3: l**).

The crusher plant is located 5 - 8m below ground-level with the overland conveyor exiting to ground-level at a 16 degree angle. The tipping ramp is about 15m above ground level with an additional 1 - 2m housing on top of this concrete structure. The tipping bay is enclosed by the steel housing and a security fence and lighting was installed around the plant (**Figure 5-3: e**).

### 5.2.3 Proposed Block Z Area

The mining methods 1 and 2 as detailed in Section 5.4.1 are proposed for Block Z, namely, dragline and truck and shovel.

The proposed Block Z area is to be mined as a western extension of the existing North Pit, in a southerly direction. Isibonelo Colliery has established a 500m buffer from the Dwars-in-die-weg-spruit 1:100yr floodline in an effort to mitigate potential impacts thereto.

The North Pit will be progressively extended by the dragline after the Kriel Colliery Pit 4 straightening. No box cutting is envisaged for the proposed Block Z operations and the dragline overburden / spoils at the end-cuts will therefore be profiled / rehabilitated immediately and in accordance Isibonelo Colliery EMPR.

A stormwater control berm is proposed along the western Block Z mining boundary between the proposed pit and the Dwars-in-die-weg-spruit riparian zone situated west of the site. This berm will serve as a clean / dirty water diversion and will prevent contaminated runoff from the opencast operations from contaminating the adjacent wetland areas.

## 5.3 Mine Infrastructure

The current layout of the Isibonelo Colliery mine area is shown in and the existing mine infrastructure in **Figure 5-2**.

## 5.3.1 Existing Mine Infrastructure

### 5.3.1.1 Conveyor

Coal is hauled from the pits to a central crushing plant (**Figure 5-3: e**) and transported via an overland conveyor to a common 8 000 ton open longitudinal surge bunker and emergency stockpile. Coal is loaded from this bunker onto another conveyor and transported to the central coal stockpile at the SSF Secunda Complex. The conveyor belt runs at a speed of 4.2m / s over a distance of 12km and is covered with suitably covered by metal sheeting (**Figure 5-3: a – b**).

Belt turnovers (**Figure 5-3: b**) are utilised to minimise spillage along the trajectory of the conveyors. Dust mitigation is performed via water spraying at the transfer points which are located within the strip mine area and at the Syferfontein coal handling area. Wash down water at the transfer points is collected and transferred to evaporation and settling dams where the coal is recovered and fed back into the system.

### 5.3.1.2 Access Roads

Access to the Isibonelo Colliery offices is via the N17 and R547, with the opencast operation accessed via the internal Isibonelo Colliery access road, previously the dragline walkway, which was constructed adjacent to the Sasol overland conveyor belt. Haul roads within the mine area are present out of the box cuts to the berm, crusher plant and parking area (**Figure 5-3: c - d**).

### 5.3.1.3 Water Supply

Potable water is supplied via Syferfontein Colliery's Rand Water pipeline which runs directly to the main offices, workshops and change houses. This water is stored in a 10 000ℓ steel tank before being distributed to the pit offices.

Water required for the crusher, service systems and dust suppression is extracted from the dirty water system (**Figure 5-3: g – h**).

### 5.3.1.4 Electricity Supply

Isibonelo Colliery electricity is supplied from Syferfontein Colliery via power supply cables installed along the conveyor route, at a tension of 132kV and 22kV. The 132kV supply is a dual feed system on common suspension structures. Power is supplied to the strip mine areas via substations at a rate of 45MVA – 20MVA. The 22kV power supply is a permanent line which supplies the necessary power required to walk the dragline to a new strip mine site and is also used as a ring-feed.

## 5.3.2 Proposed Infrastructure for Block Z

In order to include the proposed Block Z operations into current Isibonelo Colliery mining operations, the service and mine infrastructure present at Isibonelo Colliery will be extended as required to accommodate the additional operations. It is envisaged that additional haul roads will be constructed within the proposed Block Z area to provide for access and coal transportation. Additionally, the existing water and electricity supply line are to be extended into the Block Z area.

The dragline and equipment currently utilised by Isibonelo Colliery will be transferred to the proposed Block Z area.

The extracted coal will be transported to the inpit crushing plant located at the existing Isibonelo Colliery operations prior to transfer via the existing overland conveyor to the Syferfontein bunker.

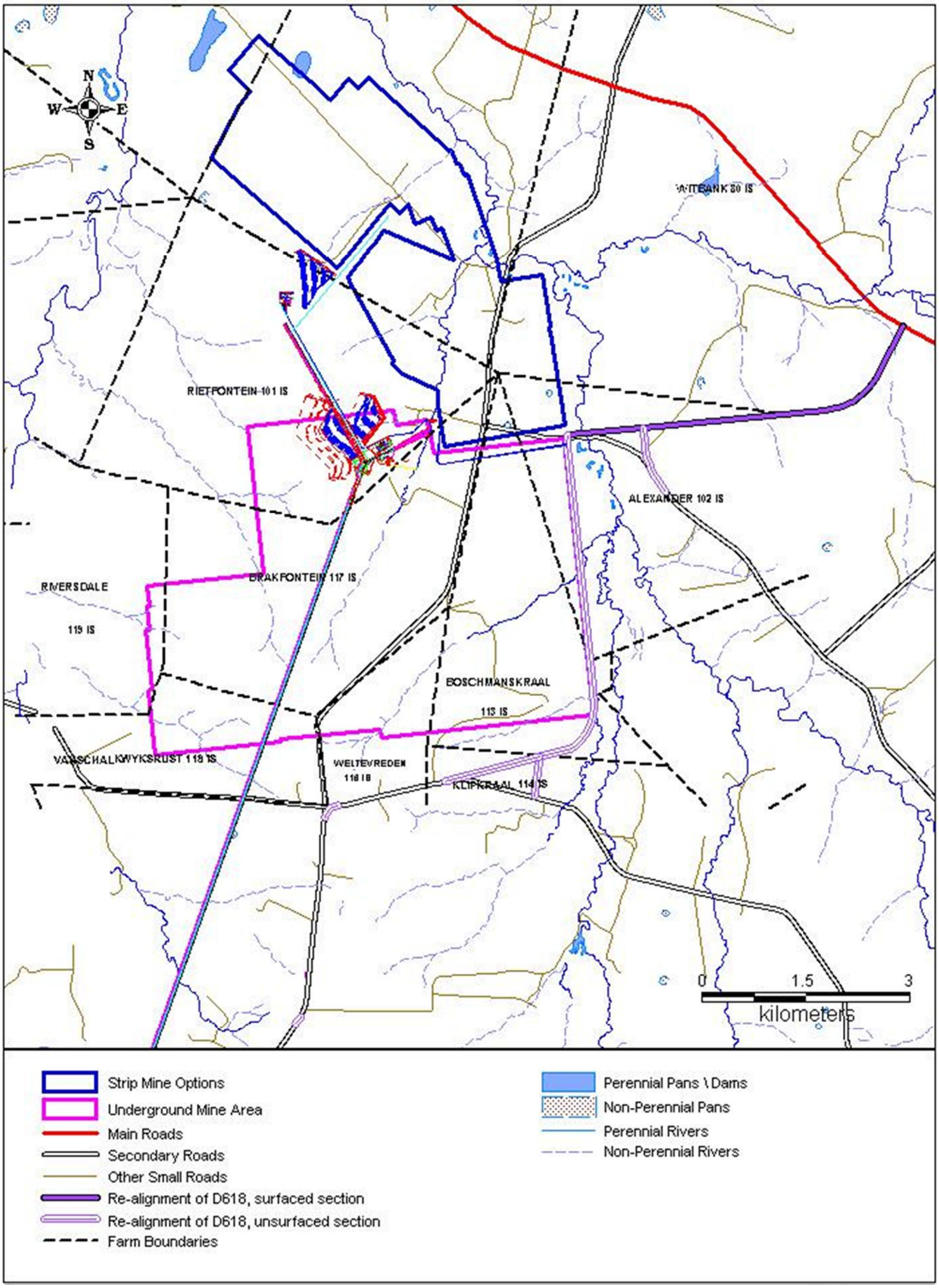



**Figure 5-2: Road and Infrastructure plan for Isibonelo Colliery (Consolidated EMPR for Isibonelo Colliery, 2012)**

a) Overland conveyor covered with metal sheeting

b) Conveyor Belt turnover point near the Syferfontein Bunker

c) Isibonelo Colliery Pit access road

d) In-pit haul roads

e) Operational inpit sizing

f) One of the two Draglines operated at Isibonelo Colliery

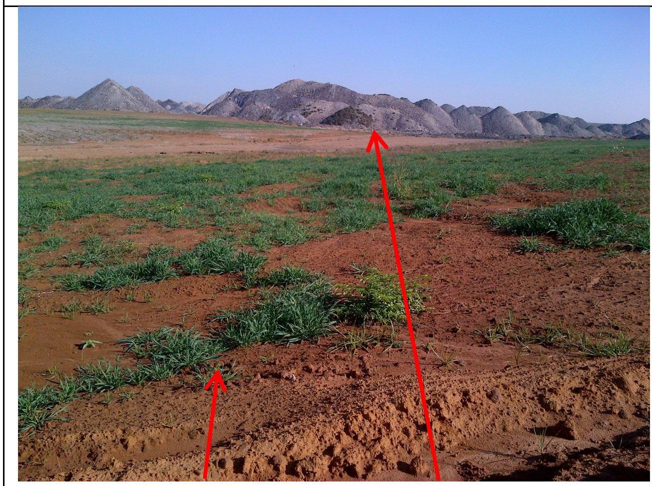
| | |
|---|---|
|  |  |
| g) Water extraction point | h) Dust suppression along haul and access roads |
|  |  |
| i) Truck and shovel methods of overburden material | j) Truck and shovel methods of overburden material |
|  |  |
| k) Topsoil placed and overburden stockpiles | l) Syferfontein bunker storage before transfer to Sasol overland conveyor |

**Figure 5-3: Existing mine infrastructure at Isibonelo Colliery**

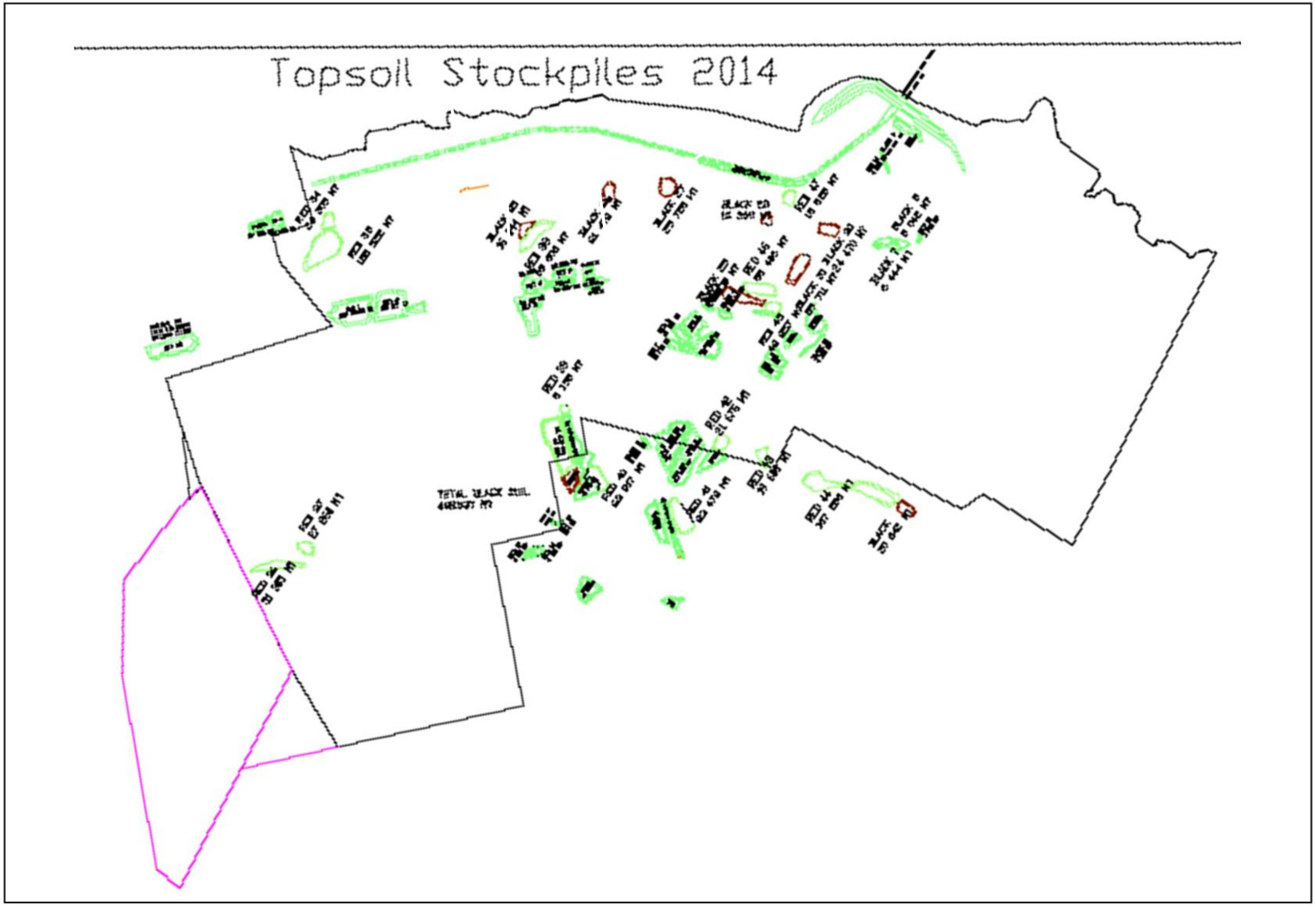



Figure 5-4: Topsoil stockpile locations as of end 2013

# 6 Alternatives Considered

## 6.1 Kriel Colliery Underground Mining

Kriel Colliery is an open cast (strip and benching) and underground coal mining operation (board and pillar mining using a continuous liner) located to the west of Isibonelo Colliery.

Board and pillar mining is typically used for flat or gently dipping bedded ores or coal seams. Once the coal seam has been accessed, the ore is mined utilising a regular grid of mining tunnels and involves progressively excavating panels into the coal seam whilst leaving behind pillars of coal to support the mine. The coal is then removed in a regular pattern while the rooms are mined out through the tunnels by drill and blast methods or a Continuous Miner and deposited onto a conveyor. The open chambers remaining following coal removal is referred to as a stope. The remaining coal contained within the pillars may be won at closure by a retreating system, starting at the farthest point from the stope access, allowing the roof to collapse and fill in the stope. This allows a greater recovery as less ore is left behind in pillars.

As with Isibonelo Colliery, Kriel Colliery mines the No. 4 coal seam via Kriel Colliery previously held the mining rights for the proposed Block Z area and initially proposed to extend their current underground operations to mine the No.4 coal seam within this area.

Following feasibility and baseline environmental assessments / investigations Kriel Colliery determined that the proposed use of board and pillar mining methods in the proposed Block Z area would not be economically viable due to several factors, *inter alia*:

- Mine health and safety risks, and financial implications associated with mining underneath the Dwars-in-die-wegspruit were to high; and
- The Block Z site is secluded from Kriel Colliery's existing infrastructure.

AAC Isibonelo Colliery completed preliminary investigations into the feasibility of mining the No.4 coal seam within the Block Z area, and determined that it would be more feasible to employ open cast mining methods to access this coal. Subsequently, as the coal seam is located adjacent to Isibonelo Colliery's' North Pit, AAC took a decision to transfer Kriel Colliery's' Block Z mining right to Isibonelo Colliery in orDwars-in-die-weg-apruit o pursue open cast mining by extending the existing North Pit. Kriel Colliery's' underground mine extension proposal was cancelled.

## 6.2 Alternative Site Selection

As noted in Section 5.1.2, Isibonelo Colliery originally proposed to mine an area south of its existing Central Pit (approved in the Consolidate EMPR currently implemented by Isibonelo Colliery) in order to fulfil its supply agreement with Sasol. **Figure 6-1** indicates the area proposed for mining by Isibonelo Colliery. Isibonelo Colliery proposed to mine this area by extending the Central Pit in a southerly direction and continuing to utilise current open cast mining methods i.e. dragline and truck and shovel.

Isibonelo Colliery as part of their environmental responsibilities has constructed a Stormwater Diversion Channel (SWDC) (red line on **Figure 6-2**), located to the west south west of the opencast operations, which serves to prevent clean water from the natural environment entering the south pit. The clean water is subsequently discharged into the DeBeerspruit which flows to the north east of the mining area. The existing SWDC is authorised in terms of the relevant legislation within the current mining EMPR.

The existing SWDC is located in the previously proposed mining area, that being south of the Central Pit. Therefore, should Isibonelo Colliery extend its current open cast mining south (as previously proposed), it would result if the decommissioning of this SWDC and require the construction of a new SWDC to ensure that the clean water is diverted away from the South and Central Pits.

Phase 1 is the existing SWDC (noted as the red line in (**Figure 6-2**), Phase 2 is an amended / additional SWDC located south east of the mining operations and Phase 3 (blue line on **Figure 6-2**) was to be installed to the west south west of the mining operations.

Further to the above, Isibonelo Colliery has located its spoils on this area south of the central pit. The open cast mining of this area would require the relocation of the spoils and increased operational costs which directly impacted the feasibility thereof.

However, following discussions between Isibonelo Colliery and Sasol, an agreement was reached and the original proposed area south of Central Pit was subsequently transferred to Sasol for mining and Isibonelo Colliery would identify an suitable alternative. Sasol propose to mine the area south of the Central Pit via underground mining methods.

Once it was established that the Block Z area could not be economically mined by Kriel Colliery, it was identified by Isibonelo Colliery as a suitable alternative (as it is anticipated to provide similar coal volumes at a comparable operational cost).

## 6.3 No-Go Option

The ‘no-go’ option is a scenario in which mining and/or environmental authorisation is not awarded to Isibonelo Colliery for the proposed Block Z area. The proposed Block Z area lies between the Kriel Colliery and Isibonelo Colliery mining operations, and in terms of physical proximity, the area constitutes a viable coal reserve to both collieries. However, due to the geological features present in the region, the proposed Block Z area cannot be mined by Kriel Colliery.

Coal mining is responsible for approximately 77% of South Africa’s primary energy supply (www.energy.gov.za, accessed 25/06/2014), exploitation of both commercially and environmentally viable coal bearing areas (such as the proposed Block Z area) is vital to the continued growth of the South African economy.

Although, the proposed mining of the Block Z area will not increase Isibonelo Colliery’s existing life of mine (LoM); it will increase its annual production rate and ensure contractual obligations to SSF (the downstream economic importance of which has been expanded upon in Section 4).

Furthermore, Isibonelo Colliery currently employs 316 permanent staff and 887 individuals who are employed on a contractual basis. **Table 4-1** presents the percentage of the current Isibonelo Colliery employees comprising previously disadvantaged individuals (as of June 2014). Isibonelo Colliery noted that an estimated 27% of the current workforce will be dedicated to the proposed Block Z project.

The establishment of the proposed Block Z mining operation will result in a currency injection into secondary industries such as contractors, manufacturers and suppliers. In addition to this, the Social and Labour Plan (SLP) will not be implemented to its full extent; resulting in lower investments within the local communities and a reduction in the potential for community upliftment.

In summation, should the ‘no-go’ option be effected, the following eventualities may transpire:

- Inability for Isibonelo Colliery to fulfil contractual obligations with SSF;
- The coal reserves within the Block Z area will remain a viable but untapped commercial resource;
- Reduction in the contribution to the local and national economy (both from Isibonelo Colliery and SSF processes);
- An approximate loss of 27% of the current Isibonelo Colliery workforce that are earmarked for deployment at the proposed Bock Z opencast area; and
- Reduction in downstream business service opportunities to secondary industries.

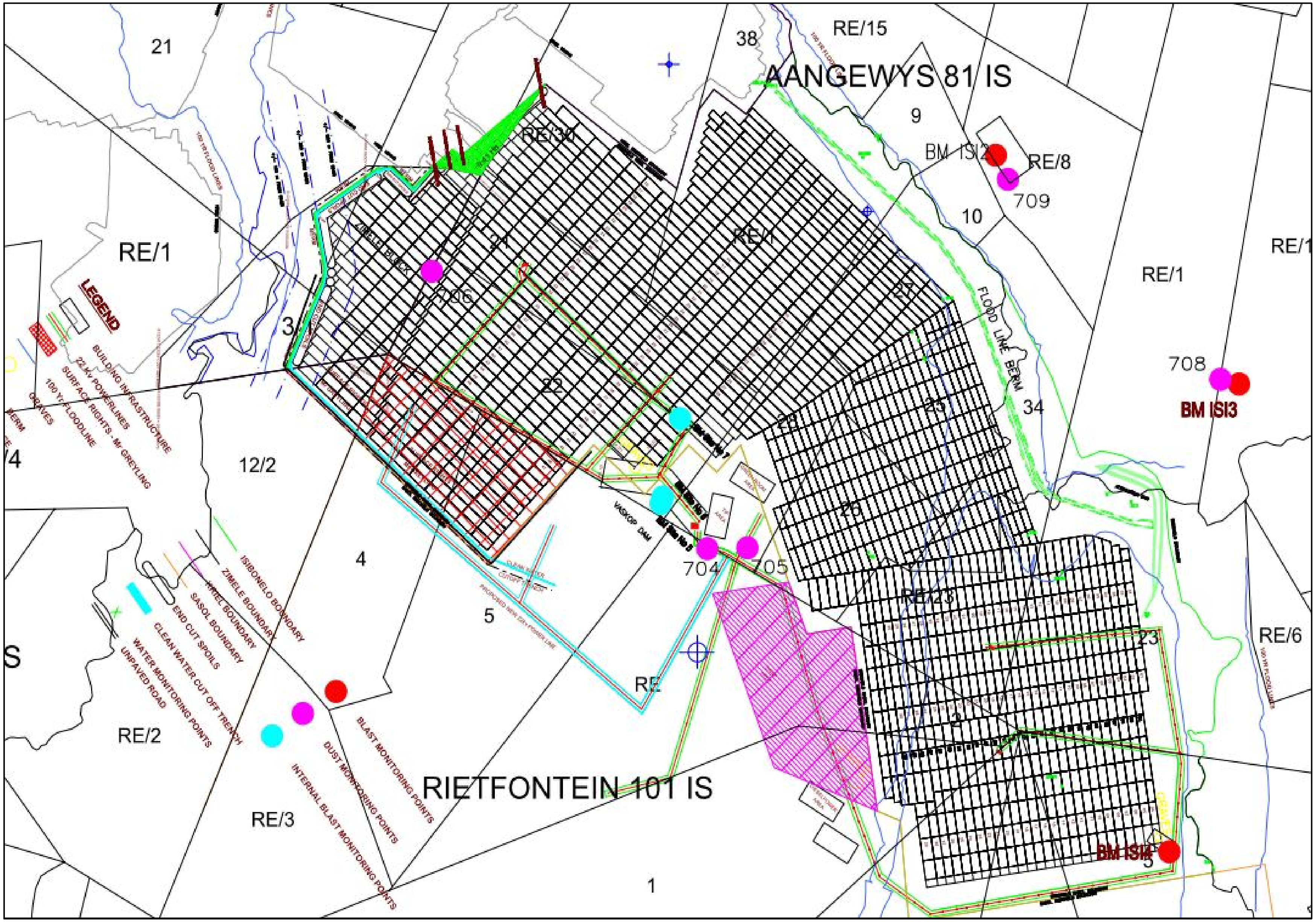



Figure 6-1: Isibonelo Colliery operations noting Block Z and the previously identified area south of the Central Pit

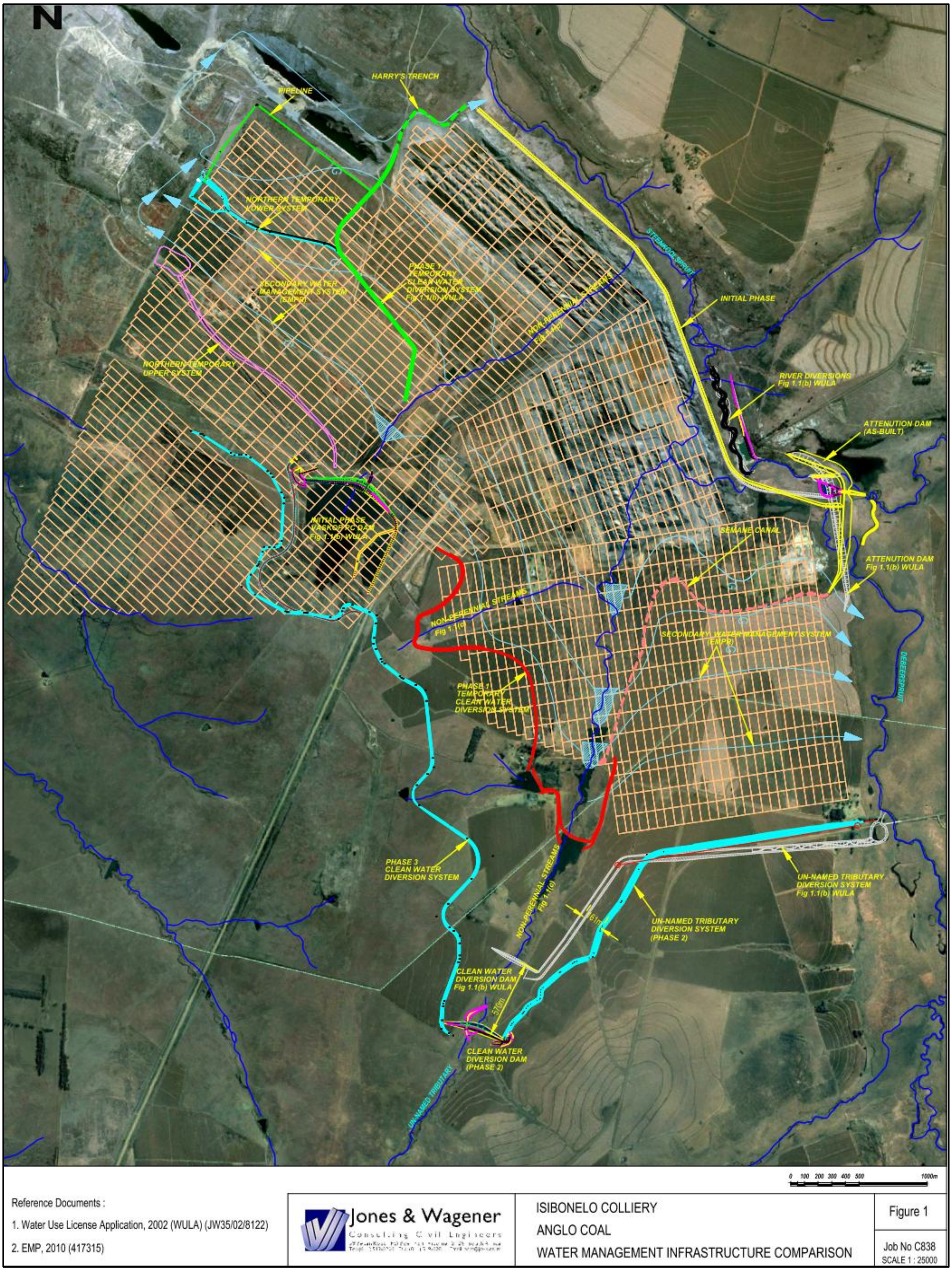



**Figure 6-2: Previously proposed mining through SWDC Phase 1 (Jones and Wagner, 2012)**

# 7 Baseline Environment

The following environmental aspects are detailed on a regional level (as applicable) which provides a broad description of the conditions that can be expected within the district municipality and / or the Olifants and Letaba river catchment areas. A local description of the area surrounding the proposed Block Z project area is then provided to describe the environmental status quo of the Block Z project footprint area and potentially directly affected surrounds.

## 7.1 Climatology and Meteorology

The eMalahleni Local Municipality as a whole has a temperate climate with warm to hot summers and mild winters, with night time temperatures cold enough for frost formation. The area receives predominantly summer rainfall as a result of low pressure troughs that form over the central plateau. The eastern parts of the region experience generally higher rainfall than the western parts and summer rainfall events are generally associated with severe thunderstorms.

Transport of pollutants is dependent on the state of the atmosphere (i.e. the stability regime) and circulation of air. Atmospheric transport within the area occurs both vertically and horizontally. Vertical transport is primarily due to deep convection. This convection transports air and any air pollutants contained therein from the surface into the upper atmosphere. Vertical motion is eventually inhibited due to the absolutely stable layers found preferentially at ~700 hPa, ~500 hPa and ~300 hPa on no-rain days. These stable layers trap pollutants at lower atmospheric levels and so influence the transport of pollutants over the whole of southern Africa (Cosijn and Tyson, 1996; Garstang et al., 1996)

On a more local scale, like that of the eMalahleni Local Municipality, vertical motion and hence dispersion of pollutants is inhibited by surface inversions that form during the night predominantly during winter. These inversions are a result of radiational cooling at the surface and are most pronounced just before sunrise. In the presence of sunlight the inversions begin to break down through convective heating and the height of the mixed layer is increased, allowing for dispersion of pollutants trapped at lower levels (Cosijn and Tyson, 1996; Tyson and Preston-Whyte, 2000).

In terms of horizontal transport, local winds may transport pollutants within the vicinity of their source. These include: anabatic and katabatic winds, valley and mountain winds, and mountain-plain and plain-mountain winds (Tyson and Preston-Whyte, 2000). On a larger scale, various synoptic systems affect atmospheric circulation over the eMalahleni Local Municipality as well as circulation over the whole of southern Africa. These systems include: continental highs, ridging highs, westerly lows, westerly waves and easterly waves, which transport air and any pollutants contained within over larger distances (Garstang et al., 1996; Tyson et al., 1996).

In the eMalahleni region, transport associated with continental highs occurs all year round, but with greater frequency during winter. Easterly waves show an annual cycle, peaking in summer, with extremely seldom occurrences in winter. Transport associated with ridging highs and westerly waves dominates during winter (Garstang et al., 1996; Tyson and Preston-Whyte, 2000). During winter, ambient air quality can either deteriorate with the occurrence of continental highs which decrease the dispersion potential of the atmosphere or improve as a result of westerly waves which transport clean, mostly maritime air over the region. During summer, frontal and convective storms reduce ambient pollutant concentrations hence improving air quality in the region.

Recirculation is also important in the transport of pollutants and occurs frequently over southern Africa due to the high frequency of anticyclonic circulations (Garstang et al., 1996; Freiman and Piketh, 2003). Recirculation occurs when air is transported away from its source and returns in the opposite direction after rotating cyclonically or anticyclonically. Recirculation can occur at a number of scales from sub-continental to regional, and an interaction between different scales of wind systems results in further recirculation (Tyson et al., 1996; Tyson and Preston-Whyte, 2000; Freiman and Piketh, 2003).

### 7.1.1 Meteorological Overview

Meteorological conditions affect how pollutants emitted into the air are directed, diluted and dispersed within the atmosphere, and therefore incorporation of reliable data into an Air Quality Impact Assessment (AQIA) is of the utmost importance.

The major factors which affect the dispersion of pollutants from an emission source are the wind speed and direction, and atmospheric turbulence. Higher wind speeds are associated with greater dilution as a larger volume of air passes the emission point, particularly for low level and ground emissions. However, high wind speed may reduce the plume height from elevated stacks, leading to higher ground level concentrations near the source than under lower wind speeds. Wind direction is important in determining where the pollutant is carried. The atmosphere is generally turbulent; with mixing and dilution occurring in response to mechanical mixing of air masses heating that causes convection (United States EPA, 2003).

#### 7.1.1.1 Local Wind Field

Wind roses are useful for illustrating the prevailing meteorological conditions of an area, indicating wind speeds and directional frequency distributions. In the following wind roses, the colour of the bar indicates the wind speed while the length of the bar represents the frequency of winds *blowing from* a certain direction (as a percentage).

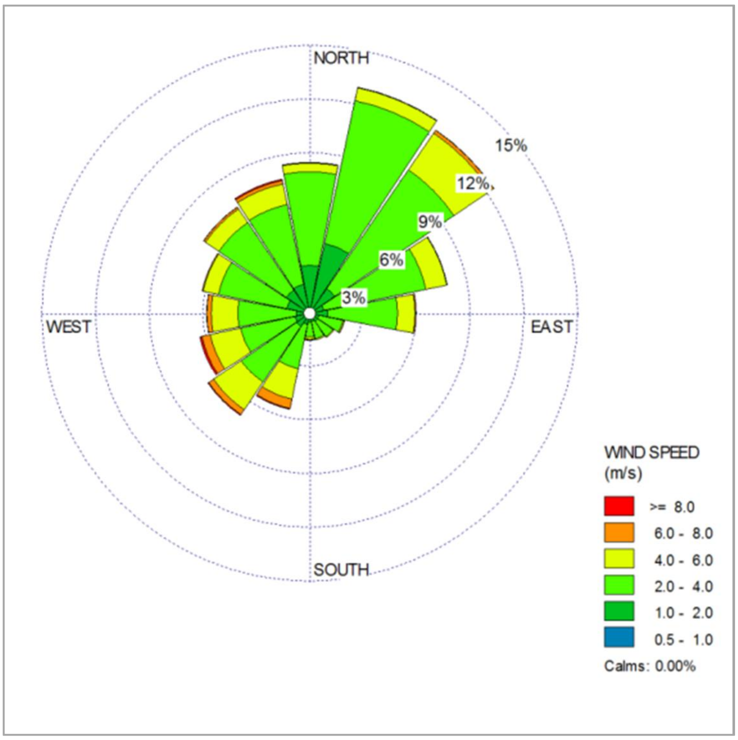



**Figure 7-1: Surface wind rose plot for Secunda (June 2009 to July 2012)**

Winds in the Secunda area indicate a very strong north easterly wind component; with winds originate predominantly from the north-north-east and north-east (**Figure 7-1**). Wind speeds are moderate to fast, with most winds occurring between 2 and 4 m / s with a frequency of 60.8% (**Figure 7-2**). Winds occur with a low frequency from the southerly and westerly directions, with these winds also indicating very low wind speeds. Calm conditions, which are defined as wind speeds less than 0.5 m / s, were recorded 0% of the time.

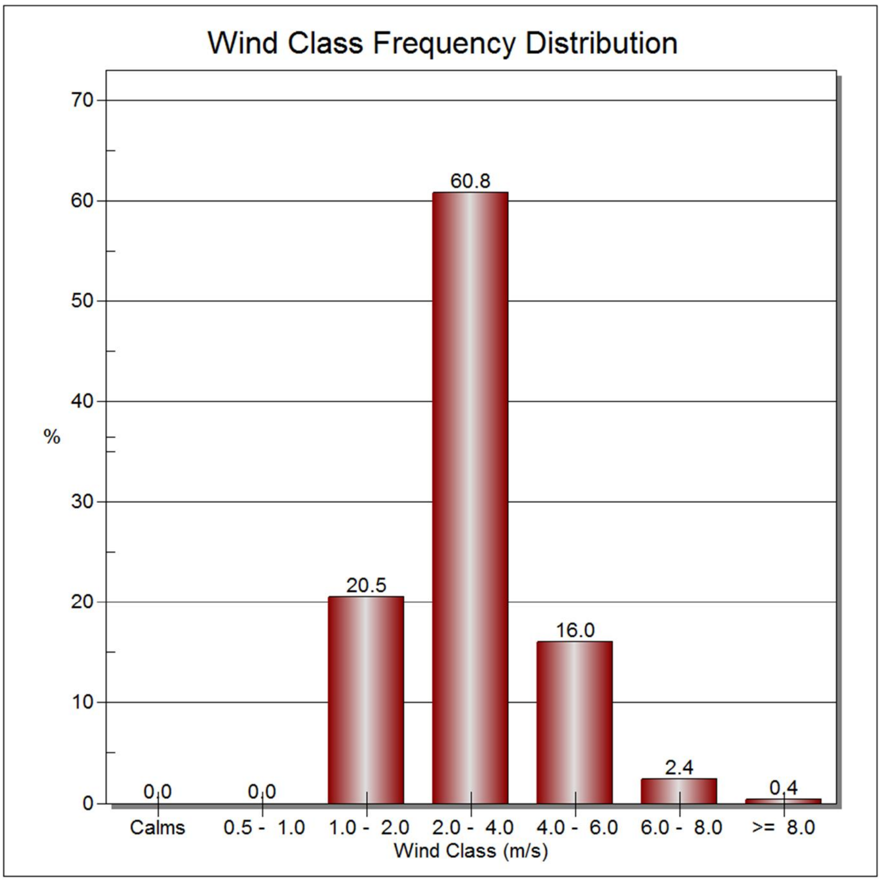



**Figure 7-2: Wind class frequencies for Secunda (June 2009 – July 2012)**

Variations in seasonal winds are illustrated in **Figure 7-3**. The winter months indicate the strong north-north-easterly and south-westerly components; with the wind speeds ranging between 2 and 4m / s. Winds originate predominantly from southerly and northerly directions during winter. In summer, the winds originate predominantly from the northeast. Direction shifts slightly during autumn indicating winds predominantly from the north-northeast and a stronger southwest component. During spring, the winds originate predominantly from the westerly, northerly and easterly sectors.

For the dispersion of emissions, during the spring and winter months when highest winds are experienced in the area, the southeast and west parts of the mine will be affected. During the summer months, slow wind speeds associated with more stable conditions will be experienced within the area. The dispersion of pollutants in these conditions is low, which can potentially lead to a greater impact of emissions in close proximity to mine operations.

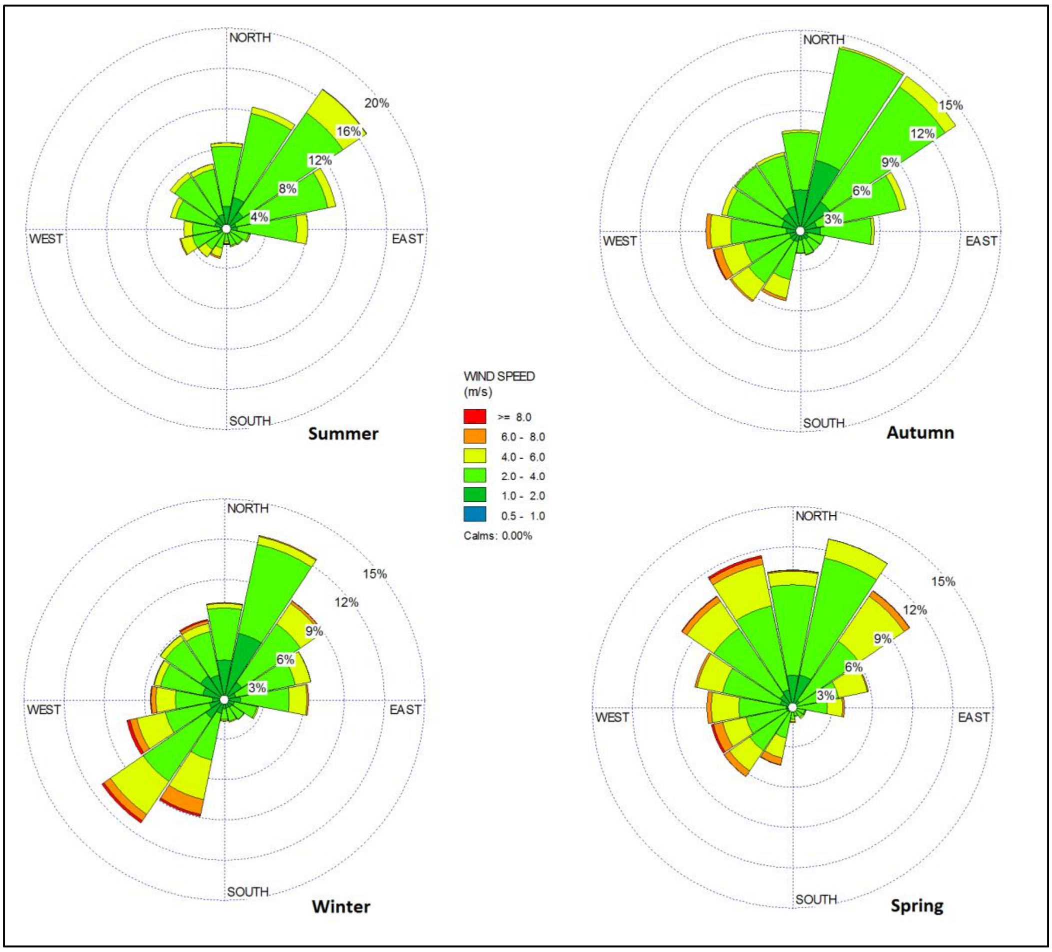



**Figure 7-3: Seasonal surface wind roses for Secunda (June 2009 – July 2012)**

Diurnal surface wind roses are presented in **Figure 7-4**. Highest wind speeds are recorded during the daytime hours (06:00 – 18:00), with the majority of speeds occurring between 4–8 m / s, with winds originating predominantly from the north-northeast, west-southwest and southwest directions. During the night-time hours (18:00 – 06:00), winds are faster, with the majority of speeds between 2–3 m / s, although winds still predominantly originate from the north-northeast and northeast.

For the dispersion of emissions, the daytime hours would experience the highest wind speeds, with emissions being dispersed to the northeast and south-southwest of mine. During the night-time hours, slow wind speeds associated with more stable conditions will be experienced within the area. The dispersion of pollutants in these conditions is low, which can potentially lead to a greater impact of emissions in close proximity to mine.

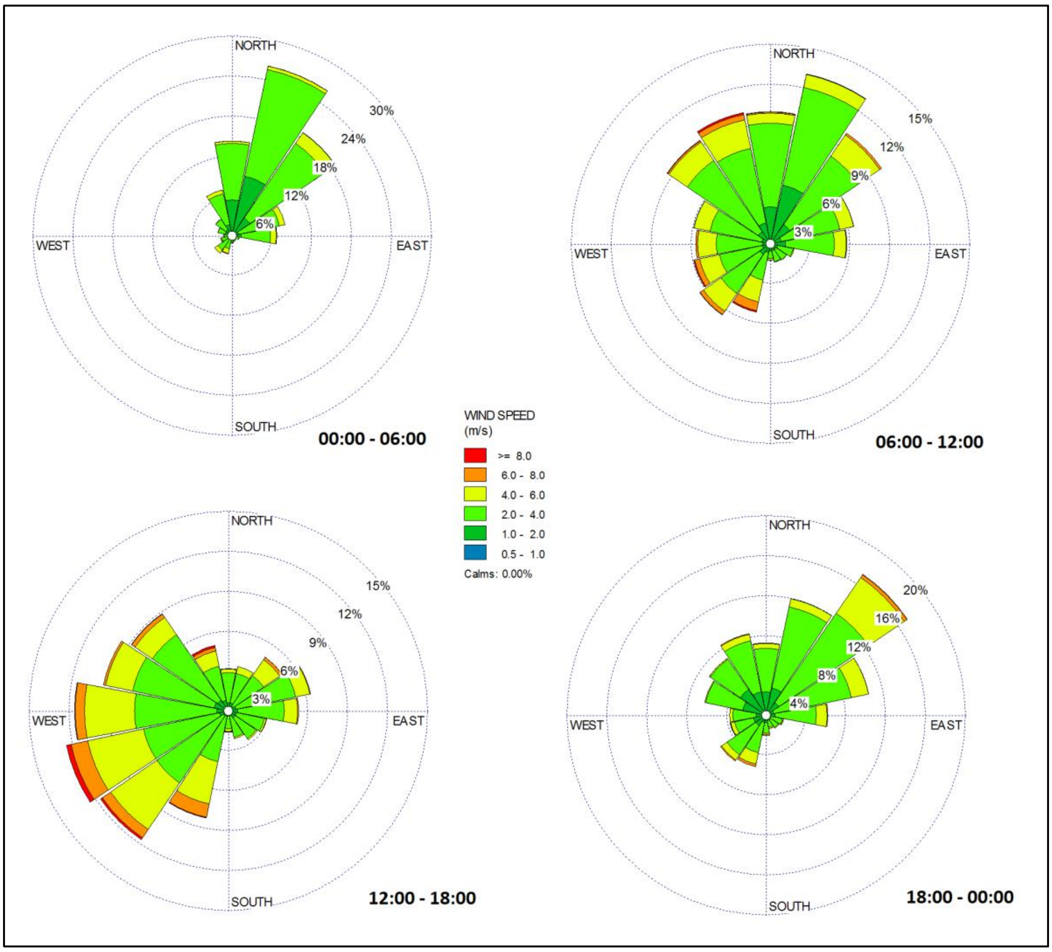



Figure 7-4: Diurnal surface wind roses for Secunda (June 2009 – July 2012)

#### 7.1.1.2 Temperature

**Figure 7-5** illustrates the average temperatures experienced in the Secunda area. The maximum temperature recorded for the period June 2009 to July 2012 was 33.8°C in November 2011, while the minimum temperature recorded was -7.4°C in June 2010. Average temperatures remain relatively stable throughout the years, with an average temperature of 15.5°C.

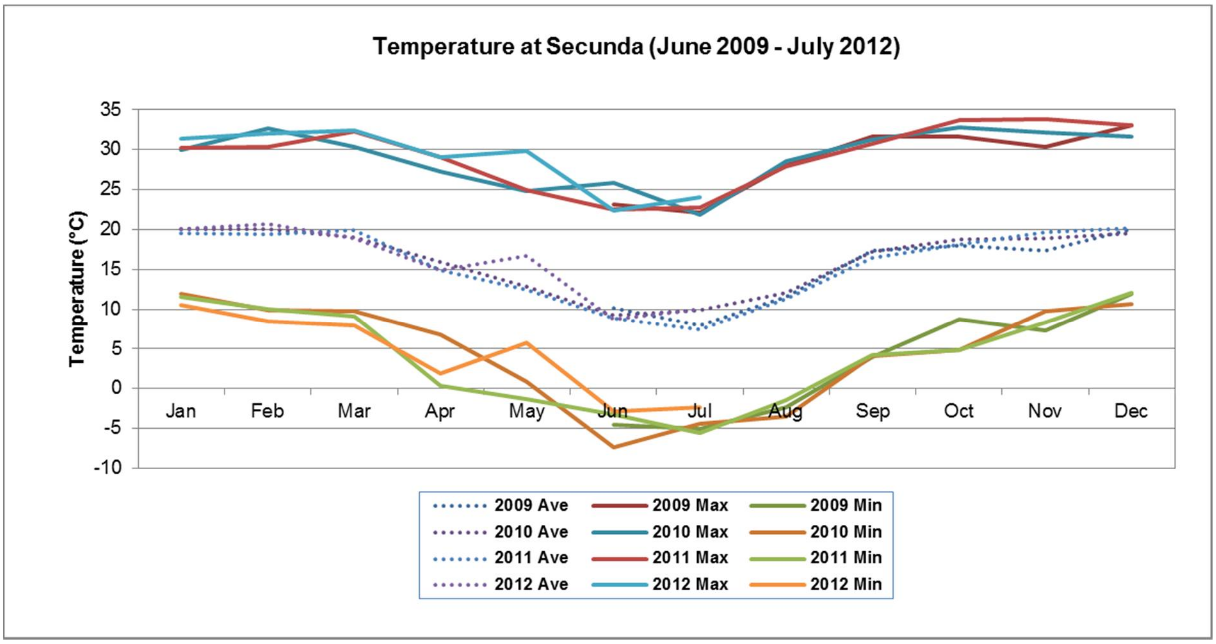



Figure 7-5: Average hourly temperatures for Secunda (June 2009 – July 2012)

#### 7.1.1.3 Rainfall

Monthly rainfall recorded in the Secunda area is illustrated in **Figure 7-6**. This area falls within a summer rainfall region. Rainfall has the potential to remove pollutants from the air, especially particulates, thereby improving the air quality situation in high rainfall areas. During the summer months, when rainfall is high, it is possible that the air pollution situation in the Isibonelo Colliery mining area is good due to the high rainfall. Air pollution during the winter months could be potentially more severe due to the low rainfall, as well as the high domestic fuel burning experienced during these months.

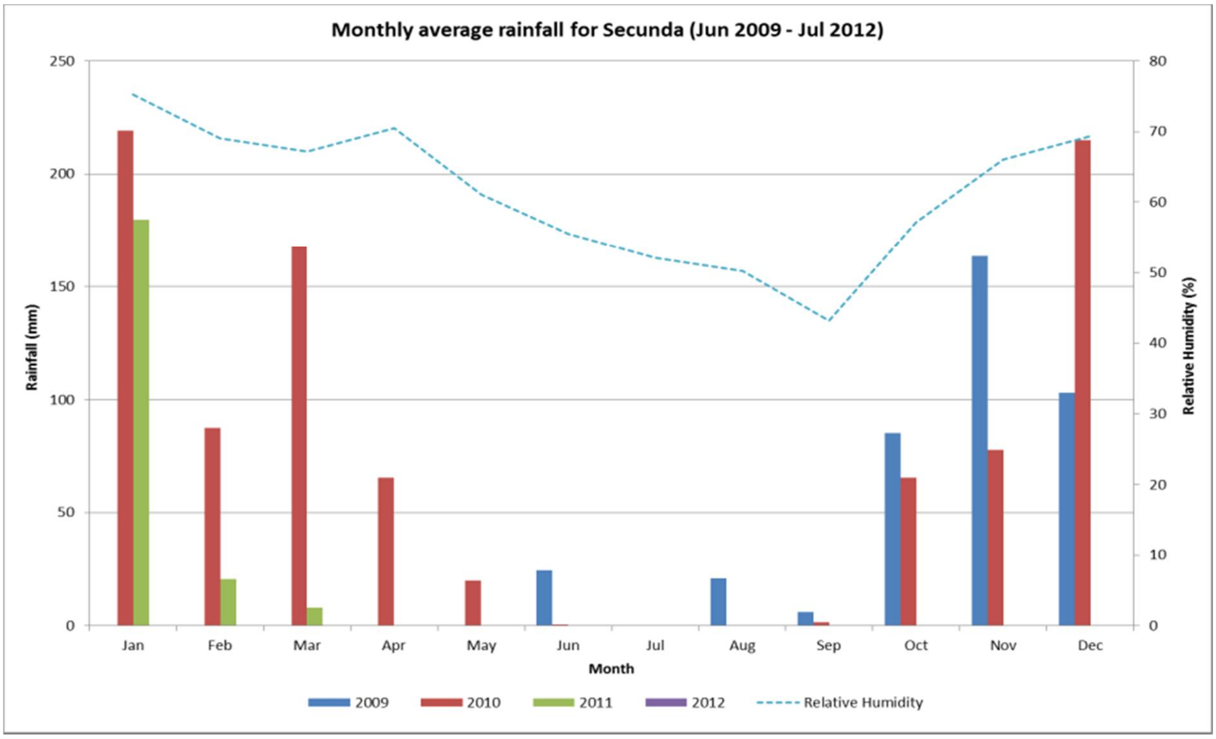



Figure 7-6: Monthly rainfall for Secunda (June 2009 – July 2012)

## 7.2 Air Quality

### 7.2.1 Regional Air Quality

On 4 May 2007 the Minister of Environmental Affairs and Tourism formally declared the eastern part of Gauteng and the western part of Mpumalanga an air pollution hotspot, to be known as the “The Highveld Priority Area”, a national air pollution hotspot in terms of Section 18(1) of the NEM:AQA. By declaring a priority area, authorities recognise that air quality within these areas is generally regarded as being poor, and frequently exceed ambient air quality standards (DEA, 2010).

The Highveld Priority Area extends from the eastern parts of Gauteng, to Middelburg in the north and the edge of the escarpment in the south and east. Major towns occurring within this region include eMalahleni (Witbank), Middelburg, Secunda, Standerton, Edenvale, Boksburg, Benoni and Balfour. The area incorporates portions of the Gauteng and Mpumalanga Provinces. The area is contained within one metropolitan municipality (Ekurhuleni) and three district municipalities (Sedibeng, Gert Sibande and Nkangala) and more specifically nine local municipalities: Lesedi Local Municipality (Sedibeng); Govan Mbeki Local Municipality (Gert Sibande); Dipaleseng Local Municipality (Gert Sibande); Lekwa Local Municipality (Gert Sibande); Msukaligwa Local Municipality (Gert Sibande); Pixley ka Seme Local Municipality (Gert Sibande); Delmas Local Municipality (Nkangala); eMalahleni Local Municipality (Nkangala); and Steve Tshwete Local Municipality (Nkangala).

The proposed Isibonelo Colliery Block Z area is located within the eMalahleni Local Municipality in the Nkangala District and therefore falls within the boundaries of the Highveld Priority Area. This implies that authorities may impose measures on Isibonelo Colliery and other mines and industries within this area in order to improve air quality in the region.

Although eMalahleni was traditionally known for coal mining and electricity production, other industries have also developed in the town, making eMalahleni a prominent industrial node. This includes metallurgical enterprises such as the production of steel, chrome and vanadium (ELM IDP, 2013). Potential air pollution sources surrounding the proposed Isibonelo Colliery Block Z area include:

- Coal fired power stations;
- Coal mining operations;
- Domestic fuel burning;
- Biomass burning (during late winter and early spring);
- Agricultural activities; and
- Vehicular emissions.

To the northwest of Isibonelo Colliery is Eskom’s Matla and Kriel coal-fired power stations, with the mining area east of the proposed site. On the southern side of the N17 road, south of the colliery, the largest industry in the area is SSF. East and west of the colliery is the mainly farms. All of these industries potentially contribute emissions to the ambient air. In addition to the industries, numerous road networks exist in close proximity to Isibonelo including the main N17 road, potentially contributing high levels of Nitrogen Oxides ($NO_X$), Sulphur Dioxide ($SO_2$) and Particulate Matter $(PM)_{10}$ to the ambient air. Domestic fuel burning results in high particulate matter emissions, with the main domestic fuel burning areas located to the south of Isibonelo Colliery (Trichardt residential area).

An ambient monitoring station is currently operated by Department of Environmental Affairs (DEA) in Secunda. The parameters measured at the station include relative humidity, wind speed, wind direction, barometric pressure, solar radiation, ambient temperature, rainfall, particulate matter, oxides of nitrogen and sulphur dioxide. The ambient concentrations of pollutants applicable to Isibonelo Colliery for the period January 2011 December 2012 are stipulated in **Table 7-1**.

Table 7-1: PM10, SO2 and NOX ambient concentrations measured at the Secunda Monitoring Station for the period January 2011 to December 2012

| Pollutant | Averaging Period | Ambient Concentration (µg / m³) |
|---|---|---|
| **$PM_{10}$** | Annual | 68.2 |
| | 24 Hours | 65.9 |
| **$SO_2$** | Annual | 23.1 |
| | 24 Hours | 13.5 |
| | 1 Hour | 17.3 |
| **$NO_X$** | Annual | 23.6 |
| | 1 Hour | 18.1 |

In addition to the above mentioned neighbouring sources, numerous areas of exposed lands (agricultural land) and unpaved roads surround Isibonelo Colliery, all contributing high levels of particulate matter emissions to the ambient air.

## 7.2.2 Local Air Quality

### 7.2.2.1 Dust Fallout Monitoring

Dust fallout monitoring at the Isibonelo Colliery commenced in 2009. Five dust fallout monitoring units were installed at locations within the Isibonelo Colliery property boundary, and five monitoring points were installed at different residential areas surrounding the mining areas. Descriptions and location of these units is presented in **Table 7-2**.

Table 7-2: Coordinates of the existing dust fallout monitoring points at Isibonelo Colliery

| Site | Site Name | Classification | Latitude | Longitude |
|---|---|---|---|---|
| **1** | Mr Henry Dunn | Residential | 26°18'30.0" S | 29°17'1.90" E |
| **2** | Mr Dunn | Residential | 26°19'15.9" S | 29°17'56.7" E |
| **3** | Mr JJ Swart (Koos) | Residential | 26°19'23.2" S | 29°15'55.7" E |
| **4** | Mr Venter | Residential | 26°20'20.7" S | 29°18'56.8" E |
| **5** | Conveyor Belt | Non-residential | 26°25'46.3" S | 29°14'8.00" E |
| **6** | South of Bunker | Non-residential | 26°26'0.20" S | 29°13'58.2" E |
| **7** | Circular Stockpile | Non-residential | 26°25'57.5" S | 29°13'44.6" E |
| **8** | De Wet Farm | Residential | 26°26'38.1" S | 29°14'5.10" E |
| **9** | Tip Area | Non-residential | 26°19'53.5" S | 29°15'46.3" E |
| **10** | Diesel Power | Non-residential | 26°19'52.0" S | 29°15'54.9" E |

A summary of monthly dust fallout rates at Isibonelo Colliery is presented in **Table 7-3** and **Figure 7-7**, which details the data recorded since the commencement of the monitoring in 2009. Monitoring points which fall within a residential area include Mr Henry Dunn, Mr Dunn, Mr JJ Swart Farm, Mr Venter and De Wet Farm and therefore are compared to the NEM:AQA residential standard of 600 mg / m² / day. The sites that fall within an industrial area include Conveyor Belt, South of Bunker, Circular Stockpile, Tip Area and Diesel Power, and these will be compared to NEM:AQA non-residential standard of 1,200 mg / m² / day.

The monthly average dust fallout rates at Mr JJ Swart Farm and De Wet Farm indicate exceedances of the residential standard over the monitoring period. The remaining residential sites are compliant with the standard. Mr Venter experienced a dust fallout rate that exceeds the residential standard during the month of November, although remains compliant as two exceedances of the dust fallout standard are allowed within a year, provided they are not sequential months.

Exceedances of the NEM:AQA non-residential standard were experienced at the Diesel Power industrial site during winter and summer periods. This site is located at the bulk fuel storage tank farm, where haul trucks and other vehicles come and go. The elevated dust fallout rates at this site can be attributed to the dust caused during vehicle entrainment. The dust fallout exceedances experienced during winter months (June) may be due to the minimum amounts of rainfall occurring in the region. The higher dust fallout rates experienced in spring and summer months may be due to the high winds in the region.

**Table 7-3: Monthly Average Dust Fallout Monitoring Results for Isibonelo Colliery for period 2009 to 2012**

| Site Description | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mr Henry Dunn** | 65.5 | 170.0 | 321.3 | 81.8 | 76.3 | 127.5 | 80.8 | 177.3 | 197.3 | 292.0 | 125.3 | 138.0 |
| **Mr Dunn** | 90.3 | 255.3 | 85.3 | 56.5 | 67.0 | 101.0 | 60.5 | 93.3 | 105.3 | 191.3 | 204.5 | 137.5 |
| **Mr JJ Swart (Koos)** | 136.0 | 296.7 | 544.0 | 496.3 | 482.5 | **744.8** | 468.8 | **1211.3** | **650.3** | 551.8 | 331.3 | 452.0 |
| **Mr Venter** | 185.0 | 437.0 | 197.0 | 180.7 | 426.0 | 266.8 | 253.3 | 152.3 | 357.3 | 446.3 | **863.5** | 564.0 |
| **Conveyor Belt** | 203.3 | 312.8 | 510.5 | 312.0 | 400.5 | 512.0 | 316.0 | 705.5 | 509.8 | 753.5 | 583.0 | 327.0 |
| **South of Bunker** | 55.0 | 44.3 | 253.0 | 151.8 | 126.8 | 257.5 | 177.0 | 307.0 | 265.5 | 466.5 | 418.5 | 125.5 |
| **Circular Stockpile** | 81.0 | 30.5 | 172.3 | 110.3 | 72.3 | 79.0 | 129.0 | 214.0 | 192.3 | 497.3 | 232.8 | 191.0 |
| **De Wet Farm** | 45.0 | 64.3 | 133.8 | 59.5 | 126.0 | 128.3 | **1061.3** | 56.7 | **1641.5** | **659.8** | 280.3 | 148.0 |
| **Tip Area** | 144.3 | 72.3 | 190.7 | 363.3 | 262.3 | 488.3 | 357.7 | 509.8 | 669.5 | 1013.8 | 661.0 | 643.5 |
| **Diesel Power** | 556.7 | 254.0 | 425.3 | 227.0 | 690.0 | **1516.7** | 745.3 | **1727.7** | **1413.0** | **1665.7** | **3347.3** | **4417.0** |
| **Numbers in *bold* indicate exceedences of the dust fallout standards** | | | | | | | | | | | | |

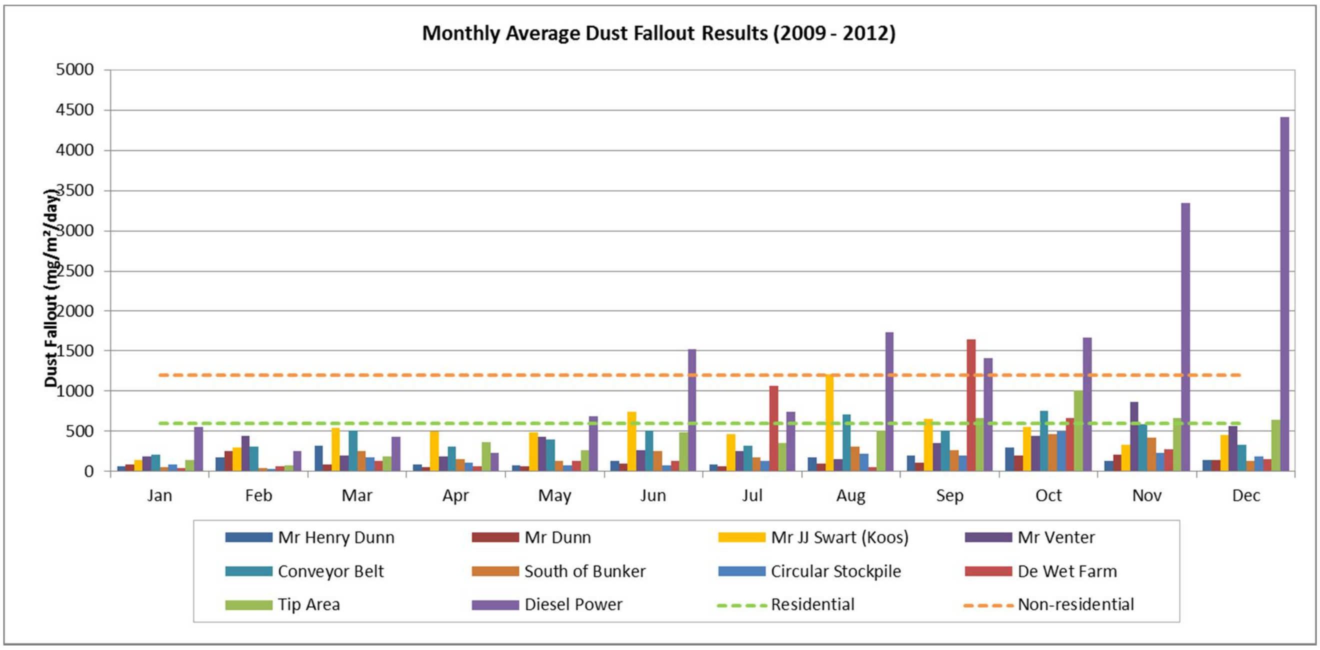



Figure 7-7: Monthly average dust fallout results for the period 2009 to 2012

# 7.3 Noise

Existing noise sources in the area surrounding the proposed open cast Isibonelo Block Z section include the mining operations at Isibonelo Colliery, nearby N17 national road and natural sources such as the river, insects and wind. Depending on the activities and amount of traffic along the main road, high levels of noise may already be experienced in the area of the proposed due to equipment used in the mine. As such, the area surrounding the proposed mining section can be classified as category F (Industrial District) as per the typical rating levels for noise in districts as specified in the SANS 10103:2008 regulations (**Table 2-4**). It must be noted that onsite monitoring, to establish the baseline noise climate of the region, is essential in order to assess the noise impacts of the proposed open cast going forward.

# 7.4 Visual Aspects

## 7.4.1 Site Description

The proposed Block Z project area lies between current Isibonelo Colliery and Kriel Colliery operations (to the west of current Isibonelo Colliery and to the east of current Kriel Colliery operations). North of the proposed site lies the town of Kriel with Sasols Secunda complex to the south. The proposed area comprises rolling hills with the Dwars-in-die-wegspruit River to the west of the site. No potential visual receptors were identified to be located near the proposed site. Taking into consideration that the proposed site lies between two currently operational mines, it is not anticipated that a significant impact on the visual aspect of the area will occur as a result of the proposed project.

## 7.5 Geology

### 7.5.1 Regional Description

The region falls within the Karoo Supergroup. The geology of the greater project area comprises mainly sedimentary lithologies belonging to the Karoo Supergroup. Sandstone and sand / siltstone intervals of the Vryheid Formation rest uncomfortably on a pre-Karoo basement, which consist mostly of granite, with gabbro. Dolerite sills and dykes occur sporadically over the region (Muller *et al*. 2001). **Figure 7-8** represents the geology of the Mpumalanga province.

### 7.5.2 Site Description

The geology underlying the proposed Block Z project site comprises shales and sandstones of the Madzaringwe Formation. The general lithological profile on the Isibonelo Colliery up to and including the deepest mineable coal seam, consists of:

i. Soft overburden.

ii. Hard overburden.

iii. No.5 coal seam.

iv. Inter burden.

v. No.4 coal seam.

The lithology below the No.4 coal seam comprises primarily sandstone and non-economical thin coal seams (The No.3 coal seam and the No.2 coal seam).

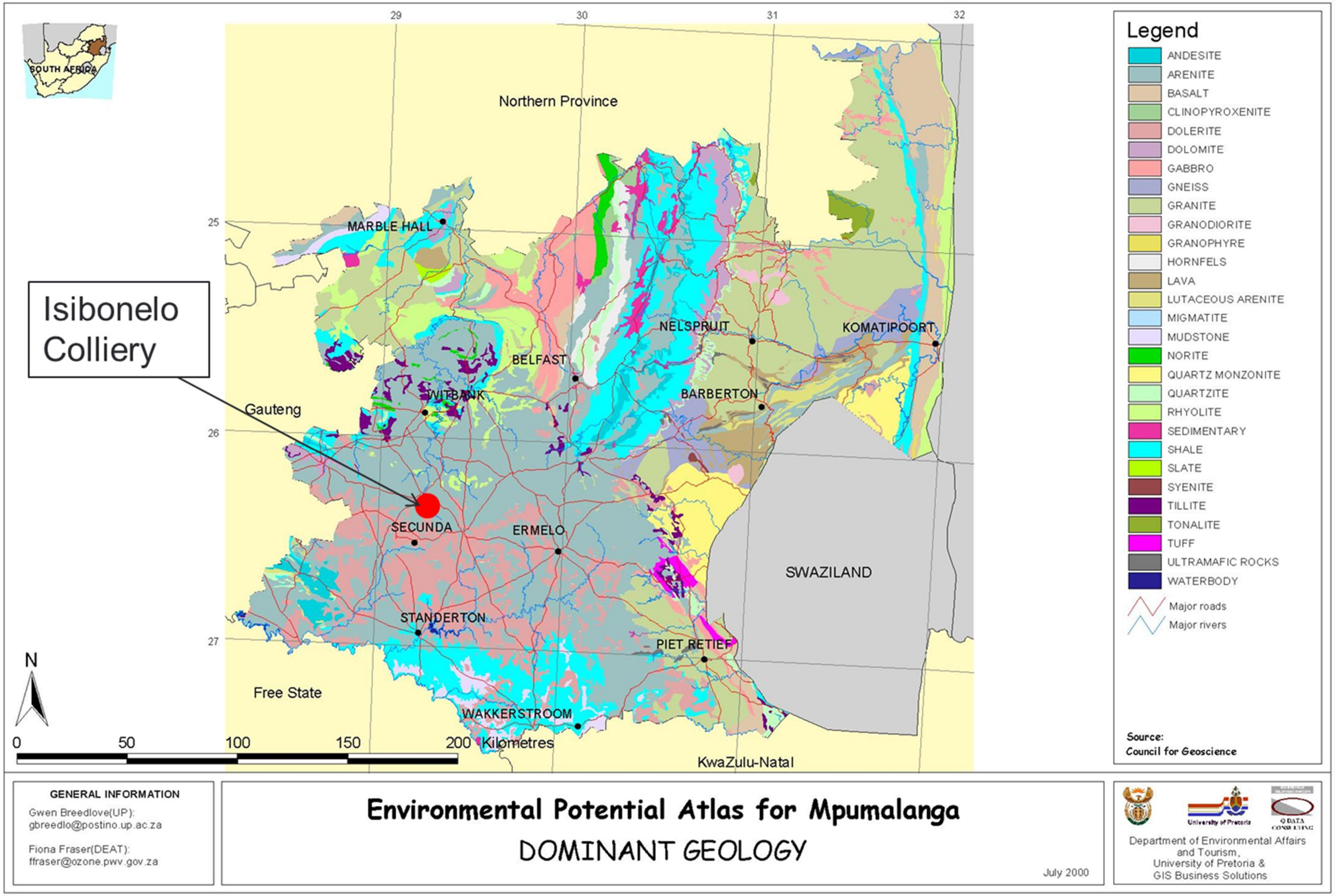



**Figure 7-8: The dominant geology of the Mpumalanga Province (Department of Environmental Affairs and Tourism (DEAT), 2000)**

# 7.6 Ground Water

## 7.6.1 Regional Description

Rocks of the Karoo Supergroup generally generate economic aquifers, although high yielding aquifers may occasionally occur. These rocks can be divided into two distinct aquifers; a shallow intergranular upper weathered aquifer within the weathering zone, fractured rock aquifers; and deep-seated aquifers occurring below the coal seams. Aquifers may also be identified in areas associated with weathering adjacent to dolerite intrusions (sills and dykes), as well as unconfined aquifers in the alluvium adjacent to major rivers. It has been noted that the aquifers may be hydraulically connected due to excessive intrusions in the region.

The shallow weathered aquifer occurs between 5–12 m, and up to 20 m, below the surface and is generally low yielding (1 – 10 $m^3$ / day). The fractured rock aquifer developed variable yields and occurrence, with yields varying from 0.1–2 l / s. The deep-seated aquifer has been noted to have low hydraulic conductivity of approximately <0.001 m / day, although a higher hydraulic conductivity of 0.1 m / day could be expected along shallow coal seams (Dr. Pixley ka Isaka Seme EMF, 2012).

## 7.6.2 Local Description

A baseline groundwater investigation was conducted as part of the EMPR in 2001. Groundwater levels and quality are monitored on a quarterly / biannual basis by the Institute for Ground Water Studies. This information is summarised in the Isibonelo Colliery IWWMP (Radyn *et al*, 2010) from which this baseline has been developed.

### 7.6.2.1 Groundwater Baseline

Groundwater occurs in three aquifers at Isibonelo Colliery (**Table 7-4**)

**Table 7-4: Summary of Aquifers at Isibonelo Colliery (Radyn et al, 2010)**

| Aquifer | Geology | Depth below ground | Characteristics |
|---|---|---|---|
| Shallow perched aquifer | • Restricted to the soil (soft overburden) horizon<br>• Includes alluvial deposits along streams | 1-5m | • Water is held in the spaces between soil / sediment particles<br>• May support surface ecosystems at springs, pans, wetlands and along watercourses<br>• Contributes to flow in watercourses<br>• Unconfined (groundwater table at atmospheric pressure) |
| Shallow Karoo aquifers | Weathered zone Karoo sediments and coal seams | 5 – 30m | • Groundwater held in fractures, joints and weathered voids in the bedrock.<br>• Contributes to base flow in watercourses<br>• unconfined to semi-unconfined |
| Deep Karoo aquifers | Unweathered Karoo sediments and coal seams | 30m – 180m | • Groundwater held in fracture systems in fresh bedrock.<br>• Confined (water under pressure) |

Dolerite intrusions (semi-vertical dykes and semi-horizontal sills) intersect the Karoo sediments in places and affect the shallow and deep Karoo aquifers. The margins of dolerite intrusions are often preferentially weathered and fractured which may result in preferential groundwater flowpaths and increased borehole yields. Dykes may act as barriers to groundwater flow and cause differences in groundwater level from one side of a dyke to another. Sills may act as perched aquifers, holding groundwater above them while limiting vertical flow.

Groundwater flow in all three aquifer types is essentially horizontal. However, interconnection between the aquifer types allows limited vertical flow.

Recharge of these aquifers is generally from rainfall at surface. This infiltrates to lower levels and deeper aquifers in the geological sequence through fracture systems, dyke margins, joints, etc. Recharge is estimated as 1% to 3% of mean annual rainfall.

Groundwater flow directions in areas not impacted by mining will be along the surface topographical gradient, that is, from high ground towards the drainage lines and rivers. The depth to groundwater in boreholes in the vicinity of Isibonelo varies between 0.10m and 21.1 m, with an average of ±5 m. Groundwater is used for domestic and stock watering purposes. The approximate range of boreholes yields is from 0.5 L / s to 1.5 L / s.

The baseline groundwater quality at Isibonelo Colliery prior to mining is summarised in **Table 7-5**.

**Table 7-5: Baseline Groundwater Quality at Isibonelo Colliery (Radyn et al, 2010)**

| Variable | Unit | Minimum | Maximum |
|---|---|---|---|
| **pH** | - | 7.38 | 8.9 |
| **EC** | (mS / m) | 18.5 | 86 |
| **TDS** | (mg / l) | 144 | 512 |
| **Ca** | (mg / l) | 13 | 70 |
| **Mg** | (mg / l) | 4 | 41 |
| **Na** | (mg / l) | 14 | 178 |
| **K** | (mg / l) | 1.1 | 10.9 |
| **Si** | (mg / l) | 7.1 | 28 |
| **Cl** | (mg / l) | 4 | 96 |
| **T.Alk** | (mg / l) | 90 | 445 |
| **SO4** | (mg / l) | 4 | 20 |
| **NO3** | (mg / l) | 0.2 | 3.0 |
| **F** | (mg / l) | 0.19 | 1.8 |
| **Fe** | (mg / l) | 0.01 | 28 |
| **Mn** | (mg / l) | 0.01 | 0.7 |

# 7.7 Surface Water

## 7.7.1 Regional Description

The proposed Block Z study area falls within quaternary catchment B11D, which comprises the Trichardspruit, Vaalbankspruit and Steenkoolspruit catchments (**Figure 7-9**). The various catchments are located within the Olifants Water Management Area. Quaternary catchment B11D is 551km$^2$ in extent, and its constituent rivers form a tributary of the Olifants River in the upper catchment area. The Olifants River flows through the Kruger National Park and joins the Limpopo River in Mozambique. The Olifants River catchment is 54,570 km$^2$ in extent, and is largely situated in the coalfields of the Highveld in Mpumalanga. The catchment is, therefore, heavily impacted by coal mining, power generation, heavy industry, sewage and large-scale commercial agriculture. The Olifants River and its tributaries exhibit high heavy metal concentrations due to acid mine drainage, and high *E. coli*, total nitrate and phosphate concentrations from inflows of sewage. Pollution in the catchment has recently resulted in the mortality of fish, Crocodiles and other wildlife between Loskop Dam and the Kruger National Park. Much of the pollution originates from the upper catchment area in which Klipfontein is situated. It is critical that any form of pollution from the study area during the lifespan of the project is controlled to prevent further contamination, loss of biodiversity and ecosystem functioning in the Olifants River catchment.

### 7.7.2 Site Description

The following rivers surround the proposed Block Z project area and ultimately the Isibonelo Colliery mine lease area (**Figure 7-9**):

- The Steenkoolspruit which is located approximately 2.5km north-east of the proposed Block Z project area (at its nearest point). The Steenkoolspruit flows in a general northerly direction, flowing into the Olifants River 29km north of the site in the vicinity of Tweefontein / Phoenix. The Olifants River flows into Witbank dam, which in turn flows into the Loskop dam. Thereafter the river flows through Mpumalanga and the central part of the Kruger National Park to Mozambique.
- The Dwars-in-die-wegspruit which is located adjacent to the proposed Block Z project area (approximately 500m west).

The in-stream water quality of the Steenkoolspruit is reflected in **Table 7-6**.

**Table 7-6: Field water quality measurements at selected sites in the Steenkoolspruit on four occasions in 2011**

| Site | Temp (⁰C) | Secchi Depth (cm) | Conductivity (mS / m) | pH |
|---|---|---|---|---|
| ***April 2011*** | | | | |
| RPL4 | - | - | 55 | 6.6 |
| Harry's Canal | - | - | 72 | 7.0 |
| ***June 2011*** | | | | |
| MON A | 11 | 86 | 90 | - |
| MON B | 11 | >100 | 85 | - |
| RPL4 | - | - | 60 | 6.4 |
| Dirty Water Dam | - | - | 115 | 8.2 |
| ***September 2011*** | | | | |
| RPL4 | - | - | 344 | 6.7 |
| Dirty Water Dam | - | - | 179 | 7.9 |
| Wetlands-BH | - | - | 54 | 7.2 |
| ***December 2011*** | | | | |
| MON A | 23 | 32 | 73 | - |
| MON B | 24 | 95 | 86 | - |
| RPL4 | - | - | 80 | 7.3 |
| Dirty Water Dam | - | - | 205 | 8.5 |

According to the DWA Resource Quality Services data and Malete (2012), there are no water quality monitoring points located on the Dwars-in-die-Wegspruit in the vicinity of the proposed Block Z project.

A Pollution Control Dam (PCD) is located approximately 1m to the south-west of the proposed Block Z project area however the dam is used for "dirty" runoff water from the south pit and therefore not a natural body of water.

### 7.7.3 Wetlands

A study entitled An Ecological Assessment of Riparian Zone and Wetland Habitats of the Kriel South Area (Marneweck, 2001) and evaluated wetlands in and surrounding the proposed Block Z project area. The Kriel South study area included part of the catchment area of the upper Olifants River, including portions of the three major watercourses in the catchment, namely the Steenkoolspriuit, the Debeerspruit and the Dwars-in-die-wegspruit (which runs adjacent to the proposed Block Z project area.

The study identified seven types of wetlands located within the study area, comprising:

- Channelled and non-channelled valley bottom riparian wetlands.
- Channelled valley bottom floodplains.
- Valleyhead.
- Midslope seepage wetlands.
- Footslope seepage wetlands.
- One endorheic pan.

The study noted that the Steenkoolspruit, Debeerspruit and the Dwars-in-die-wegspruit periodically flood their banks and this has resulted in the development of a floodplain along the entire length of each of these rivers in the Kriel South area.

Marneweck (2001) noted that the Dwars-in-die-wegspruit floodplain lacked the channelled valley bottom seepage areas and open water areas associated with these areas as well as the habitats associated with the footslope seepage areas. The study noted that the area comprised mostly extensive grass meadows dominated by *Eragrostis plana*. The deeply incised channel also meant that the banks were unstable and the riparian zone habitats were disturbed and thus poorly developed. There was also no clear transition from the grass meadow habitat of the valley bottom to the grass meadow of the levee and as such the levee habitat was largely indistinguishable. The study continued to state that the incised river channel had probably contributed to the reduced frequency of flooding in the floodplain and the lowering of the watertable along the valley bottom. The grass meadows are therefore probably only inundated intermittently following larger floods that historically would have been required to inundate the floodplain.

The Consolidated EMPR for Isibonelo Colliery (2012) indicates that both riparian and non-riparian wetlands are expected within the catchments within which Isibonelo Colliery is located and that various wetlands are present in the vicinity of the Isibonelo Colliery mine lease area. The Consolidated EMPR for Isibonelo Colliery (2012) indicated that the state of the riparian wetlands at the time were slightly modified as compared with reference surrounding conditions. Most of the floodplain areas, while modified by roads and agriculture in places, were in reasonably good condition; while the non-riparian systems were heavily impacted by either agriculture or mining.

### 7.7.4 Current Isibonelo Colliery Surface Water Management

Isibonelo Colliery has a SWDC, located to the west south west of the opencast operations; which serves to prevent clean water from the natural environment entering the south mining pit. The clean water is subsequently discharged into the DeBeerspruit which flows to the northeast of the mining area.

The dirty water contained within the mining pit is collected in a sump (within the various pits) and pumped from the pits into the PCD (Vaskop dam). Isibonelo Colliery holds a water use license (No. 24084884) authorising the following water uses:

- Section 21 (b): Storing of water;
- Section 21 (c): Impeding or diverting the flow in a watercourse;
- Section 21 (i): Altering the bed, banks, course or characteristic of a watercourse;
- Section 21 (g) Disposing of waste in a manner which may detrimentally impact on a water resource; and
- Section 21 (j): Removing of water found underground.

Furthermore, Isibonelo Colliery hold a water use license (No. 2484884) for the discharge of water containing waste (of a specified quality concentration) into the Steenkoolspruit in terms of Section 21 (f) of the NWA.

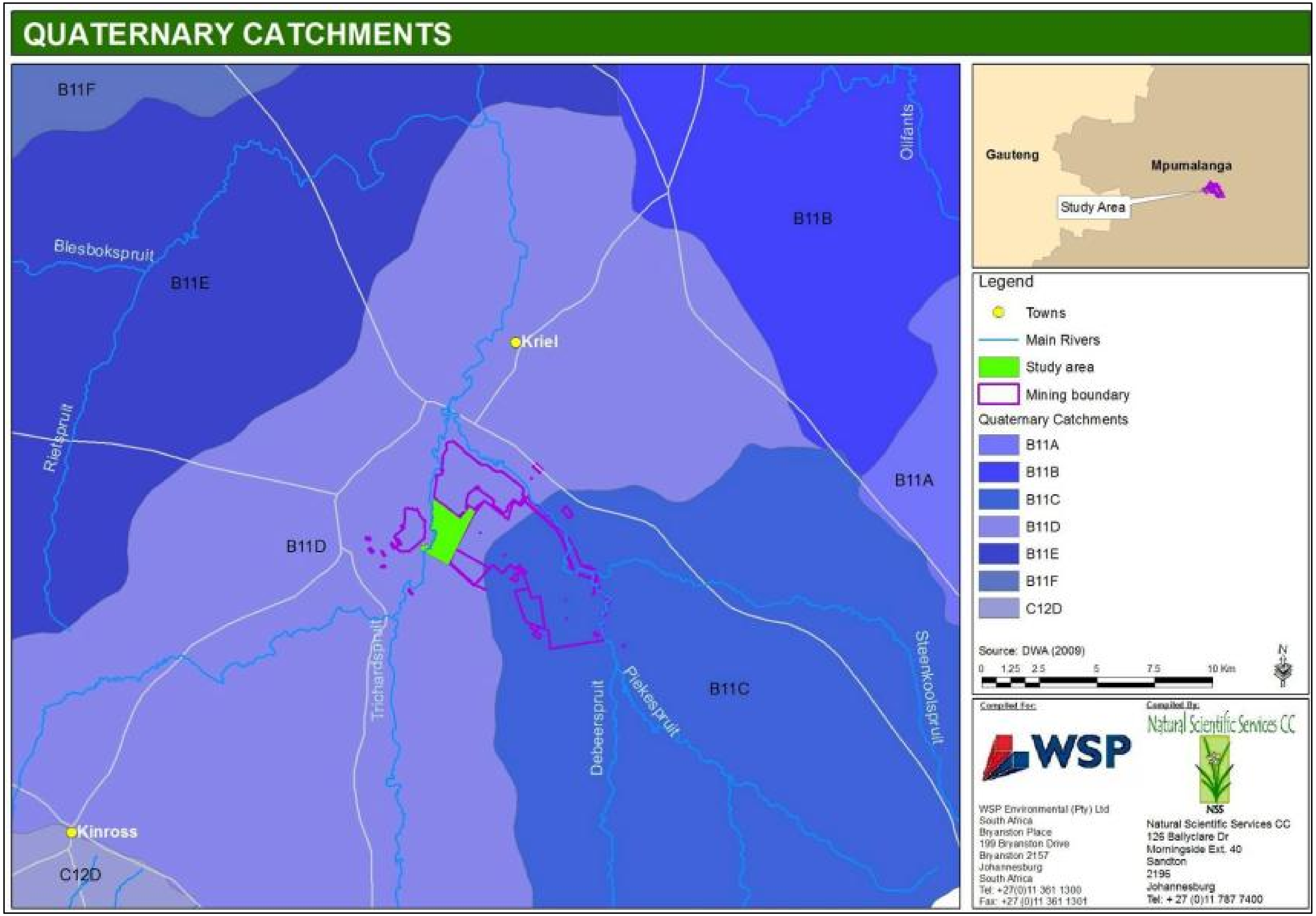



Figure 7-9: Quaternary catchments and major drainage lines in the study region (NSS, 2014)

# 7.8 Topography

## 7.8.1 Regional Description

According to the Mpumalanga Department of Agriculture and Land Administration, the Mpumalanga Province ranges from 0m to approximately 2200m (Resource Information Report: Mpumalanga, 2005). **Table 7-7** represents the elevation, hectares of land which occur within the specific elevation, and the percentage of land that comprises the specific elevation. The region is generally fairly flat with no areas with a slope of more than 9%.

**Table 7-7: Topography of Mpumalanga (Resource Information Report: Mpumalanga, 2005)**

| Range (m) | Area (ha) | % of Area |
|---|---|---|
| **0 – 500** | 147 227 935 | 18.6 |
| **501 – 100** | 64 018 237 | 8.1 |
| **1001 – 1500** | 154 372 203 | 19.4 |
| **1501 – 2000** | 426 274 303 | 53.6 |
| **2001 – 2200** | 2 381 422 | 0.3 |

**Figure 7-10** represents the topography across the Olifants and Letaba River Catchment Areas. The proposed Block Z project site is situated to the south of the catchment i.e. within the region indicated as having an average slope ration of 0-5%.

## 7.8.2 Site Description

The elevation of the target area ranges from 1552 masl to 1582 masl. The project area slopes from east to the west towards a watercourse; with the adjacent watercourse being the lowest point at 1548 masl. The area to the east of the proposed Block Z project area is highly impacted upon by opencast mining activities.

**Figure 7-11** illustrates the cross profile of the target area as indicated from northeast to southwest. The northeast to southwest profile has an average slope of between 1.6% and 2.7%.

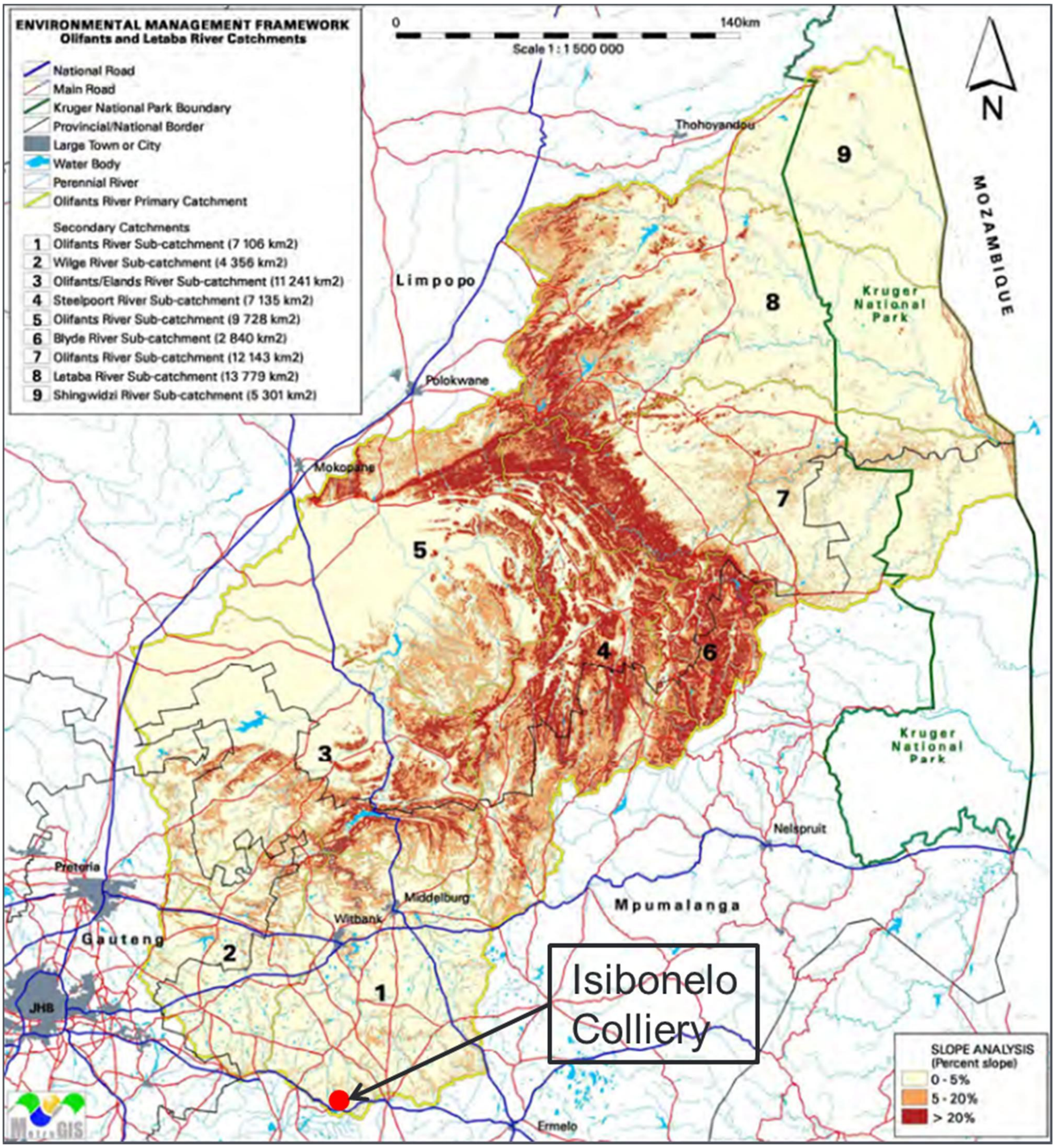



**Figure 7-10: Slope analysis across the Olifants and Letaba River Catchment Areas (Olifants and Letaba Rivers Catchment Areas (Environomics and MetroGIS, 2009)**

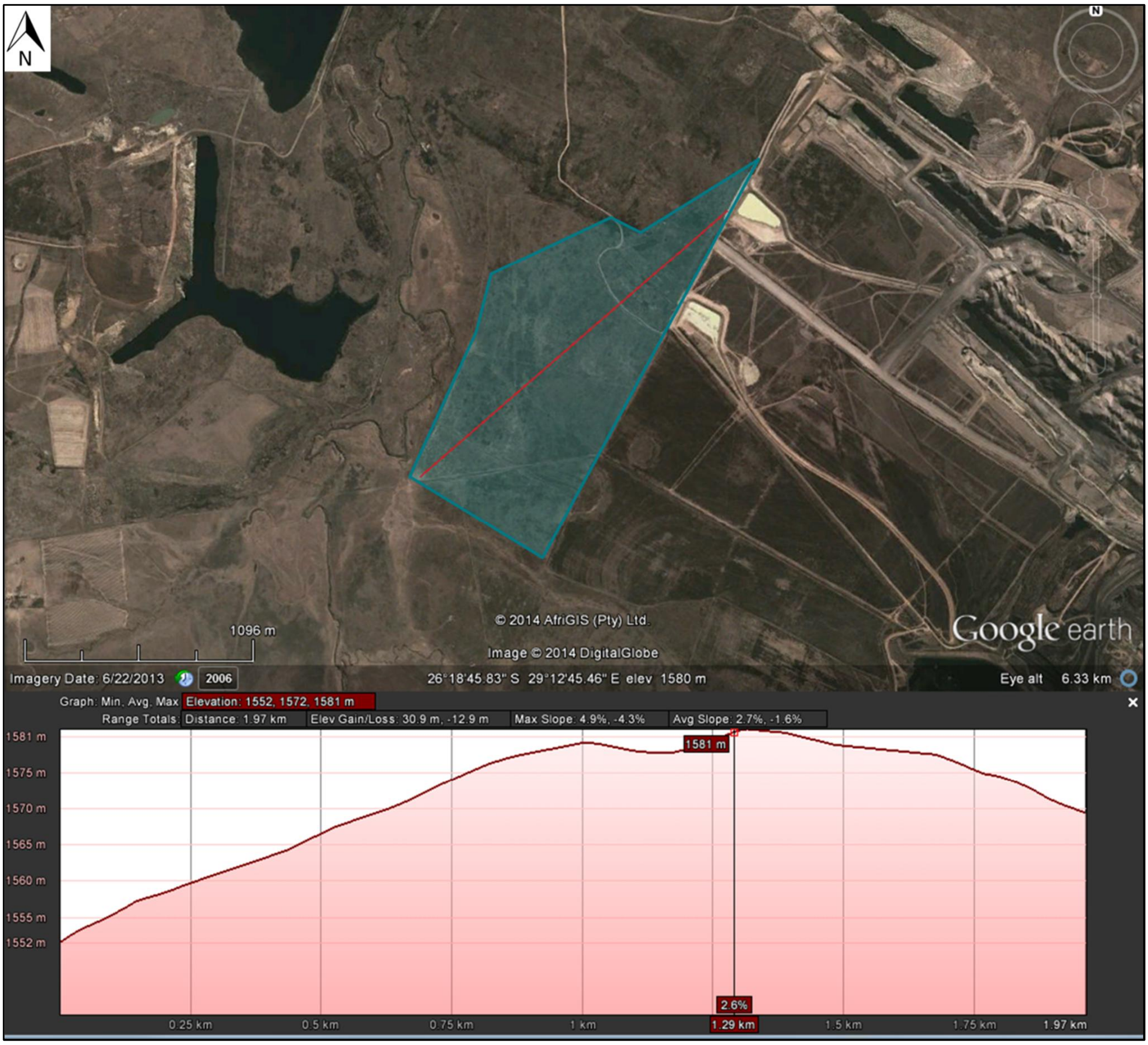



Figure 7-11: Gradient Profile of Proposed Block Z area (Google Earth, 2013)

## 7.9 Soil and Land Capability

### 7.9.1 Regional Description

The soils that occur in the Olifants and Letaba River Catchment Areas (Isibonelo Colliery falls on the southern boundary of the catchment) are also closely related to the geology and landforms of the area. There is a wide variety of soil types distributed throughout the Olifants and Letaba River Catchment Areas. A summary of the different soil types found in the catchment areas is listed in **Table 7-8**. **Figure 7-12** represents the locations of the various soil types (the red circle indicates the proposed Block Z project area).

Table 7-8: Soils that occur in the Olifants and Letaba River Catchment Areas (Environomics and MetroGIS, 2009))

| Soil Description | Area ($km^2$) | Percentage (%) |
|---|---|---|
| Glenrosa and / or Mispah forms (other soils may occur) - lime generally present in the entire landscape. | 697.01 | 0.95 |
| Glenrosa and / or Mispah forms (other soils may occur) - lime rare or absent in the entire landscape. | 7 601.97 | 10.33 |
| Glenrosa and / or Mispah forms (other soils may occur) - lime rare or absent in upland soils but generally present in low-lying soils. | 11 831.19 | 16.07 |
| Grey regic sands and other soils. | 126.36 | 0.17 |
| Miscellaneous land classes- rocky areas with miscellaneous soils. | 8 766.57 | 11.91 |
| Miscellaneous land classes- undifferentiated deep deposits. | 1 158.20 | 1.57 |
| Miscellaneous land classes- very rocky with little or no soils. | 498.33 | 0.68 |
| One or more of: vertic- melanic- red structured diagnostic horizons- undifferentiated. | 6 768.32 | 9.19 |
| Plinthic catena: dystrophic and / or mesotrophic; red soils not widespread- upland duplex and margalitic soils rare. | 6 160.34 | 8.37 |
| Plinthic catena: Dystrophic and / or mesotrophic; red soils widespread- upland duplex and margalitic soils rare. | 6 974.62 | 9.47 |
| Plinthic catena: eutrophic; red soils not widespread - upland duplex and margalitic soils rare. | 2 484.12 | 3.37 |
| Plinthic catena: eutrophic; red soils widespread- upland duplex and margalitic soils rare. | 1 159.25 | 1.57 |
| Plinthic catena: undifferentiated- upland duplex and / or margalitic soils common. | 541.70 | 0.74 |
| Prismacutanic and / or pedocutanic diagnostic horizons dominant- B horizons mainly not red 5. | 514.00 | 0.70 |
| Prismacutanic and / or pedocutanic diagnostic horizons dominant. In addition- one or more of: vertic- melanic- red structured diagnostic horizons. | 608.33 | 0.83 |
| Red-yellow apedal- freely drained soils- red- high base status- < 300 mm deep. | 335.64 | 0.46 |
| Red-yellow apedal- freely drained soils; red and yellow- dystrophic and / or mesotrophic. | 1 846.66 | 2.51 |
| Red-yellow apedal- freely drained soils; red and yellow- high base status- usually < 15% Clay. | 1 378.58 | 1.87 |
| Red-yellow apedal- freely drained soils; red- dystrophic and / or mesotrophic. | 2 621.67 | 3.56 |
| Red-yellow apedal- freely drained soils; red- high base status- > 300 mm deep (no dunes). | 11 479.37 | 15.59 |
| Red-yellow apedal- freely drained soils; yellow- dystrophic and / or mesotrophic. | 37.37 | 0.05 |
| No Data / Surface Water. | 33.39 | 0.05 |

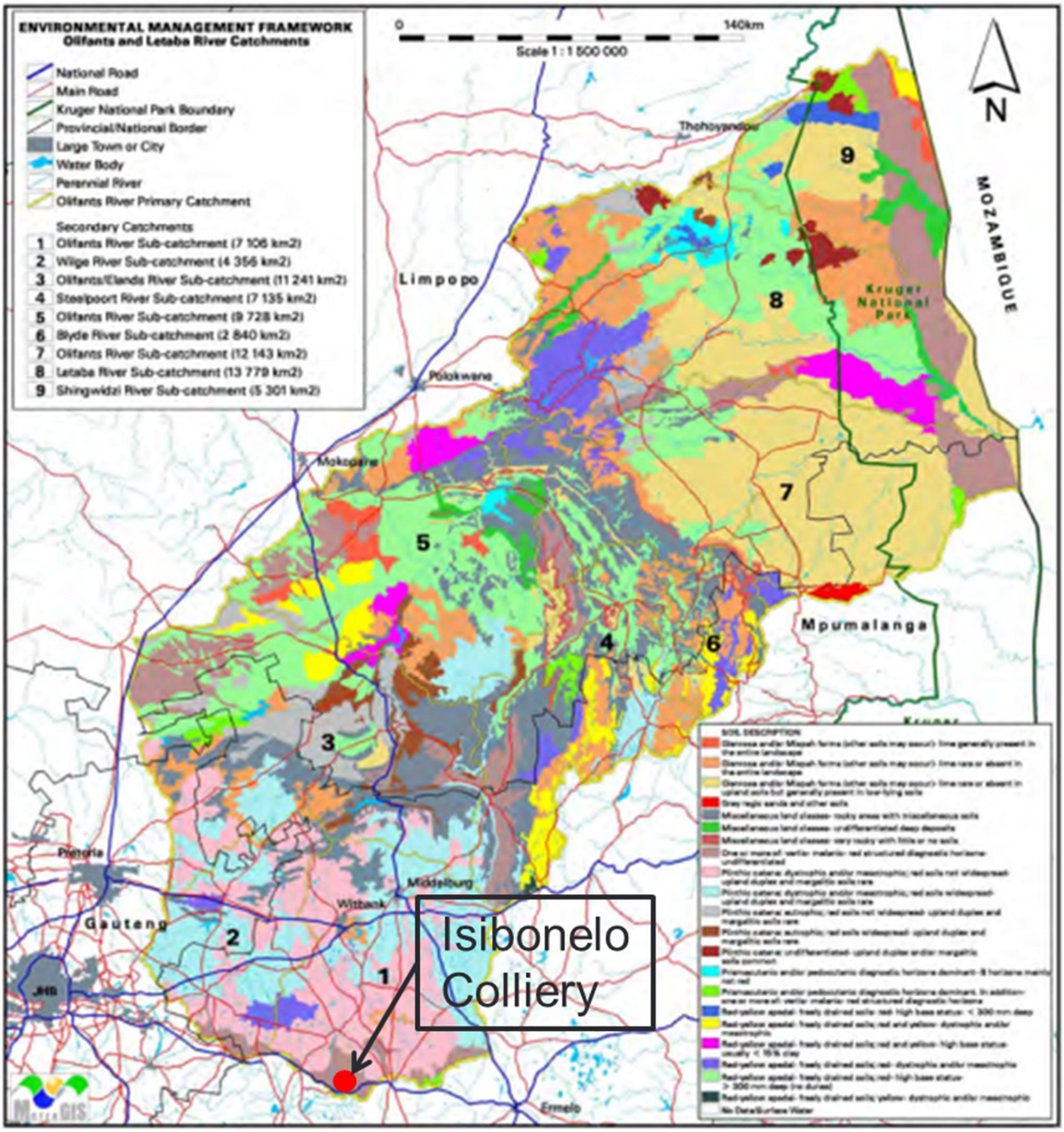



Figure 7-12: Soils represented across the Olifants and Letaba River Catchment Areas (Environomics and MetroGIS, 2009)

### 7.9.2 Site Description

Geological, climate and topographical parameters are responsible for the formation of the two broad soil patterns occurring in the Isibonelo Colliery mine lease area. Red to yellow and greyish, more sandy soils are found towards the north-eastern section of the Isibonelo Colliery mine lease area. In the south-western section, black and red strongly structured, vertic soils are present.

The following soil types occur at the proposed Block Z project site (in terms of the South African Binomial Soil Classification) (Earth Science Solutions, 2008):

Avalon / Bainsvlei

Avalon and Bainsvlei soil forms fall into the "hydromorphic" category of soils as classified. These soils are generally found associated with, and down slope of the dry, sandy loams and sandy clay loams (Clovelly and Griffin Form soils), within the transition zone of the moist grasslands. Chemically, these soils (characteristics are similar within these forms) are moderately well leached returning significantly lower amounts of Ca and Mg as well as Na, K and P. By definition, these soils vary in the degrees of wetness at the base of their profile. I.e. the soils are influenced by a rising and falling water table, hence the mottling within the lower portion of the profile. Depths of utilizable agricultural soil (to top of mottled horizon) vary from 400mm to 600mm.

Clovelly / Griffin

Soils of the Clovelly and Griffin Form have very similar characteristics, and are generally derived from the same parent materials. These soils generally returned pale red brown to yellow red colours in the topsoils, and fine to medium grained sandy, and silty clay loams, with dark orange reds and dark red colours in the sub soil horizons. The high iron content of the parent rocks from which these soils are derived, impart the strong red colours noted. The physical characteristics of these soils mapped vary, from those with a fine to medium grained sandy and / or silty loam, with pale gray brown to yellow brown colours and a single grained orthic topsoil ("A" horizon), on a yellow to yellow / red dystrophic "B", to those with a more clay rich sandy clay loam, displaying much redder and less leached colours. These soils exhibit a predominantly dystrophic leaching status and luvic characteristics.

From previous studies undertaken in close proximity to the proposed Block Z project site the following conditions are pertinent (Radyn et al, 2010):

- The soil materials vary in both physical and chemical composition, based predominantly on the parent materials from which the soils have developed / are derived, while the effects of the geomorphology (climate, slope, attitude and the overall topography) have an influence on the pedogenisis and resultant soil forms present;
- The local geology comprises horizontal to sub-horizontally bedded sediments of the Karoo formations and Ecca group in particular (sandstones, siltstones and mudstones), with significant younger intrusives comprising dolerite and in places diabase dykes and sills;
- This geomorphology combined with the semi-arid climate and undulating topography results in soils with a number of similar / common attributes that are tempered and altered by the changes in the lithological units that occur at or close to surface; and
- The soil chemistry, topographic slope and the degree or lack of adequate vegetative cover influences the erosion index and degree of impact on the natural conditions.

A factor important to these areas and a factor that is moderately typical of semi-arid environments are the evaporites that characteristically occur as layers within the wet based soil profiles. These features are important to the ecological sustainability of the area, and need to be considered in terms of both the risk as well as the sensitivity analysis if development is to be considered on any of the sites proposed.

Avalon, Bainsvlei, Griffin and Clovelly soils each have their own erodibility indices which are indicated in **Table 7-9**. According to **Table 7-9**, the erosional index of the Clovelly and Griffin soil types is considered Low to Moderate whereas the erosional index of the Bainsvlei and Avalon soil types is considered Moderate to High.

**Table 7-9: Soil erosion indices (Radyn et al, 2010)**

| Soil Form | Erodibility Index |
|---|---|
| Hutton / Clovelly / Griffin | Low to Moderate |
| Pinedene / Bloemdale | Moderate |
| Glencoe / Dresden | Moderate |
| Sepane | Moderate to High |

| Soil Form | Erodibility Index |
|---|---|
| Bainsvlei / Avalon | Moderate to High |
| Westleigh / Longlands | High |
| Glenrosa / Mispah / Mayo | Moderate |
| Valsrivier | High |
| Swartland / Sterkspruit | Moderate |
| Kroonstad | High |
| Rensburg / Bonheim | High |

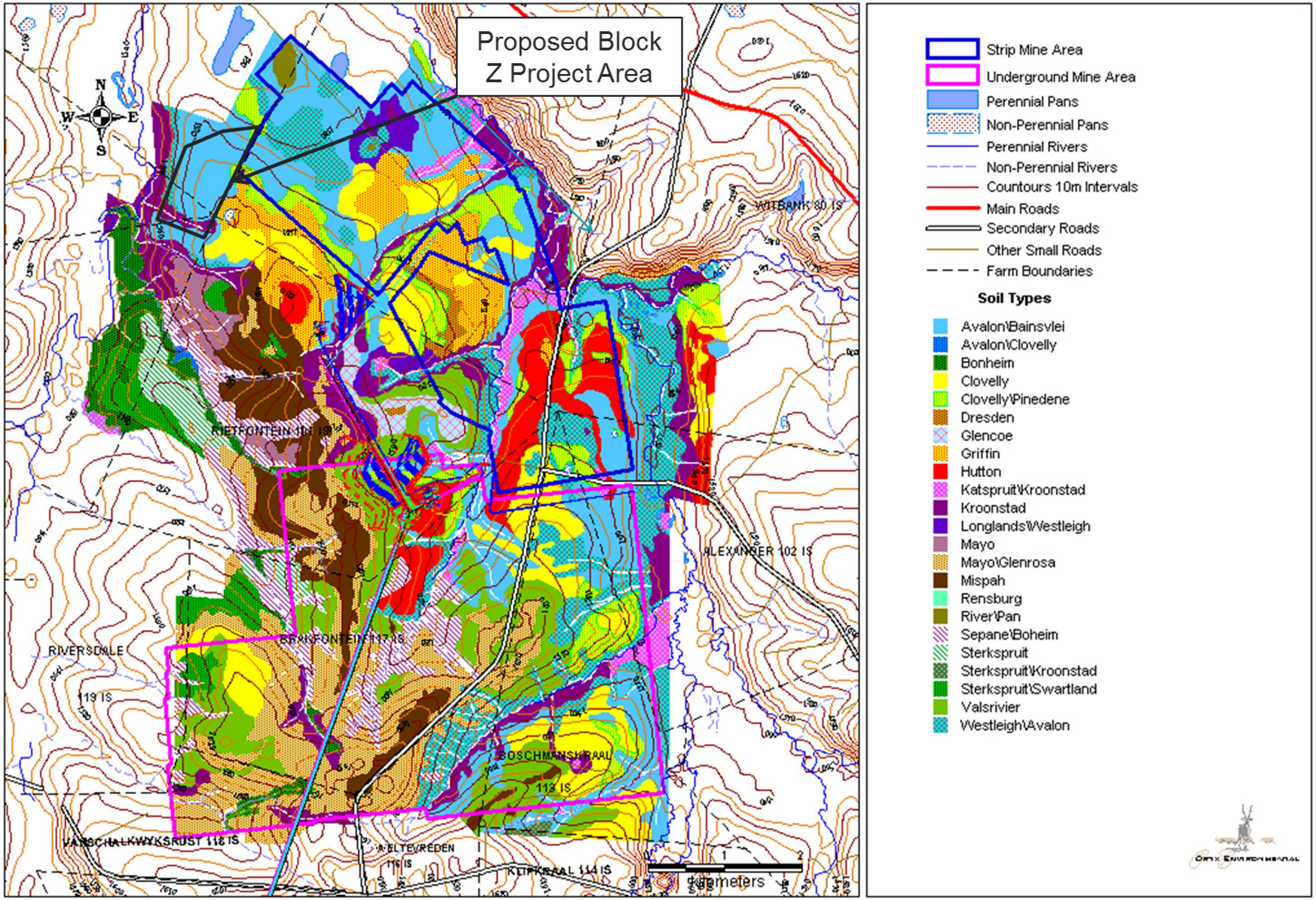



Figure 7-13: Soil Types found in and around the Isibonelo Colliery Mine Lease Area (Oryx Environmental, 2001)

## 7.10 Land Use

### 7.10.1 Regional Description

The most common forms of land use in the region surrounding the study area include:

- Crop (mainly maize and soya) cultivation.
- Livestock (mainly cattle) grazing.
- Coal mining and power generation.
- Human settlement.

### 7.10.2 Site Description

The proposed Block Z project is situated primarily in land type Bb4. The western side of the proposed Block Z project is situated in land type Ea20. Both these land types feature slightly to moderately undulating landscapes. The Bb4 land type includes some low hills and small to large pan depressions, while the Ea20 land type is interspersed with scattered small wetlands, narrow stream alluvia, pans and occasional ridges or rocky outcrops (Mucina & Rutherford 2006).

The proposed Block Z project area falls within the following areas:

- Land which has the potential for cattle grazing;
- An existing mining right area of Isibonelo Colliery (however approved mining right associated with underground mining); and
- Directly adjacent to existing open cast operations at Isibonelo Colliery and will therefore not significantly alter the land use or sense of place in the area.

## 7.11 Flora

### 7.11.1 Regional Description

There are 52 vegetation types occurring within the Olifants and Letaba river catchment areas. Of these, 29 occur in the Savanna Biome, 13 in the Grassland Biome and 5 in the Forest Biome (**Figure 7-14)**. There are also 4 wetland vegetation types that are considered to be azonal or not limited to a single biome. **Figure 7-15** indicates the layout of the various threatened ecosystems across the Olifants and Letaba river catchment areas.

### 7.11.2 Site Description

The proposed Block Z project site is situated within the Grassland Biome (indicated as Mosaic Grassland Biome in as classified by Rutherford & Westfall (1994). The majority of plant species within grasslands are non-grassy herbs (forbs), most of which are perennial plants with large underground storage structures. Frost, fire and grazing maintain the herbaceous grass and forb layer, and ultimately prevent the establishment of tall woody plants (Tainton 1999).

The Grassland Biome has extremely high biodiversity, second only to the Fynbos Biome. At the 1000m scale, the average species richness of the Grassland Biome is even higher than that of Fynbos, being surpassed only by Renosterveld (Cowling et al. 1997; Van Wyk 2002). Furthermore, the majority of rare and threatened plant species in the summer rainfall region of South Africa are restricted to high-rainfall grassland, making this the vegetation type in most urgent need of conservation (60% destroyed and only 2.2% conserved). It should be noted that the proposed Block Z area does not lie within or adjacent to any protected areas.

The proposed Block Z project site is situated primarily within Gm 12 Eastern Highveld Grassland vegetation type. The western side of proposed Block Z project site is situated in Gm 8 Soweto Highveld Grassland (**Figure 7-17).** The dominant floral species in these vegetation types are listed in **Table 7-10**.

#### 7.11.2.1 Eastern Highveld Grassland

Eastern Highveld Grassland represents a short, dense form of grassland. It is dominated by the usual composition of Highveld grassland floral taxa (i.e. *Aristida, Digitaria, Eragrostis, Themeda, Tristachya* etc.), but is interspersed with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Acacia caffra, Celtis africana, Diospyros lycioides subsp. lycioides, Parinari capensis, Protea caffra, Protea welwitschii, and Rhus magaliesmontanum*). Eastern Highveld Grassland is recognized as an Endangered South African vegetation type (Mucina & Rutherford 2006). At least 44% of this vegetation type has been transformed mainly by crop cultivation, but also afforestation, mining, urbanization and construction of dams. Although alien plant invasion is not an extensive problem in this grassland type, *Acacia mearnsii* can become dominant in disturbed places. Only a very small fraction of Eastern Highveld Grassland is conserved in the statutory Nooitgedacht Dam and Jericho Dam Nature Reserves, and in the Holkranse, Kransbank and Morgenstond private reserves. Considering this, it seems unlikely that the national target to protect 25% of this vegetation type will be met. **Figure 7-17** depicts the proposed Block Z project site in relation to the Eastern and Soweto Highveld Grasslands and **Figure 7-10** details the floral species that comprise these grassland types.

#### 7.11.2.2 Soweto Highveld Grassland

Soweto Highveld Grassland represents a short to medium-high, dense, tufted grassland dominated almost entirely by *Themeda triandra*, and accompanied by a variety of other grasses such as *Elionurus muticus, Eragrostis racemosa, Heteropogon contortus* and *Tristachya leucothrix*. Soweto Highveld Grassland is also recognized as an Endangered South African vegetation type (Mucina & Rutherford 2006). Almost 50% of this vegetation type has been transformed mainly by crop cultivation, urban sprawl, mining, roads and dams.

Only a handful of patches of Soweto Highveld Grassland are conserved in the statutory Waldrift, Krugersdorp, Leeuwkuil, Suikerbosrand and Rolfe‟s Pan nature reserves, and in the Johanna Jacobs, Tweefontein, Gert Jacobs, Nikolaas and Avalon private reserves, and the Heidelberg Nature Heritage Site. It, therefore, seems unlikely that the national target to protect 24% of this vegetation type will be met

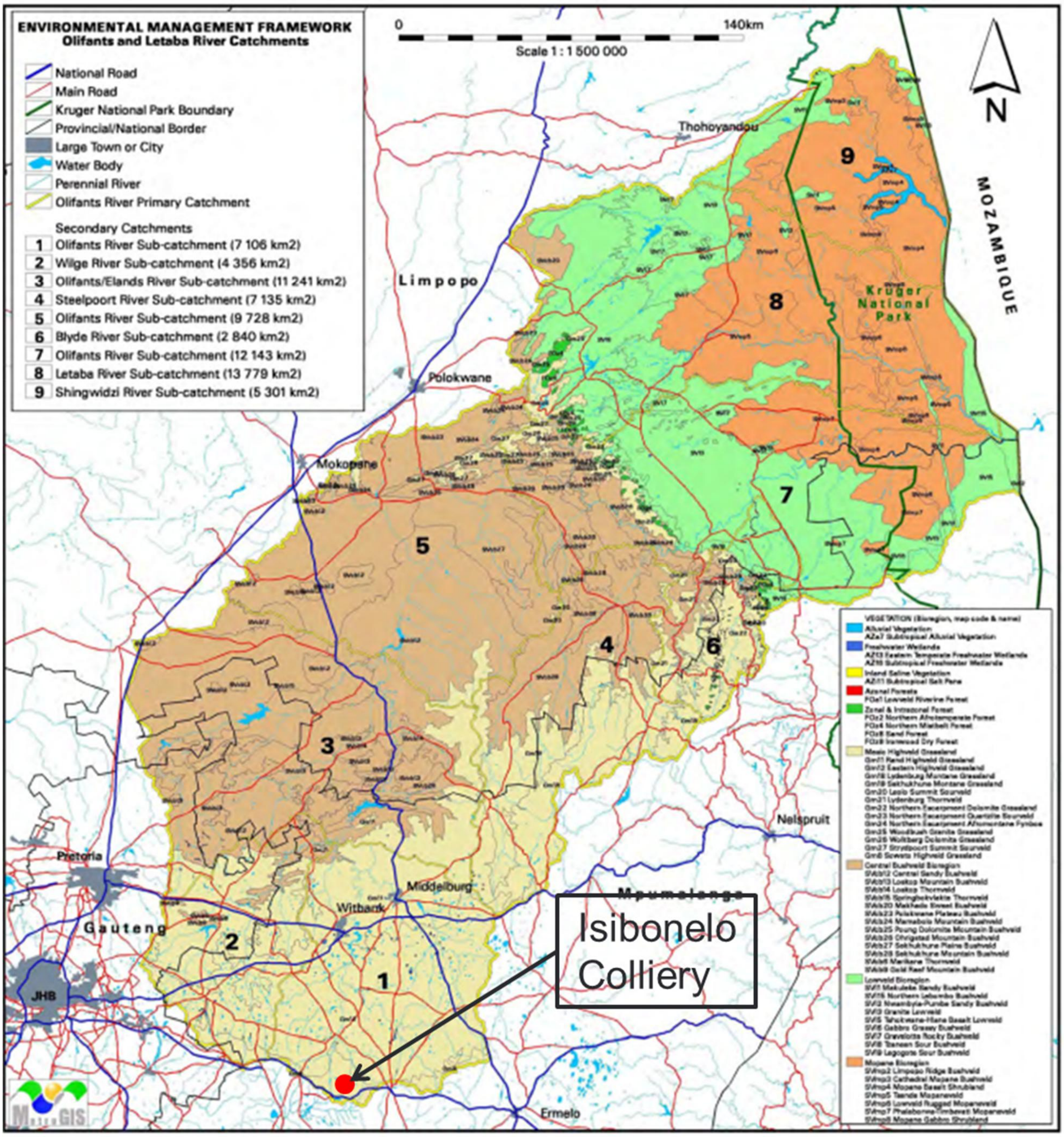



Figure 7-14: Vegetation cover across the Olifants and Letaba river catchment areas (Environomics and MetroGIS, 2009)

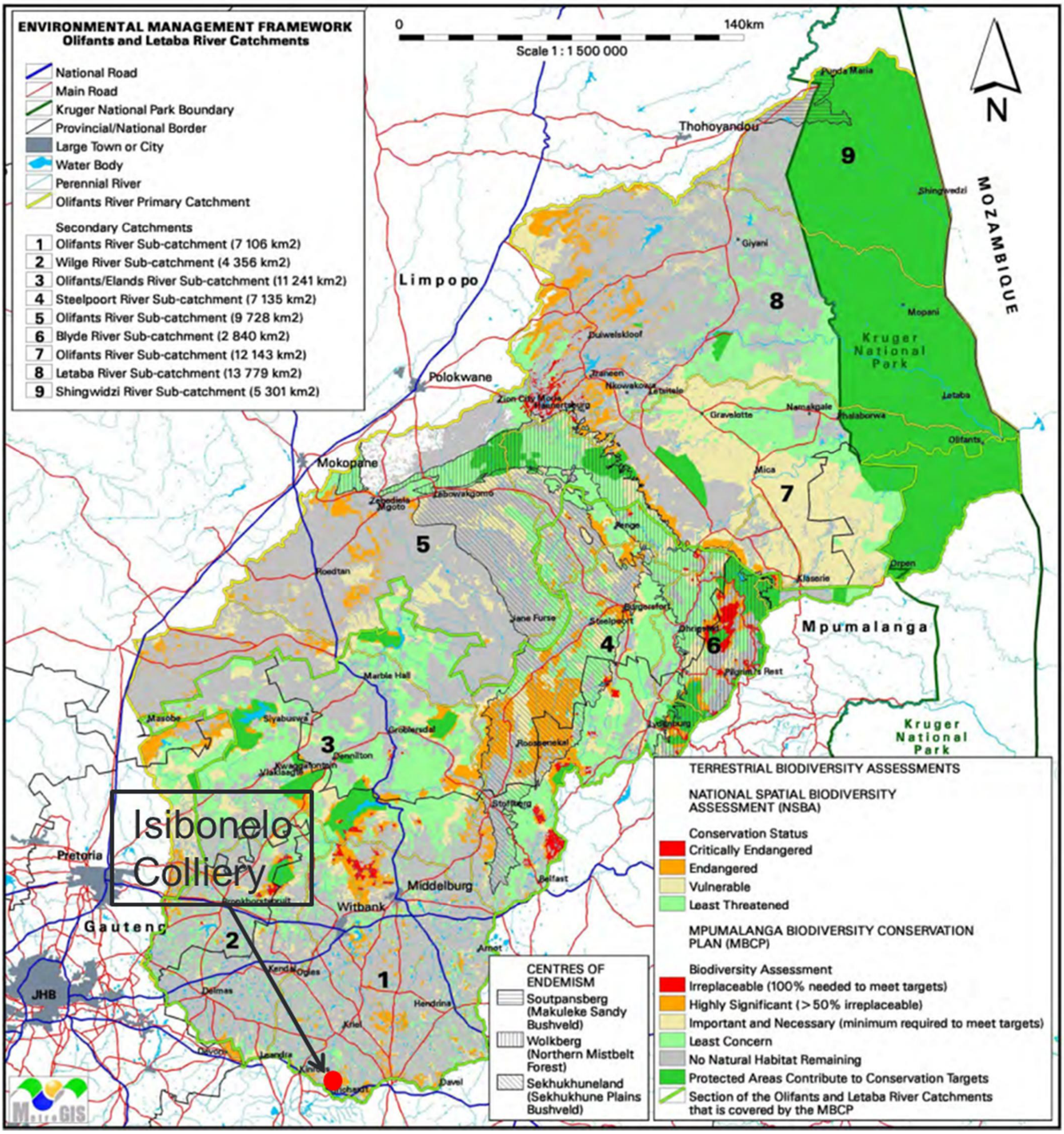



**Figure 7-15: Threatened Ecosystems across the Olifants and Letaba river catchment areas (Environomics and MetroGIS, 2009)**

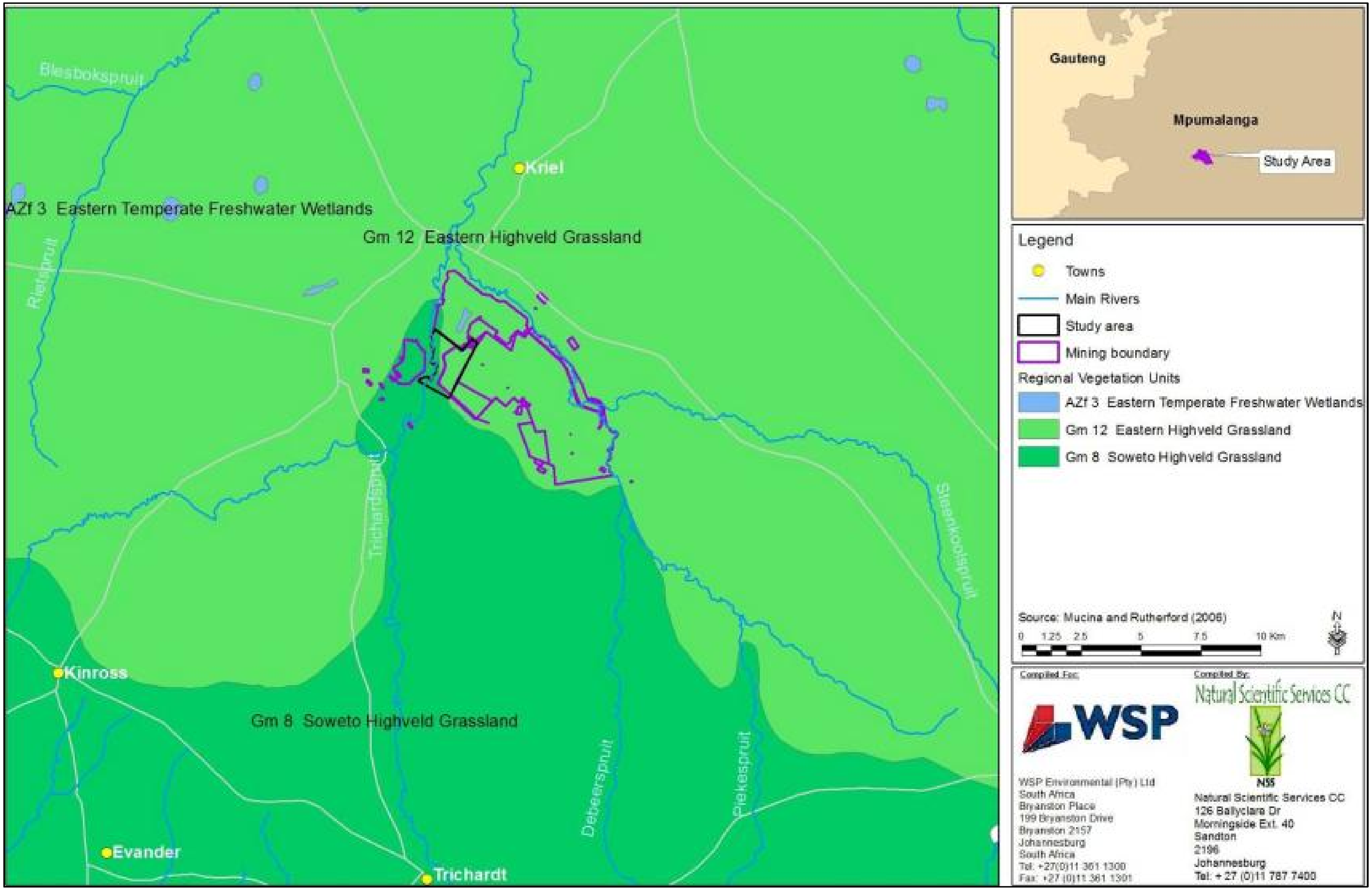



Figure 7-16: Vegetation types in the study region (NSS, 2014)

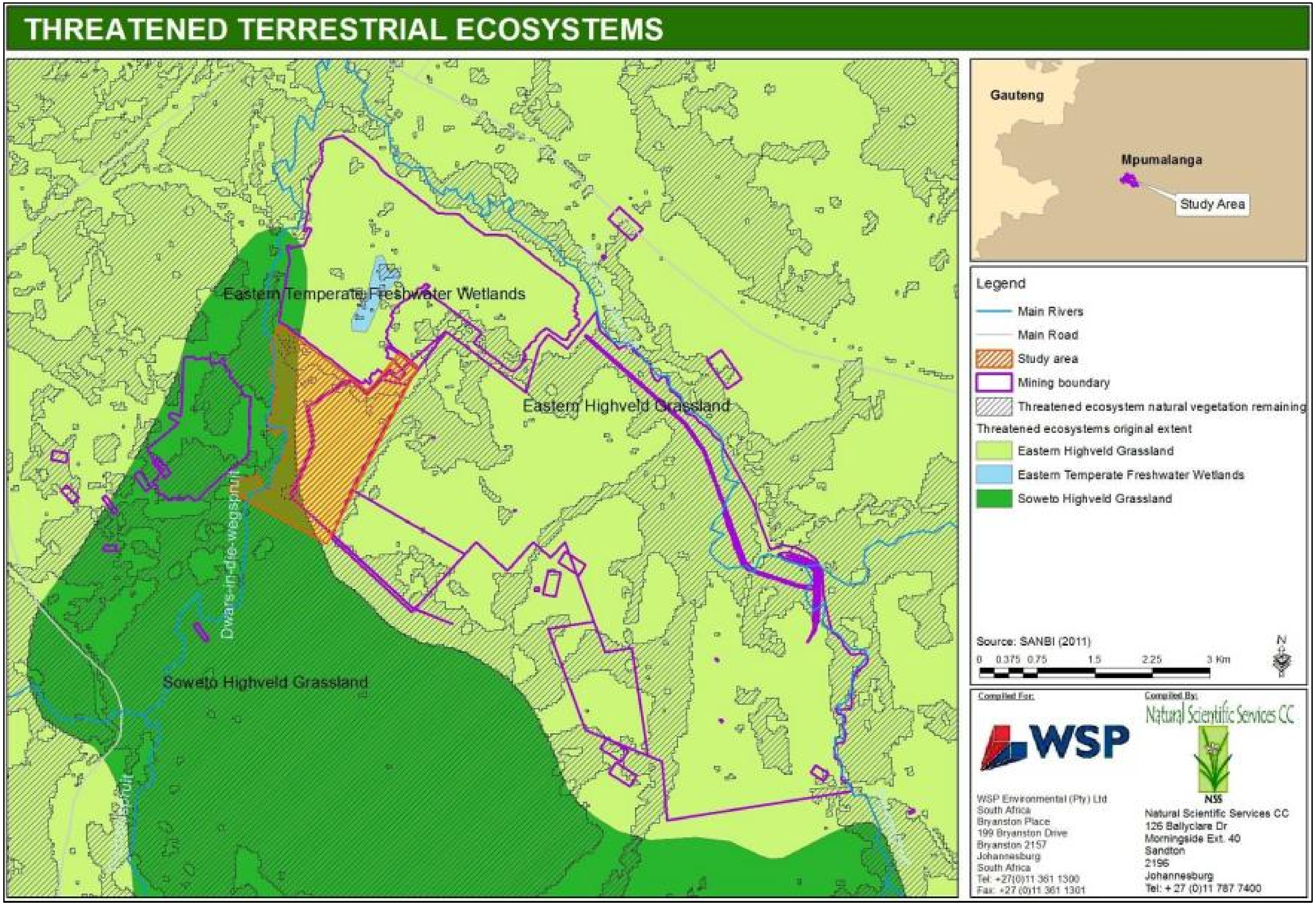



**Figure 7-17: Remaining (hatched) patches of the Eastern and Soweto Highveld Grassland Threatened (NSS, 2014)**

Table 7-10: Dominant Floral Species Comprising the Regional Vegetation Types in the proposed Block Z area (NSS, 2014)

| Growth Form | Species |
|---|---|
| **Eastern Highveld Grassland** | |
| Low shrubs: | *Anthospermum rigidum subsp. pumilum, Seriphium plumosum.* |
| Graminoids: | *Aristida aequiglumis, Aristida congesta, Aristida junciformis subsp. galpinii, Brachiaria serrata, Cynodon dactylon, Digitaria monodactyla, Digitaria tricholaenoides, Elionurus muticus, Eragrostis chloromelas, Eragrostis curvula, Eragrostis plana, Eragrostis racemosa, Eragrostis sclerantha, Heteropogon contortus, Loudetia simplex, Microchloa caffra, Monocymbium ceresiiforme, Setaria sphacelata, Sporobolus africanus, Sporobolus pectinatus, Themeda triandra, Trachypogon spicatus, Tristachya leucothrix, Tristachya rehmannii.* |
| Herbs: | *Berkheya setifera, Haplocarpha scaposa, Justicia anagalloides, Pelargonium luridium, Acalypha angustata, Chamaecrista mimosoides, Dicoma anomala, Euryops gilfillanii, Euryops transvaalensis subsp. setilobus, Helichrysum aureonitens, Helichrysum caespititium, Helichrysum callicomum, Helichrysum oreophilum, Helichrysum rugulosum, Ipomoea crassipes, Pentanisia prunelloides* subsp. *latifolia, Selago denisiflora, Senecio coronatus, Hillardia oligocephala, Walhlenbergia undulata.* |
| Succulent herb: | *Aloe ecklonis.* |
| Geophytic herbs: | *Gladiolus crassifolius, Haemanthus humilis subsp. hirsutus, Hypoxis rigidula var. pilosissima, Ledebouria ovatifolia.* |
| **Soweto Highveld Grassland** | |
| Low shrubs: | *Anthospermum hispidulum, Anthospermum rigidum subsp. pumilum, Berkheya annectens, Felicia muricata, Ziziphus zeyheriana.* |
| Herbaceous climber: | *Rhynchosia totta.* |
| Graminoids: | *Andropogon appendiculatus, Brachiaria serrata, Cymbopogon pospischilii, Cynodon dactylon, Elionurus muticus, Eragrostis capensis, Eragrostis chloromelas, Eragrostis curvula, Eragrostis plana, Eragrostis planiculmis, Eragrostis racemosa, Heteropogon contortus, Hyparrhenia hirta, Setaria nigrirostis, Setaria sphacelata, Themeda triandra, Tristachya leucothrix.* |
| Herbs: | *Hermannia depressa, Acalypha angustata, Berkheya setifera, Dicoma anomala, Euryops gilfillanii, Geigeria aspera var. aspera, Graderia subintegra, Haplocarpha scaposa, Helichrysum micronifolium, Helichrysum nudifolium var. nudifolium, Helichrysum rugulosum, Hibiscus pusillus, Justicia anagalloides, Lippia scaberrima, Rhynchosia effusa, Schistostephium crataegifolium, Selago densiflora, Senecio coronatus, Vernonia oligocephala, Wahlenbergia undulata.* |
| Geophytic herbs: | *Haemanthus humilis subsp. hirsutus, Haemanthus montanus.* |

# 7.12 Fauna

## 7.12.1 Regional Description

A summary of potentially occurring vertebrate and invertebrate taxa (for those taxonomic groups for which comprehensive distribution data is readily available) are provided only, and are subject to in **Table 7-11**. The lists are based on desktop research change following observations during the field surveys.

Table 7-11: Summary of Potentially Occurring Species (NSS, 2014)

| Faunal Group | No. of Potentially Occurring Species |
|---|---|
| **Mammals (class: Mammalia)** | 53 |
| **Birds (Class: Aves)** | 196 |
| **Reptiles (Class: Reptilia)** | 31 |

| Faunal Group | No. of Potentially Occurring Species |
|---|---|
| **Frogs (Class Amphibia)** | 14 |
| **Butterflies (Order: Lepidoptera)** | 19 |
| **Scorpions (Order: Scorpiones)** | 3 |

There is currently little information on the geographic ranges and conservation status of most other terrestrial macro-invertebrates in South Africa. Moreover, comprehensive sampling and accurate identification of all insect, arachnid, crustacean, molluscan and other terrestrial macro-invertebrate taxa would require considerable sampling effort, time, specialist expertise and funding. This assessment, thus, involved opportunistic sampling of some of the more conspicuous terrestrial macro-invertebrates for which atlas data exists (ie: butterflies and scorpions).

Of the 53 potentially occurring mammal species, 21 species are highly likely to occur and include Steenbok (Raphicerus campestris), Slender Mongoose (Galerella sanguinea), Large-spotted Genet (Genetta tigrina), Striped Polecat (Ictonyx striatus), Vlei Rat (Otomys irroratus), Springhare (Pedetes capensis), Striped Mouse (Rhabdomys pumilio) and Pouched Mouse (Saccostomus campestris). Thirty-two species have a moderate LoO given their marginal distribution, ecological requirements, habitat transformation and / or sensitivity to disturbance. These species include e.g. the Highveld Golden Mole (Amblysomus septentrionalis), Caracal (Caracal caracal), Spotted Neck Otter (Lutra maculicollis) and other

small carnivores, the cave-dwelling Natal Long-fingered (Miniopterus natalensis) and Geoffroy's Horseshoe (Rhinolophus clivosus) bats, Southern African Hedgehog (Atelerix frontalis), and various habitat-specific shrew and rodent species. Common Duiker (Sylvicapra grimmia), Reedbuck (Redunca arundinum), and the spoor of Serval (Leptailurus serval) were tentatively identified on site by WSP (J. Bedford-Owen pers. comm. 2014). Servals have also reportedly been seen by mine staff (J. Bedford-Owen pers. comm. 2014).

Of the 196 potentially occurring avifaunal species, 129 species are highly likely to occur, and 67 species may occur given their marginal distribution, ecological requirements, habitat transformation and / or sensitivity to disturbance. Water, insect-eating and seed-eating species, respectively, represent approximately 30%, 36% and 16% of the 129 avifaunalspecies that are highly likely to occur. Seven raptor and three nocturnal (i.e. owl and nightjar) species also have a high LoO. Water birds also represent the largest proportion (34%) of the 67 species that have a moderate LoO. Five raptor and one nocturnal species may occur. Potentially occurring species that are most sensitive to disturbance include e.g. Caspian Tern (Sterna caspia), African Openbill (Anastomus lamelligerus), Southern Bald Ibis (Geronticus calvus), Black-winged Pratincole (Glareola nordmanni), Lesser Flamingo (Phoenicopterus minor), Greater Flamingo (Phoenicopterus ruber), Maccoa Duck (Oxyura maccoa), African Marsh-harrier (Circus ranivorus), Blue Korhaan (Eupodotis caerulescens), Lanner Falcon (Falco biarmicus), Lesser Kestrel (Falco naumanni) and African Grass-owl (Tyto capensis). African Grass-owl was tentatively identified on site by WSP (J. Bedford-Owen pers. comm. 2014).

Potentially 31 reptile species may occur in the study area, of which the majority are represented by colubrid snakes. Fifteen reptile species have a high LoO and include common and adaptable species such as Brown House Snake, Brown Water Snake, Mole Snake, Thread Snake, Bibron's Blind Snake, Distant's Ground Agama, Transvaal and Cape Gecko, and Cape and Variable Skink. Fifteen reptile species have a moderate LoO given their marginal distribution, ecological requirements, habitat transformation and / or sensitivity to disturbance. Species with a marginal distribution include e.g. South Eastern Green Snake (Philothamnus hoplogaster), Short-snouted Grass Snake (Psammophis brevirostris), Mozambique Spitting Cobra (Naja mossambica) and Rhombic Night Adder (Causus rhombeatus). Species that are sensitive to disturbance include e.g. Spotted Harlequin Snake(Homoroselaps lacteus), Aurora House Snake (Lamprophis aurora), Common Flap-necked Chamaeleon (Chamaeleo dilepis dilepis), Coppery Grass Lizard (Chamaesaura aenea), and Short-headed Legless Skink (Acontias breviceps).

Fourteen amphibian species potentially occur in the study area, of which seven species have a high LoO, several of which have been observed on site by WSP (J. Bedford-Owen pers. comm. 2014). Species that are highly likely to occur include the common Raucous Toad (Amietophrynus rangeri) and Red Toad (Schismaderma carens), Snoring Puddle Frog (Phrynobatrachus natalensis), Common River Frog (Amietia angolensis), Striped Stream Frog (Strongylopus fasciatus), Tremolo Sand Frog (Tomopterna cryptotis) and Natal Sand Frog (Tomopterna natalensis). Giant Bullfrog (Pyxicephalus adspersus) has a moderate LoO considering that while local climatic conditions are suitable for this species (Yetman, 2012), extensive crop cultivation and mining have likely reduced or destroyed local populations. Available butterfly distribution data (i.e. SABCA, 2010; Mecenero et al. 2013; LepiMap, 2014) suggest that there is a very low diversity of butterfly species within the degree square 2629, including QDS 2629AC wherein Block Z is situated. This is likely due to a long-standing lack of sampling effort in this region because common butterfly species such as the Broad-bordered Grass Yellow (Eurema brigitta brigitta), Pirate (Catacroptera cloanthe cloanthe), Common Diadem (Hypolimnas misippus), Eyed Pansy (Junonia orithya madagascariensis), Painted Lady (Vanessa cardui) and Brown-veined White (Belenois aurota aurota) have reportedly never been recorded in the area even though NSS has observed these species at nearby sites. The appended butterfly list, therefore, probably provides a poor reflection of local butterfly diversity, and at least several more butterfly species occur in the study area. At least three scorpions are considered likely to occur in the study area. These include Cheloctonus jonesii, which inhabits peaty soils, and the thick-tailed scorpions Pseudolychas pegleri and Uroplectes triangulifer, which are known to occur in suburban and even industrial areas in Gauteng.

## 7.13 Archaeology and Cultural Heritage

In order to understand possible finds that could be unearthed during construction activities, it is necessary to give a background regarding the different phases of human history in the area. **Figure 7-20** presents the site relative to the Ramsar and World Heritage Sites.

### 7.13.1 Historical Context

#### 7.13.1.1 Stone Age

The Stone Age is the period in human history when lithic material was mainly used to produce tools (Coertze & Coertze 1996: 293). In South Africa the Stone Age can be divided in three periods. It is, however, important to note that dates are relative and only provide a broad framework for interpretation. The division for the Stone Age according to Korsman & Meyer (1999: 93-94) is as follows:

- Early Stone Age (ESA) 2 million – 150 000 years ago;
- Middle Stone Age (MSA) 150 000 – 30 000 years ago; and
- Late Stone Age (LSA) 40 000 years ago – 1850 - A.D.

The geographical area around the town of Kriel is not known as an area containing prehistoric sites dating to the Stone Age. For instance no such sites are indicated on maps contained in a historical atlas of this area (Bergh 1999: 4-5). However this may only be since no research has actually been done in this area. The closest known Stone Age occurrences are a Late Stone Age site at the town of Ermelo and rock art sites in the Chrissiesmeer area (Bergh 1999: 4-5) which lies much further to the south-east.

However, no natural shelters were seen during the survey and therefore it is possible that these people did not stay here for long periods. The good vegetation in the surrounding area and the rivers indicated that ample grazing and water may have been available, making it a prime spot for hunting in the past. Therefore one may assume that Stone Age people probably would have moved through the area.

#### 7.13.1.2 Iron Age

The Iron Age is the name given to the period of human history when metal was mainly used to produce metal artifacts (Coertze & Coertze 1996: 346). In South Africa it can be divided in two separate phases according to Van der Ryst & Meyer (1999: 96-98), namely:

- Early Iron Age 200 – 1000 A.D; and
- Late Iron Age 1000 – 1850 A.D.

Huffman (2007: xiii) however, indicates that a Middle Iron Age should be included. His dates, which now seem to be widely accepted in archaeological circles, are:

- Early Iron Age (EIA) 250 – 900 A.D;
- Middle Iron Age (MIA) 900 – 1300 A.D; and
- Late Iron Age (LIA) 1300 – 1840 A.D.

In the historical atlas no sites from the Early Iron Age are indicated in this area (Bergh 1999: 6). Again it needs to be stated that this may only be a result of the lack of research done in this part of the country.

In contrast to the mentioned periods in time, it is known that Late Iron Age sites are found in a large area around the towns of Bethal and Standerton. It includes at least 585 such sites. At none of these indications of metal working has been found (Bergh 1999: 6-7), meaning that it would mostly consist of stone walled living complexes. It is also known that the early trade routes did not run through this area (Bergh 1999: 9).

During a recent survey on some farms to the east of the Isibonelo area, two Late Iron Age sites were identified, indicating that these people did utilize the area. The good grazing in the broader environment would have provided a good environment for Iron Age people although building material would have been reasonably scarce. One would therefore expect not to find many Iron Age sites, but these people definitely utilized the area. The white settlers later on moved into this environment for the same reason.

#### 7.13.1.3 Historical Age

The historical age started with the first recorded oral histories in the area. It includes the moving into the area of people that were able to read and write. This era is sometimes called the Colonial era or the recent past.

Due to factors such as population growth and a decrease in mortality rates, more people inhabited the country during the recent historical past. Therefore and because less time has passed, much more cultural heritage resources from this era have been left on the landscape. It is important to note that all cultural resources older than 60 years are potentially regarded as part of the heritage and that detailed studies are needed in order to determine whether these indeed have cultural significance. Factors to be considered include aesthetic, scientific, cultural and religious value of such resources.

At the beginning of the 19th century the Phuthing, a South Sotho group, stayed in the vicinity of modern day Kriel and Bethal. During the Difaquane they fled to the south (Bergh 1999: 10-11; 109). In 1829 the traveler Robert Scoon passed through an area to the south of Kriel (Bergh 1999: 13). The first white farmers only settled here during the late 1850’s. By the 1890’s this area was inhabited by many white farmers (Bergh 1999: 18-20).

During the Anglo-Boer War the Highveld areas saw much action consisting of various skirmishes between Boer and Brit (Bergh 1999: 51, 54). It includes skirmishes on the farms Oshoek (4 December 1901), Trigaardsfontein (10 December 1901), Witbank (11 January 1902) and Nelspan (26 January 1902). The farm Witbank is within the project area, but battlefields usually do not contain structures, but only artefacts such as bullet casings.

One may therefore expect to find farm buildings, structures and objects in the area. One can also expect to find signs of recent historical mining activities, possible remains of artefacts on battlefields and graves. Many graveyards from this period in time have indeed been identified in surrounding areas during past surveys (Archaetnos database).

### 7.13.2 Site Description

The project is located in a typical Mpumalanga Highveld setting with farming as the main activity. The topography of the surveyed area consists of rolling hills which slope gradually to the west where the Dwars-in-die-wegspruit is situated, just outside of the surveyed area.

The area has been primarily used for grazing resulting in low disturbance occurring, with only a relatively small area disturbed by agriculture. The most northern and north-western section of the surveyed area were identified as a rehabilitated open cast mine.

The grass cover was noted to be very dense with a length of approximately 0.5 – 1m high. Previously disturbed areas contain high concentrations of high growing weeds and cosmos flowers. The high density of vegetation had an extremely negative effect on archaeological visibility – in certain areas one only had vision for about 2-5m.

While no sites of cultural heritage significance were encountered in the proposed Block Z area, an adjacent area containing at least 9 graves was encountered. Graves are regarded as having a high cultural significance and this site has therefore received a field rating of Local Grade III B. The site should be included in the heritage register, but as it is not located within the proposed project area the graves need not be relocated and can be fenced off.

**Figure 7-18: One of the nine graves located in the surrounding areas (north western side of the Dwars-in-die-wegspruit.**

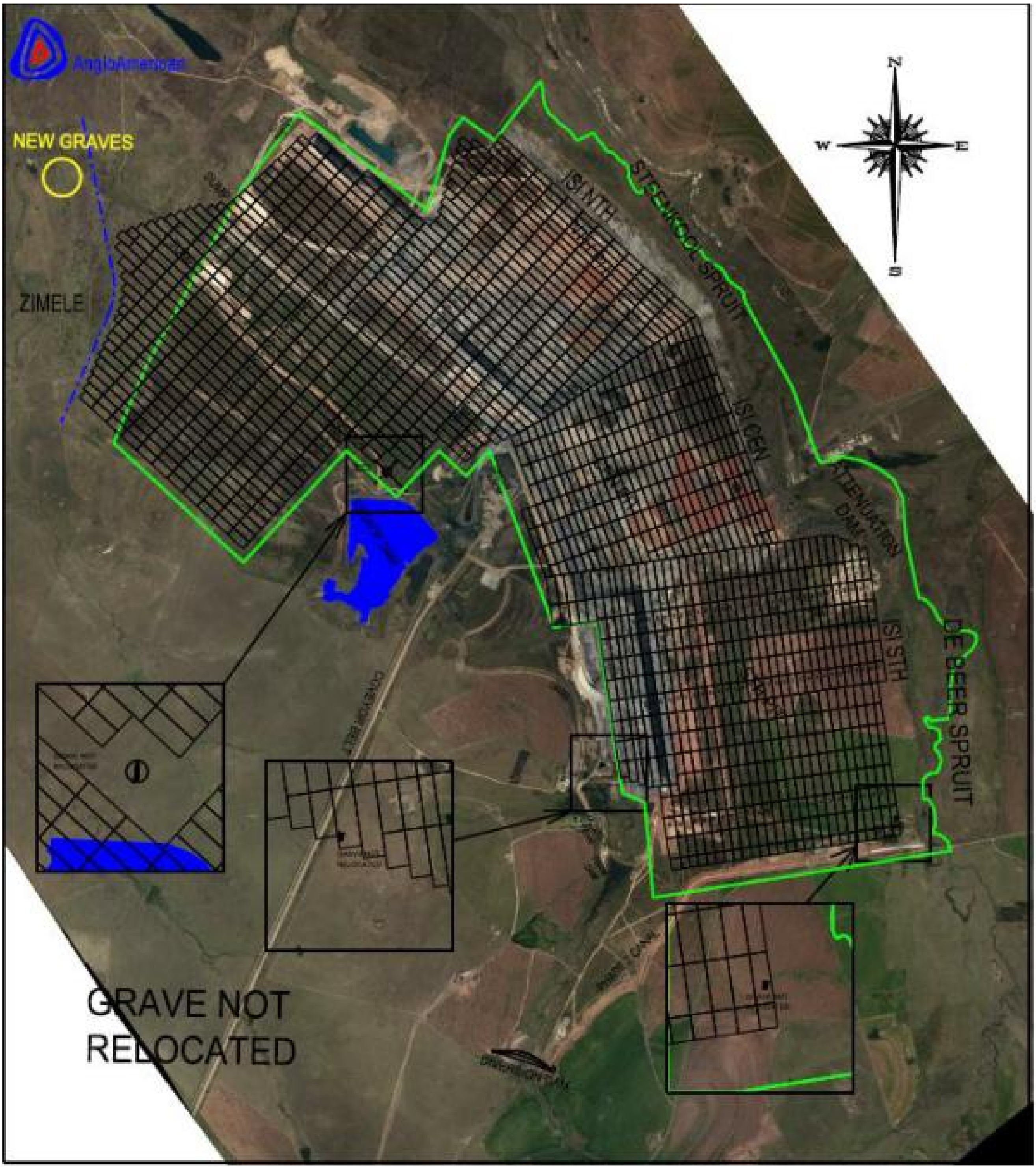



Figure 7-19: Location of the grave site identified North West of Block Z.

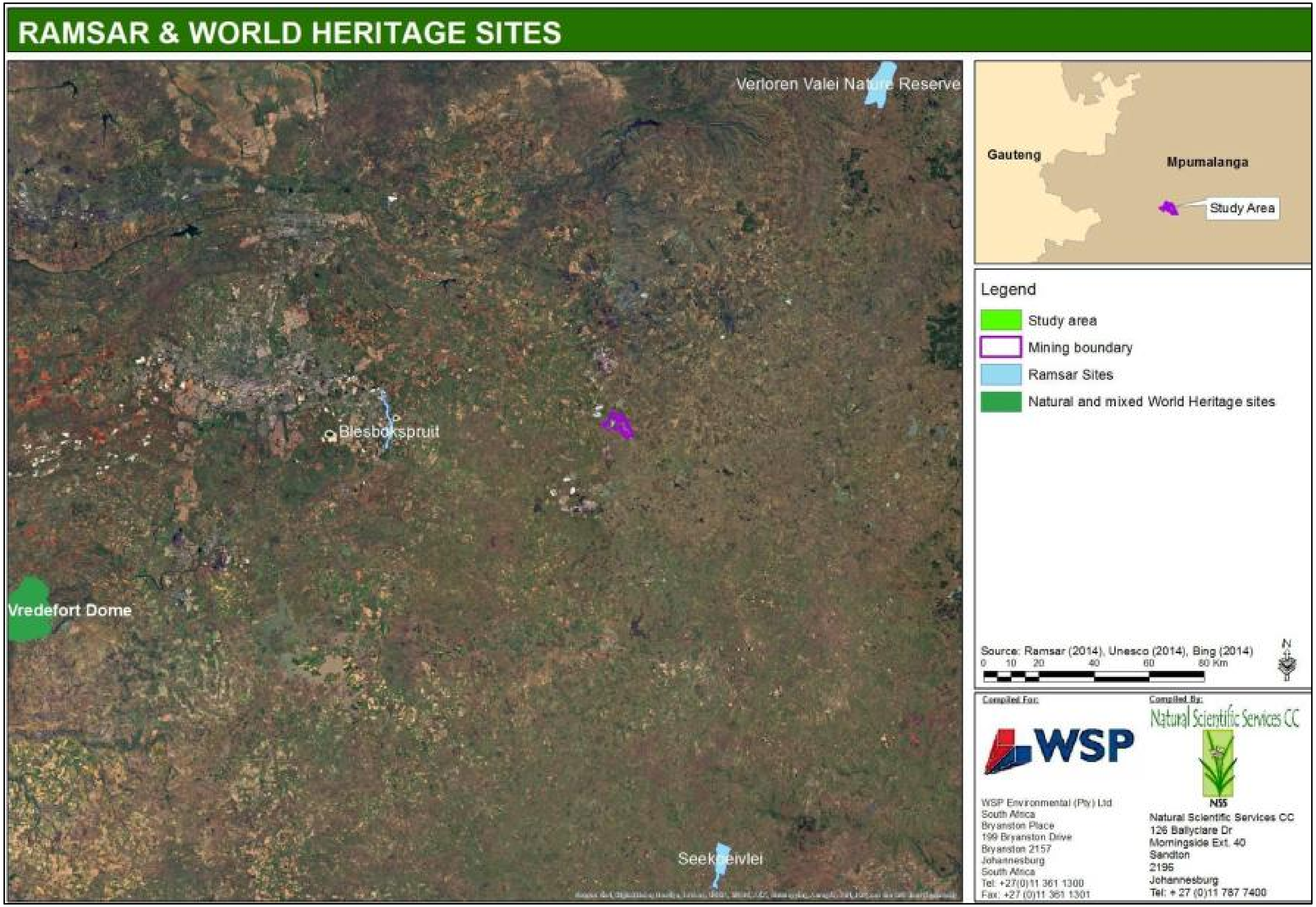



**Figure 7-20: The location of Ramsar and World Heritage sites in relation to the study area (NSS, 2014)**

## 7.14 Socio-Economic

### 7.14.1 Regional

The Mpumalanga Province is geographically split into the Highveld and the Lowveld by the northern reaches of the Drakensberg Mountain range. It covers an area of 76,495 $km^2$ approximately 6.3% of the country. Agriculture is one of the largest economic sectors in Mpumalanga, covering 68% of the land use in the province (Mpumalanga Economic Growth and Development Path, 2011).

Manufacturing is the largest economic sector in Mpumalanga, contributing almost 25% of the gross geographic product (GGP). This sector comprises predominantly of Sasol's coal refining activities and chemical operations in the southern Highveld (Secunda), however, chrome alloy and steel manufacturing also occurs in this area. The Lowveld is dominated by agricultural product manufacturing, including food and related industries, sugar mills, paper and pulp and other forestry related activities (SOER, 2005)

The mining sector is another important primary sector activity, providing 24% of the GGP and 6% of the employment in the province. In 2009, Mpumalanga contributed R169.9 billion to the GDP of South Africa (2011). The main mining sector is coal, with large resources situated in the western and south-western regions, while gold, iron ore, chrome, alusite, magnitie and vanadium contribute significantly towards the mining sector (Mpumalanga Economic Growth and Development Path, 2011).

Tourism in Mpumalanga is a key economic activity for the province and South Africa, as Mpumalanga is an established tourism area (Kruger National Park, the Blyde River Canyon, Pilgrim's Rest and private game reserves), and is growing as an eco-tourism destination.

### 7.14.2 District

Nkangala District Municipality (DC31) is located to the North-West of the Mpumalanga province and is the smallest district in land mass (21%) and has the second largest population concentration (35%) in the province (Nkangala District Municipality IDP, 2010 / 2011). Nkangala is the economic hub of Mpumalanga and is a major contributor in terms of GDP when compared to the other districts with a contribution of 40%. Gert Sibande at 33% and Ehlanzeni 27% (Mpumalanga Economic Profile, 2009). The key economic sectors of the district include mining, manufacturing, energy and agriculture (**Table 7-12**).

**Table 7-12: Sectoral Contribution to Regional Economy (Mpumalanga Economic Profile, 2009)**

| Sectoral Contribution to the Regional Economy | 2009 |
|---|---|
| **Agriculture** | 1.9% |
| **Mining** | 29.7% |
| **Manufacturing** | 12.2% |
| **Electricity** | 8.9% |
| **Construction** | 2.1% |
| **Trade** | 8.9% |
| **Transport** | 8.8% |
| **Finance** | 13.5% |
| **Community services** | 14% |

### 7.14.3 eMalahleni Local Municipality (MP 312)

#### 7.14.3.1 Population

In accordance with Statistics South Africa (Statistics SA, 2011), eMalahleni Local Municipality has 395,466 people living in the area 2678 km$^2$, with a population density of 148 people per square kilometre. This is relatively high, and is likely to result from mining activities that provide employment in the local municipality. The key economic centre within the local municipality is eMalahleni, or Witbank, area, which is a coal mining and power generation centre for South Africa.

The population structure within the local municipality is bottom heavy – with the 65.5% of the population being under 35 years old. The gender profile of the eMalahleni municipality indicates that there are a higher number of males than females, 52.8% and 47.2% respectively. Both the age profile and gender difference is indicative of an in-migration of males for employment opportunities in mining and manufacturing sectors within the local area.

#### 7.14.3.2 Education

The education levels within the local municipality are moderate, with 28.3% having some form of secondary education, 31.4% having completed grade 12 (or equivalent), and 13.9% having tertiary education. This is indicative of the high levels of commercial development within the local municipality.

#### 7.14.3.3 Income and Employment

The income levels are low, with 40.8% of the population having no income (including non-economically active), and 23% earning less than R1600 per month. The unemployment levels are fairly high, with 36.2% of the potential labour force being unemployed (Statistics South Africa, 2011) (**Table 7-13**).

**Table 7-13: Employment Sectors (Statistics South Africa, 2011)**

| Sector | Percentage |
|---|---|
| **Formal sector** | 27.30% |
| **Informal sector** | 3.70% |
| **Private household** | 3.70% |
| **Do not know** | 0.80% |
| **Not applicable** | 64.50% |

#### 7.14.3.4 Housing and Services

The predominant settlement type in eMalahleni Municipality is urban (95.4%). The service levels within the local municipality are relatively high with 73.4% of the households having access to electricity (for lighting, 70.8% for cooking and 63% for heating). The water service is however lower with 54.9%of households having access to piped water, either in their dwelling or near to their property. Refuse removal services level are relatively high, as 67.2% of households have their refuse removed by the municipality, and 20.8% have their own refuse dump for disposal. Sixty eight percent has access to flushing toilets, 20.2% have access to pit toilets, and 2.5% have no access to toilet facilities.

## 7.14.4 Site Description

### 7.14.4.1 Land Use

The proposed Block Z site is currently under agricultural land use; understood to be extensive grazing and crop farming. The surrounding land uses include mining (coal) and agriculture. The area is predominantly rural, with scattered settlements and towns.

### 7.14.4.2 Local Communities

The site is remote in relation to formal communities and settlements within the area. There are several communities which are within the 25km study area (**Table 7-14**). Each of these settlements and towns were observed during the initial site visit (20 March 2014), and characterised according to eye-witness accounts and information obtained from personal communications with the Anglo Community Development Superintendent (Ms Fikile Mokwena) (**Table 7-14**), and topographical maps.

**Table 7-14: Communities associated to the Isibonelo Colliery**

| Settlement Name | Distance from site | Observations Characteristics |
|---|---|---|
| **Kriel** | 7km | Kriel is a small, formal residential town, presumed to have been historically developed in association with the Kriel mine. It appears to be well serviced and has a small shopping district, and access to social services. |
| **Relocated community** | 10km | Small community of seven informal households, and is comprised predominantly of women (males assumed to be working away).<br>The community was set up by Sasol in 1989 as the group was relocated, presumably from an area near Secunda[1]. There does not appear to be any municipal services to this community. |
| **Secunda** | 16km | A medium-sized town and municipal centre for the local municipality. Historically, this town was developed around the Secunda Sasol plant (located southwest of the town). It is comprised of formal business and residential areas, and appears to have access to most municipal and social services. |
| **Evander** | 17km | Evander is a primarily residential area. It appears to have access to most municipal and social services, with a small business / shopping district. The settlement is likely to have developed as a direct result of the Secunda Sasol plant, to provide housing for staff. |
| **Embalenhle** | 24km | This is a township located southwest of the Sasol plant. This is likely to have developed historically as a residential area for Black African staff and labour at the Sasol plant. This settlement has limited access many municipal and social services[2]. |
| **Small formal and informal farming settlements** | Various | There are a number of small farming settlements within the vicinity if the proposed site (which could be indirectly affected by the proposed Block Z project). These could include farm houses and associated structures, and formal and informal farm labour communities. Details of all potential affected settlements are not known at this stage.<br>E.g. A small farm community, located 12km south of the site, comprised of over 15 households. These are assumed to be the households of farm labourers and their families[3]. There does not appear to be any municipal services to this community, however, the farmer (land-owner) may provide limited services. They appear to be low-income households |

[1] Source: Anglo Community Development Superintendent

[2] Source: Anglo Community Development Superintendent

[3] Source: Anglo Community Development Superintendent

#### 7.14.4.3 Anglo Employment and Employees

Sasol (Secunda) is the primary employer in the immediate area (although it falls within the neighbouring Govan Mbeki Local Municipality), with mining operations being secondary employees locally. There are currently 316 permanent staff employed at the Isibonelo Colliery, and 887 individuals employed on a contractual basis.

No staff or labour is accommodated on site, and travel by private vehicles or public transport to the colliery on a daily basis (assisted by transport allowances). Staff and labour primarily reside in the Evander, Embalenhle, Bethal, Kinross and Kriel areas.

#### 7.14.4.4 Social responsibility and Engagement

Anglo subscribes to a set of social management operational procedures, and social and community responsibility and communications programmes. These aim to promote sustainable socio-economic development within local communities and stakeholders. The set of tools include:

- Anglo Safety Way (Safety Management System Standards)
- Socio-economic Assessment Toolbox (socio-economic evaluation and engagement methodology)
- South African Mining Charter and the MRPDA – including Social and Labour Plan (SLP) and social responsibility
- Corporate Social Responsibility programmes (Internal)
- Supply Chain Sustainable Development Code (including good labour practices, and addressing poverty and HIV / Aids).

There are no communities exclusively related, or in proximity, to the Isibonelo Colliery, and Anglo appears to have a good relationship with local communities. Anglo has indicated that there are very few issues with social unrest or protests from local communities, with the Kriel and neighbouring informal communities being the only recent exceptions. These issues are related to Kriel Colliery and Isibonelo Colliery respectively, and issues raised regarding the employment of local individuals and more opportunities for women.

Stakeholder communication takes place regularly with key stakeholders and municipal representatives, through the Community Development Superintendent and Community Engagement Department.

# 8 Environmental and Socio-Economic Issues and Impacts

It is understood that the proposed Block Z project will cause impacts to the immediate, surrounding and regional biophysical and socio-economic environment. Specific environmental and socio-economic impacts will occur at different phases of the proposed Block Z project during the life of mine.

As with many mining operations implementing open cast, strip, benching etc. mining methods, Isibonelo Colliery completes a multi-phased approach in that construction, operation, decommissioning and rehabilitation are undertaken concurrently. For purposes of this report, these phases have been generically defined below.

- Construction / Preparation: the preparatory works / activities typically associated with the development / establishment of a new pit but not including the extraction of coal;
- Operation: the activities associated with the extraction of coal from an open cast / pit;
- Decommissioning: the activities associated with the removal / dismantling of machinery / equipment / infrastructure no long necessary to the operation;
- Rehabilitation: the activities associated with the initial backfilling, levelling and placement of topsoil to agreed level(s) (as per EMPR), fertiliser, re-vegetation and maintenance thereof;
- Closure: Cessation of mining operations in totality and the closure certificate has been applied for or issued (Including completion of rehabilitation goals, application for closure, transfer of liability to the State and agreed post-closure monitoring and maintenance).

All the above phases include continued monitoring and management of environmental aspects throughout

The impacts associated with each of these phases will be specific to the mineral commodity, environmental and socio-economic context, mining method, spatial and temporal aspects of the operation and stated rehabilitation goals. For the purpose of this report, anticipated / potential impacts have been identified, based on the EAP and specialists' experience (consideration of typical impacts of similar projects in similar conditions) and stakeholder inputs.

WSP will assess the environmental and socio-economic impacts associated with the proposed mine during the EIR phase of the S&EIR Process. The methodology that will be utilised is detailed in **Section 9** of this report (specifically **Table 9-1** to **Table 9-8**).

## 8.1 Potential Impacts

The following potential environmental and socio-economic impacts associated with the proposed Block Z project will be assessed during the EIR phase of the process. Impacts are identified by utilising a number of sources. Preliminary specialist studies have been performed to inform the impact identification process; furthermore, stakeholder comments received were evaluated and existing available empirical data has been reviewed/consulted. The impacts include all aspects of the mining and associated activities during the construction, operation, decommissioning and closure phases:

The following biophysical / environmental and social impacts were identified and have been further detailed in **Table 8-1**:

- Geology;
- Topography;
- Air quality;
- Soil, land use and land capability;
- Biodiversity;
- Hydrology and geohydrology;
- Noise;

- Visual aspects;
- Sites of archaeological, historic or cultural interest; and
- Socio-economic aspects.
- Key stakeholder Issues

No mitigation measures have been included in this report, the proposed mitigation and measures manafement measures, as well as specialist recommendations will be included in detail in the EIR. It should be noted that pre-existing and current impacts have been considered and will form part of the impact identification assessment. Impacts associated with the proposed Block Z project included in **Table 8-1**.

**Table 8-1: Potential Impacts that may occur due to the proposed Block Z project**

| Environment | Anticipated Impact (without mitigation measures) |
|---|---|
| **Geology** | ▪ The proposed Block Z project may have an impact on the rock masses that influence the groundwater and topography on the project site.<br>▪ Excavation of rock for the box cuts will influence the underlying geology of the site as a void will be created, that will have a steep gradient or stepped highwalls.<br>▪ Resultant impacts from blasting and vibrations may impact on geology in the immediate area.<br>▪ The extraction of coal and overburden from the opencast pit will result in the permanent impact on the geology. |
| **Topography** | ▪ Site clearing and topsoil removal may impact local topography.<br>▪ Disturbance of topography as a result of the excavation of the box-cut, stockpiling of the resultant waste rock and soil (separate stockpiles).<br>▪ Potential aesthetic impact resulting from the overburden stockpiles, topsoil stockpiles and mine infrastructure (such as a dragline, etc). |
| **Air Quality** | ▪ The generation of dust from the construction, operational and closure phases of the mine is anticipated (land clearing, drilling, blasting, processing, transport of product via road, stockpiling waste rock, overburden, topsoil and product, etc.).<br>- Dust may impact on the health and safety of employees and the surrounding community through respiratory, visual and aesthetic impacts.<br>- Dust fallout can retard vegetation growth and reduces the palatability of plants to animals.<br>▪ The transportation of coal product results in a release of volatile organic compounds (VOCs) from vehicle exhausts which may impact on the health of the mine employees and attribute to climate change.<br>▪ Spontaneous combustion of coal produces $CO_2$, noxious gases and smoke which may impact on the receiving environment as well as the health and safety of the community.<br>▪ Spontaneous combustion may cause safety impacts on the mine employees and could render the surface unusable, therefore impacting on soils, surface water, biodiversity and land use. |
| **Soil, Land Use and Land Capability** | ▪ Excavation and soil stockpiling during site preparation may result in the dilution of fertile organic components in soil with sterile soil and may result in the loss of topsoil on the site.<br>▪ Excavation and soil stockpiling may result in the ingress of alien invasive plant species to the area, impacting on the future sustainable land use potential and land capability after mining.<br>▪ Mining activities may cause erosion (e.g. stormwater runoff), resulting in a loss of fertile topsoil resources.<br>▪ Compaction of soil may concentrate surface water runoff from the proposed Block Z project site, resulting in erosion and flooding.<br>▪ Leachate from overburden or product stockpiles may contaminate soils from infiltration, resulting in surface and groundwater contamination.<br>▪ Soil contamination may occur from spillages and leakages of hydrocarbons, contaminated water, plant runoff, etc. onsite. |

| Environment | Anticipated Impact (without mitigation measures) |
|---|---|
| | ■ Contamination of soils from the poor management of mineral and non-mineral wastes generated onsite.<br>■ Potential acid mine drainage could result in acidic and saline soils, making conditions unsuitable for vegetation growth following mine closure. |
| **Biodiversity** | ■ The proposed Block Z project will result in the removal of the current flora and fauna species presently occupying the site resulting in reduced biodiversity in the immediate areas.<br>■ Mining and associated activities may disturb indigenous fauna and flora in the surrounding area due to the presence of humans and the use of mining machinery and infrastructure.<br>■ Potential impact on habitat corridors may result in the degradation of indigenous flora and fauna species, and changes in populations reliant on movement or interchange between habitats.<br>■ Potential poisoning on biodiversity through mismanagement of dangerous goods and any mineral or non-mineral type wastes.<br>■ Mining activities may introduce alien vegetation, which may encroach and impact on the ecosystem.<br>■ Opencast mining activities may impact the groundwater table, impacting sensitive areas such as wetlands within the immediate area as well as the groundwater supply to the adjacent river.<br>■ Potential loss of vegetation and habitats resulting from uncontrolled fire resulting from machinery operation on-site or unauthorised open fires.<br>■ The release of dust and emissions into the air could drive away fauna populations and result in the retardation of flora growth due to dust fall out.<br>■ Release, spillages and leakages of chemicals, hydrocarbons and sewage may impact upon the natural processes of the surrounding ecosystem. |
| **Hydrology and geohydrology** | ■ Impacts on surface water and groundwater recharge due to modification of infiltration rates from excavation, infill and compaction activities.<br>■ Impacts on adjacent wetlands due to the mining activities modified surface flow and ground water recharge.<br>■ Acid mine drainage increases the acidity of water. The runoff may affect surface water quality, groundwater and biodiversity in the area.<br>■ Potential surface and groundwater contamination from spillages and release of process water which infiltrates the surrounding environment.<br>■ Potential pollution or impact on the hydrology and geohydrology resulting from incorrect storage and management of dangerous goods (hazardous and chemical materials) and / or other contaminants.<br>■ Pumping of groundwater required for safe mining conditions may have a direct impact on the water table (reducing natural groundwater recharge).<br>■ Emergency discharge and/or failure of mining related infrastructure of contaminated process water to the adjacent stream may alter downstream ecosystems and biota status.<br>■ Physical disruptions of aquifers may occur from blasting, causing groundwater to seep to lower aquifers, which could result in cross contamination of aquifer resources and/or loss of natural resources. |
| **Noise and Vibrations** | ■ Noise will be generated from drilling, blasting, mining operations, transportation, processing, machinery etc. which may have a negative impact on the surrounding biophysical and socio-economic environment i.e. impact biodiversity and humans alike<br>■ Vibrations from blasting may impact on the underlying geology of the site.<br>■ Vibrations could cause failure of mine infrastructure which could impact on the health and safety of employees, as well as result in subsidence. |
| **Visual** | ■ The additional mining infrastructure with varying heights will result in a negative impact on the aesthetics of the area.<br>■ The generation of dust and smoke / emissions from mining operations and vehicle movement may have a visual impact within the surrounding area. |

| Environment | Anticipated Impact (without mitigation measures) |
|---|---|
| **Archaeology, Historic and Cultural** | ■ The proposed Block Z project may have an impact on uncovered sites of archaeological, historic and cultural importance / significance.<br>■ Unidentified graves may be uncovered during construction and operations which will impact on the culture of the area. |
| **Socio-economic** | ■ Coal supply to SSF will ensure the continued production of fuels for use in the country thus resulting in a positive impact on the surrounding communities and the country.<br>■ Job security within the mine and local companies (i.e. direct and indirect) will benefit local communities.<br>■ Training may be provided to employees resulting in an improvement of the local skills base.<br>■ The Social and Labour Plan will be updated, which will include a number of existing social initiatives as well as the possibly initiation of new social initiatives.<br>■ Support may be given to the local and national economy by the purchase of goods and services.<br>■ The proposed Block Z project may have negative impacts on the health and safety of the surrounding community and future employees from the generation of dust, air emissions (noxious gases and smoke), noise, vibrations, traffic, and contamination of surface and groundwater.<br>■ The proposed Block Z project may have an aesthetic impact on the surrounding communities.<br>■ Increase in economic growth and local economic development within the District and Local Municipalities.<br>■ The increase in individuals in the area may impact on social pathologies, such as social ills, crime, etc. |

### 8.1.1 Cumulative Impacts

Cumulative impacts may occur over different spatial and temporal scales by interacting, combining, compounding so that the overall effect could be considered the sum of the attributing factors.

The potential impacts identified in **Table 8-1** were identified from specific mining related activities associated with Block Z. The purpose of identifying and assessing cumulative impacts is to rate impacts, which when individually assessed may not require management but when assessed with an interacting, combining, compounding impacts could prove to be significant and require management.

Cumulative impacts identified herein considered the potential effects of existing surrounding mining, farming and industrial activities, as well as known proposed activities. The key cumulative impacts which may arise from the activities of the proposed Block Z project are listed below:

- Geohydrology and hydrology – loss of a natural resource within the surrounding area;
- Air quality – generation of dust / fumes which would impact on the biophysical and social environments;
- Biodiversity – the permanent transformation of an ecological system could result in local and regional biodiversity loss; and
- Land capability – development of the proposed Block Z project area could result the permanent transformation of land capability and use.

The specialist studies have not yet been completed; hence the significance of the impacts cannot be properly assessed at this stage. The severity and risk of the impacts will be quantified once the specialist studies are complete. The findings of the specialist studies will be detailed fully in the EIR / EMPR report which will be developed during the EIR phase.

# 9 Plan of Study for the Environmental Impact Reporting phase

## 9.1 Purpose of the Plan of Study

This Section is intended to provide a summary of the key findings of the scoping phase of the S&EIR process and to describe the activities to be undertaken in the EIR phase of the S&EIR. Legislatively, the Section must provide the following:

- A description of the environmental issues identified during scoping phase that may require further investigation and assessment;
- A description of the feasible design and placement alternatives identified during Scoping that may be further investigated;
- An indication of additional information required to determine the potential impacts of the proposed activity on the environment;
- A description of the proposed method of identifying these impacts; and
- A description of the proposed criteria for assessing the significance of these impacts.

The requirements of Regulation 28 of GNR 543 promulgated in terms of Section 24 of the NEMA have been reviewed in order to ensure compliance therewith. These requirements are as follows:

- A description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken;
- An indication of the stages at which the competent authority will be consulted;
- A description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity;
- Particulars of the public participation process that will be conducted during the environmental impact assessment process; and
- Any specific information required by the competent authority.

In addition, there are a number of other requirements which the plan of study for EIR phase must address. These include the following:

- The Department of Environmental Affairs and Tourism (DEAT) EIA Regulations Guideline Document (April 1998); and
- The DEA response to the FSR and POS for EIR phase (when received).

## 9.2 Summary of the scoping phase

The S&EIR process for the proposed Block Z project comprises two main phases, namely the scoping phase and the EIR phase. This report documents the tasks which have been undertaken as part of the scoping phase of the EIA. These tasks include the public participation process and the documentation of the issues which have been identified as a result of these activities. To date, tasks that have commenced include the:

- Identification of stakeholders or I&APs;
- Notification and advertisements;
- Background Information Documents; and
- Ongoing consultation and engagement.

The DSR was released for public review and comment from **8 August – 12 September 2014**. During the review period a public participation process will be undertaken, allowing stakeholders to engage with the project proponents and independent environmental consultants. The public participation will consist of a public meeting as well as one-on-one interactions where required. Issues raised by stakeholders during the public participation process will be documented and included in the FSR.

The relevant authorities required to review the proposed Block Z project and provide an EA were consulted from the outset of this study, and have been engaged throughout the project process.

## 9.3 Environmental Impact Assessment

### 9.3.1 Introduction

The purpose of the EIR phase of the S&EIR process is as follows:

- Address issues that have been raised during the scoping phase;
- Assess alternatives to the proposed activity in a comparative manner;
- Assess all identified impacts and determine the significance of each impact; and
- Formulate mitigation measures.

Numerous acceptable approaches and methodologies exist by which the above purpose can be achieved. The legislation in South Africa, including the guideline documents published in support thereof, does not provide a specific methodology for the assessment of impacts. Rather, an assessment framework is provided within which environmental assessment practitioners are expected to structure a project-specific assessment methodology. This assessment framework recognises that there are different methodologies available for assessing the impact of a development but that the specific methodology selected must provide for the following:

- A clear process for impact identification, prediction and evaluation;
- The specification of impact identification techniques;
- Criteria for evaluating the significance of impacts;
- The design of mitigation measures to address impacts;
- Defining types of impacts (direct, indirect or cumulative); and
- Specification of uncertainties.

This Section of the Final PoS for EIR serves to describe the manner in which WSP intends undertaking the EIR phase of the S&EIR process.

The EIA process will be undertaken in line with the requirements of the promulgated EIA Regulations of the NEMA as well as the requirements of the MPRDA.

The outcomes of the plan of study for S&EIR include the following:

- Provide a description of the tasks that are undertaken as part of the S&EIR process, including any specialist reports or specialised processes, and the manner in which such tasks were undertaken;
- Provide an indication of the stages at which the competent authority will be consulted;
- Provide a description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity;
- Overview of the stakeholder engagement that was conducted during the S&EIR process; and
- Include any specific information required by the competent authority.

The purpose of the S&EIR and draft EMPR is to provide / determine:

- An assessment of the environments likely to be affected by the proposed mining project;

- An assessment of the nature, extent, duration, probability and significance of the identified potential environmental, social and cultural impacts of the proposed Block Z project;
- A comparative assessment of the identified land use and development alternatives and their potential environmental, social and cultural impacts;
- The appropriate mitigation measures for each significant impact of the proposed Block Z project;
- Details of the stakeholder engagement process followed during the course of the assessment and an indication of how the issues raised have been addressed;
- Identification of knowledge gaps and reporting on the adequacy of predictive methods, underlying assumptions and uncertainties encountered in compiling the required information;
- A description of the arrangements for monitoring and management of environmental impacts; and
- Inclusion of technical and supporting information as appendices, if available.

The draft S&EIR report and draft EMPR document that is submitted for stakeholder review and approval by the responsible authorities (DMR, MDEDECT, DEA, DWA, etc.) will include the following:

### 9.3.2 Stakeholder Engagement

The stakeholder engagement process during the S&EIR phase is to be undertaken in a comprehensive and transparent manner. Although requirements of both the MPRDA and NEMA will be taken into consideration, WSP perceives that the requirements of the NEMA pertaining to stakeholder engagement process more stringent than the requirements of the MPRDA. Therefore WSP will be following the NEMA requirements for stakeholder engagement.

The NEMA EIA Regulations (Sections 54 – 57) require that an inclusive, transparent process of engagement – sharing of information, receipt of comments, expression of issues and concerns, and response and feedback regarding issues and concerns – be undertaken that allows participation by any and all persons and entities who may be affected by and / or have an interest in a proposed Block Z project. Procedures for informing stakeholders about a project and engaging their participation will be standard practice.

As was undertaken during the scoping phase of the project, the stakeholder consultation process will be continued in English, Afrikaans and Zulu. Letters will be circulated to stakeholders via email notifying them of the commencement of the EIR phase and proposed public meeting date. This public feedback meeting will provide additional information such as specialist study results, mitigation measures and recommendations, or any other information that was not conveyed during the scoping phase, to stakeholders.

### 9.3.3 Impact Assessment Methodology

The objective of the assessment of impacts is to identify and assess all the significant impacts that may arise as a result of the proposed coal mine. The process of assessing the impacts of the project encompasses the following four activities:

- Identification and assessment of potential impacts;
- Prediction of the nature, magnitude, extent and duration of potentially significant impacts;
- Identification of mitigation measures that could be implemented to reduce the severity or significance of the impacts of the activity; and
- Evaluation of the significance of the impact after the mitigation measures have been implemented i.e. the significance of the residual impact.

The possible impacts associated with the project were primarily identified in the scoping phase through on-site and desktop study and public consultation. In the EIR phase, additional impacts will be identified through the more in-depth specialist investigations to be undertaken and through the ongoing consultation process with interested and affected parties.

In accordance with GNR 543, promulgated in terms of Section 24 of the National Environmental Management Act, 1998 (Act 107 of 1998), specialists will be required to assess the significance of potential impacts in terms of the following criteria:

- Cumulative impacts;
- Nature of the impact;
- Extent of the impact;
- Intensity of the impact;
- Duration of the impact;
- Probability of the impact occurring;
- Impact non-reversibility;
- Impact on irreplaceable resources; and
- Confidence level.

The potential environmental impacts will be evaluated according to their severity, duration, extent and significance of the impact. Furthermore, cumulative impacts will also be taken into consideration. WSPs risk assessment methodology in combination with AAC Risk Matrix, will be used for the ranking of the impacts.

This system derives environmental significance on the basis of the consequence of the impact on the environment and the likelihood of the impact occurring. Consequence is calculated as the average of the sum of the ratings of severity, duration and extent of the environmental impact. Likelihood considers the frequency of the activity together with the probability of an environmental impact occurring.

The following tables (**Table 9-1** to **Table 9-9**) describe the process in detail:

**Table 9-1: Assessment and Rating Sensitivity**

| Rating | Description |
|---|---|
| 1 | Negligible / non-harmful / minimal deterioration (0 – 20%) |
| 2 | Minor / potentially harmful / measurable deterioration (20 – 40%) |
| 3 | Moderate / harmful / moderate deterioration (40 – 60%) |
| 4 | Significant / very harmful / substantial deterioration (60 – 80%) |
| 5 | Irreversible / permanent / death (80 – 100%) |

**Table 9-2: Assessment and Rating of Duration**

| Rating | Description |
|---|---|
| 1 | Less than 1 month / quickly reversible |
| 2 | Less than 1 year / quickly reversible |
| 3 | More than 1 year / reversible over time |
| 4 | More than 10 years / reversible over time / life of project or facility |
| 5 | Beyond life of project of facility / permanent |

**Table 9-3: Assessment and Rating of Extent**

| Rating | Description |
|---|---|
| 1 | Within immediate area of activity |
| 2 | Surrounding area within project boundary |

| Rating | Description |
|---|---|
| 3 | Beyond project boundary |
| 4 | Regional / provincial |
| 5 | National / international |

Consequence is calculated as the average of the sum of the ratings of severity, duration and extent of the environmental impact.

**Table 9-4: Determination of Consequence**

| Determination of Consequence (C) | (Severity + Duration + Extent) / 3 |
|---|---|

- Likelihood

**Table 9-5: Assessment and Rating of Frequency**

| Rating | Description |
|---|---|
| 1 | Less than once a year |
| 2 | Once in a year |
| 3 | Quarterly |
| 4 | Weekly |
| 5 | Daily |

**Table 9-6: Assessment and Rating of Probability**

| Rating | Description |
|---|---|
| 1 | Almost impossible |
| 2 | Unlikely |
| 3 | Probable |
| 4 | Highly likely |
| 5 | Definite |

Likelihood considers the frequency of the activity together with the probability of the environmental impact associated with that activity occurring.

**Table 9-7: Determination of Likelihood**

| Determination of Likelihood (L) = | (Frequency + Probability) / 2 |
|---|---|

- Impact Significance

Impact significance is the product of the consequence and likelihood values.

**Table 9-8: Determination of Environmental Significance**

| Environmental Significance (Impact) = C × L | Description |
|---|---|

| | |
|---|---|
| L (1 – 4.9) | Low environmental significance |
| LM (5 – 9.9) | Low to medium environmental significance |
| M (10 – 14.99) | Medium environmental significance |
| MH (15 – 19.9) | Medium to high environmental significance |
| H (20 – 25) | High environmental significance. Likely to be a fatal flaw. |

Table 9-9: Anglo American Coal Risk Matrix

| **Anglo American Plc Risk Matrix** | | **Hazard Effect / Consequence**<br>(Where an event has more than one 'Loss Type', choose the 'Consequence' with the highest rating) | | | | |
|---|---|---|---|---|---|---|
| | | | | | | |
| **Loss Type**<br>**(Additional 'Loss Types' may exist for an event; identify & rate accordingly)** | | **1**<br>**Insignificant** | **2**<br>**Minor** | **3**<br>**Moderate** | **4**<br>**High** | **5**<br>**Major** |
| **(S/H)**<br>**Harm to People (Safety / Health)** | | First aid case / Exposure to minor health risk | Medical treatment case / Exposure to major health risk | Lost time injury / Reversible impact on health | Single fatality or loss of quality of life / Irreversible impact on health | Multiple fatalities / Impact on health ultimately fatal |
| **(EI)**<br>**Environmental Impact** | | Minimal environmental harm – L1 incident | Material environmental harm – L2 incident remediable short term | Serious environmental harm – L2 incident remediable within LOM | Major environmental harm – L2 incident remediable post LOM | Extreme environmental harm – L3 incident irreversible |
| **(BI/MD)**<br>**Business Interruption / Material Damage & Other Consequential Losses** | | No disruption to operation/5% loss of budgeted operating profit | Brief disruption to operation 10% loss of budgeted operating profit/listed assets | Partial shutdown /<br>15% loss of budgeted operating profit/listed assets | Partial loss of operation 20% loss of budgeted operating profit/listed assets | Substantial or total loss of operation / 25% of loss budgeted operating profit/listed assets |
| **(L&R)**<br>**Legal & Regulatory** | | Low level legal issue | Minor legal issue; non compliance and breaches of the law | Serious breech of law; investigation/report to authority, prosecution and/or moderate penalty possible | Major breech of the law; considerable prosecution and penalties | Very considerable penalties & prosecutions. Multiple law suits & jail terms |
| **(R/S/C)**<br>**Impact on Reputation / Social / Community** | | Slight impact - public awareness may exist but no public concern | Limited impact - local public concern | Considerable impact - regional public concern | National impact - national public concern | International impact - international public attention |
| **Likelihood** | **Examples**<br>**(Consider near-hits as well as actual events)** | **Risk Rating** | | | | |
| **5**<br>**(Almost Certain)** | The unwanted event has occurred frequently; occurs in order of one or more times per year & is likely to reoccur within 1 year | **11 (M)** | **16 (S)** | **20 (S)** | **23 (H)** | **25 (H)** |
| **4**<br>**(Likely)** | The unwanted event has occurred infrequently; occurs in order of less than once per year & is likely to reoccur within 5 years | **7 (M)** | **12 (M)** | **17 (S)** | **21 (H)** | **24 (H)** |
| **3**<br>**(Possible)** | The unwanted event has happened in the business at some time; or could happen within 10 years | **4 (L)** | **8 (M)** | **13 (S)** | **18 (S)** | **22 (H)** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **2**<br>**(Unlikely)** | The unwanted event has happened in the business at some time; or could happen within 20 years | **2 (L)** | **5 (L)** | **9 (M)** | **14 (S)** | **19 (S)** |
| **1**<br>**(Rare)** | The unwanted event has never been known to occur in the business; or it is highly unlikely that it will occur within 20 years | **1 (L)** | **3 (L)** | **6 (M)** | **10 (M)** | **15 (S)** |

| **Risk Rating** | **Risk Level** | **Guidelines for Risk Matrix** |
|---|---|---|
| 21 to 25 | (H) – High | A high risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised immediately. |
| 13 to 20 | (S) – Significant | A significant risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised as soon as possible. |
| 6 to 12 | (M) – Medium | A moderate risk exists that management's objectives may not be achieved. Appropriate mitigation strategy to be devised as part of the normal management process. |
| 1 to 5 | (L) – Low | A low risk exists that management's objectives may not be achieved. Monitor risk, no further mitigation required. |

## 9.4 Terms of Reference for Specialist Studies

**Table 9-10** provides a list of the Specialists that are involved in this study and their areas of expertise.

**Table 9-10: Specialist Studies**

| Specialist Study | Organisation Responsible for the Study |
|---|---|
| Biodiversity Impact Assessment | Natural Scientific Services |
| Surface Water Impact Assessment and Conceptual Storm Water Management Plan | WSP |
| Hydrogeological Impact Assessment | JMA Consulting |
| Soils and Land Capability Impact Assessment | Earth Science Solutions (Pty) Ltd |
| Socio-Economic Impact Assessment | WSP Environmental (Pty) Ltd |
| Heritage Impact Assessment | Archaetnos |
| Air Quality Impact Assessment | WSP |
| Noise Impact Assessment | WSP |
| Blasting and Vibrating Assessment | Blast Management and Consulting |

All specialist studies will include a description of the baseline environment, the identification and assessment of potential impact (including cumulative impacts) and the provision of management and mitigation measures. The terms of reference for each of the above mentioned specialist studies during the EIR phase of the project are detailed below.

### 9.4.1 Biodiversity Impact Assessment

Due to the provincial importance of habitat within the study area and surrounds as well as the guidelines on Biodiversity Assessments by Mpumalanga, a biodiversity impact assessment will be undertaken for the proposed Block Z project. The assessment will be conducted during the summer months and with two sampling runs (possibly December / January 2013 and March 2014 depending on rainfall) to capture as much field data as possible. The following methodology will be applied to the assessment:

#### 9.4.1.1 Desktop Review

A desktop review will focus on sourcing current information for the area which will be obtained from the following sources:

- Latest available Mpumalanga Province Biodiversity data (such as a Sector Plan);
- National Spatial Biodiversity Assessments:
  - Descriptions of Regional Vegetation types, EcoRegions, etc; and
  - National Freshwater Ecosystem Priority Areas (NFEPA) information.
  - Relevant Legislation and Policies;
- Previous studies undertaken by NSS and other consultants in the region including:
  - Geology and geohydrology by JMA Consulting (November 2008);
  - Biodiversity by SRK Consulting (March 2010);
  - Soil and Land Capability by Earth Science Solutions; and
  - Aquatic Ecosystems by Wetland Consulting Services (November 2011).

- Communications with Mpumalanga Province and SANBI;
- Existing databases and atlases, including but not limited to the following:
  - Recent Red Data Floral Listings [produced by the Threatened Species Programme in collaboration with SANBI (National Herbarium Pretoria Computerised Information System and Integrated Biodiversity Information System (databases); and
  - Recent Red Data Faunal Listings as per the SANBI website, ADU-VM records Southern African Bird Atlas Project, Southern African Reptile Conservation Assessment, etc.
- Other studies performed within the area which are available and of relevance;
- Aerial imagery;
- Contour and Soil Data; and
- Ground and Surface water reports.

#### 9.4.1.2 Field investigations

The field investigations will comprise the following:

- Vegetation sampling plots (within the first field visit) following internationally approved methods will be set up throughout the project area. The sites and sizes for the sampling plots will be based on the type of vegetation as well as terrain indicators. A second visit (scan) will be conducted in late summer;
- A description of vegetation communities / habitats within the each of the sampling plots (including structure, dominant plant composition and condition);
- Alien floral species will be noted, however, the mapping of all individuals / clumps (depending on extent) is excluded;
- Identification of faunal species using the following methodologies:
  - Faunal Trapping (first visit only). Five day / four night trapping methods, using arrays, pitfalls and shermans will be utilised. An overview of the sites will be investigated prior to laying the traps;
  - Visual observations (both seasons). This is performed by walking the different sites and haul road and noting habitat types and the visual presence of animals or evidence of animals in the form of faeces, pellets, spoor, nests, burrows, feathers etc.; and
  - Motion Cameras – Depending on the habitat and security in the area, the consultant will place motion cameras out for additional faunal sampling.
- Night Observations (one visit only) – NSS will conduct night driving on at least two nights during the main sampling session. In terms of the night surveys a lot of faunal activity occurs during this time for all taxa. The aim of the surveys is to try and obtain as much information on species presence as possible. Avifaunal species such as owls and nightjars can only effectively be recorded at night as well as certain rodent and mammal species. Further to this, snakes are more active during dusk and chances of seeing one are heightened;
- Potential occurrence of Conservation Important Species (CIS) such as Red Data listed, Endemic of Medicinally important will be highlighted for both fauna and flora. Any species found on site will be recorded and details provided to the relevant Conservation Authorities;
- Any additional information will be recorded for any other features that may have ecological significance – GPS points will be documented;
- The wetland component will focus on covering those systems that will be removed from clearing for the open cast activities or where the open cast area falls within the buffer (approximately 141 hectares in extent). Desktop assessment of wetlands within 500m of the sites will be investigated (only via Google

Earth or imagery available). This will be conducted as per DWA requirements. The methods which will be used will include:

- Desktop Mapping

  Prior to any field investigations being undertaken, the area will be surveyed at a desktop level using 1:50,000 topographical maps, previous reports (if any), contour data and Google imagery as reference material to determine the layout of potential wetlands on the site and within 500m.

- Wetland Classification

  The most popular wetland classification method used in South Africa is the classification of wetlands into hydro-geomorphic units developed by Kotze et al. (2008) in WET-EcoServices. The system excludes artificial wetlands from the classification.

- Wetland Delineations

  Delineations will be conducted in accordance with the DWA Guideline “A practical field procedure for identification and delineation of wetlands and riparian areas” (DWAF, 2005) for the areas as specified above.

- Present Ecological State (PES) and functional assessment

  These assessments are important for assessing the current ecological importance of the wetland and for setting a benchmark for future monitoring. The methodology used to determine the PES will be dependent on the systems identified.

- Wetland Ecological Importance and Sensitivity (EIS)

- The DWAF (1999) methodology will be used to determine the EIS of any wetlands identified.

The aquatic component will focus on covering those systems adjacent to the opencast boundary. A maximum of three sampling points have been identified. The bio-monitoring at each site will assess the current state PES using standardised River Health Programme methodologies, which have been approved by DWA:

- Fluvial geomorphology and riparian vegetation: Only a brief baseline description of the fluvial geomorphology will be undertaken, based on the River Health Programme site characterisation field manual by Dallas (2005). The state of the riparian / watercourse vegetation will be assessed, if applicable, during the wetland assessment.

- Habitat Integrity: Impacts on habitat will be evaluated using the Index of Habitat Integrity (IHI) derived by Kleynhans (1999) and the habitat availability will be assessed using the River Health Programme site characterisation field manual by Dallas (2005).

- Water quality data: *In situ* variables including pH, temperature, dissolved oxygen, TDS and electrical conductivity (EC) will be analysed at each site. In addition to this, water samples will be collected and analysed for the following constituents: Turbidity, Suspended Solids (SS), Nitrates, Nitrites, Orthophosphates, Ammonia, Sulphates, Chloride, COD, as well as Aluminium(Al), Calcium (Ca), Iron (Fe), Magnesium (Mg), Manganese (Mn), Sodium (Na), Chrome (Cr), Copper (Cu), Nickel (Ni), Cadmium (Cd), Cobalt (Co), Lead (Pb) and Zinc (Zn).

- Analysis of diatom community structures using methodologies outlined in Taylor et al. (2007).

- The following undertakings are only possible if flow is evident during the sampling periods:

  - Macro-invertebrate sampling will be conducted using the South African Scoring System version 5 (SASS5) methodologies, according to Dickens and Graham (2002), as well as the Macro-invertebrate Response Assessment Index (MIRAI) methodology (Thirion, 2007).

  - Fish assemblage assessment: Sampling will be undertaken using standardised methodologies as per the Fish Response Assessment Index (FRAI), (Kleynhans, 2007). The data collected will be used to determine the PES for the fish assemblage in accordance with FRAI.

### 9.4.2 Surface Water Impact Assessment

The primary objective of the surface water impact assessment is to develop a simple, feasible, implementable and cost-effective plan for the management of on-site water use for the life cycle of the proposed Block Z project (i.e. operational, decommissioning and closure) taking cognisance of climate change risk for the area.

The surface water assessment will focus on a number of core factors related to surface water management and the impacts on regional water quality and quantity. The following methodology will be applied to the assessment:

#### 9.4.2.1 Desktop Review

A desktop review and gap analysis will be conducted at the outset of the assessment. The desktop review will specifically focus on defining the receiving hydrological environment and associated sensitive receptors. As part of the review, existing information will be reviewed, such as:

- Past EMPRs;
- Mine WUL;
- Current surface water monitoring programme (included in IWWMP);
- Available plans and reports pertaining to existing and proposed Block Z project infrastructure; and
- Catchment detail.

Where gaps are identified in the information, the relevant mine representative will be notified and recommendations put forward in terms of addressing the shortfalls.

#### 9.4.2.2 Field Work

A site walkover will be conducted in order to assess the current regional hydrological regime. Aspects that will be considered during the walkover will include:

- General catchment characteristics (e.g. soils, vegetation, land uses etc.);
- Current state of the drainage channels, streams and rivers (e.g. riparian zone, channel characteristics, channel vegetation etc.);
- Current regional land use practices; and
- Potential impacts of proposed land use practices on the hydrological regime.

Hydrological nodes will be identified during the site walkover and these nodes will be used as points of reference in the surface water assessment. From Google Earth imagery and other available topographical data, it is envisaged that no more than 8 nodes will be required in order to establish the hydrological characteristics and potential impacts of the mine on surface water resources.

Following the desktop review and site walk-over the following assessments and plans will be developed which will accompany the EIR submission.

### 9.4.3 Hydrological Impact Assessment

Over its lifespan, the proposed Block Z project will result in impacts to both regional water quality and quantity. Information gathered and outcomes of the other specialist studies will be factored into the hydrological impact assessment. The impacts of the proposed Block Z project will be assessed based on the following parameters: severity, duration, extent, frequency and probability. The consequence and likelihood are then used to determine the impact significance based on a rating matrix.

#### 9.4.3.1 Water Quality

The current water quality monitoring programme will be reviewed both in terms of available data and sampling point locations. Based on the available data, the current status of the water quality within the region will be qualified and if gaps are identified in terms of the geographical spread of the sampling points and the determinants measured, recommendations will be made to rectify shortfalls / modify the monitoring programme.

#### 9.4.3.2 Water Quantity

The flow volumes and peak discharges occurring within the area will be altered during the lifespan of the mine as a result of land use change and potential mine dewatering. The changes in peak discharges and flow volumes for the hydrological nodes identified during the site walkover will be modelled and quantified for various milestones in the proposed Block Z project's lifespan. Proposed surface water management practices that are to be implemented by the mine will be factored into the hydrological modelling. A comparative exercise will be conducted on the modelling results in order to quantify the impacts on flow volumes as a result of the changes in land use associated with the mine.

#### 9.4.3.3 Impact Assessment

Expected changes in surface water quality and quantity associated with mining activities and the associated impacts will be qualified. Mitigatory measures will be recommended to reduce the associated impacts to sensitive receptors. Water quality treatment options and solutions will be proposed and the associated high level costs for implementation estimated.

#### 9.4.3.4 Water and Salt Balance

A review of the Water and Salt Balance will be undertaken as part of the assessment in consideration of the Water Balance - Department of Water Affairs Best Practice Guidelines Series G2 of 2006.

The objective of the water balance will be to:

- Aid as a management tool to assist the environmental manager to achieve future objectives associated with water management for the site;
- To quantify the impact of the impacts of the mining activity on the natural environment.

The water balance of the area is sensitive to seasonal changes and climate change. To account for seasonal changes within a water balance, the hydrological years and their division into wet and dry seasons as well as the $5^{th}$ (dry year) and $95^{th}$ (wet year) percentile rain would be considered for the lifespan of the mine. Furthermore, the outcomes of the groundwater assessment will be factored into the water balance developed for the proposed Block Z project.

The conceptual water balance will be illustrated by means of a schematic flow diagram which identifies all the process units and flow paths within the boundaries set above.

The following data will be used to populate the schematic flow diagram:

- Expected flow rates;
- Residue and dam volumes;
- Meteorological data that includes rainfall and evaporation; and
- Geo-hydrological data that includes recharge to the mine and expected abstraction in terms of mine dewatering (if required).

The water balance model will be developed over the life of mine and post closure. A water demand versus availability graph will be included.

#### 9.4.3.5 Flood Risk Assessment

Owing to the proposed Block Z project area straddling two water courses, the associated flood risk to proposed mining activities is of concern and mining infrastructure will need to be appropriately placed in relation to the flooding risk. The flood risk assessment will be conducted for the 50- and 100-year storm events for the water courses that pass near the proposed Block Z project area.

In order to accurately assess the flood risk of the area, surveyed plans of the river channel and associated riparian area will be reviewed. Where not available necessary, floodlines will be generated based on Google Earth Imagery (i.e. 1m contour interval) and / or 1:10 000 ortho-photos (i.e. 5 m contour interval). Results obtained from the floodline assessment at this vertical scale will be adequate for planning purposes. The flood risk to the works will factor in the changes of contributing catchment areas and associated changes in flow conditions over the lifespan of the mine.

#### 9.4.3.6 Storm Water Management Plan

- A conceptual storm water management plan (SWMP) will be developed based on the proposed Block Z project layout. The basis of the SWMP will be the reduction of "dirty" storm water generated as well as the prevention of "dirty" water originating on site from passing directly into the adjacent hydrological environment for the entire lifespan of the mine. The approach to the development of the conceptual SWMP will factor in the following:
- Requirements of the DWAF GNR 704 Guideline Document for the Implementation of Regulations on Water Use of Mining and Related Activities Aimed at the Protection of Water Resources;
- DWAF Best Practice Guidelines G1: Stormwater Management (DWAF, 2006); and
- The Water Management for Surface Mines (DWAF, 2008).

These documents support Section 26 of the NWA which regulates any activity that may have an impact on a water resource and the conservation and protection of this water resource. The main principles adopted in these documents for the management of storm water include:

- Confine / divert any unpolluted water to a clean water system, and polluted water to a dirty water system;
- Both clean and dirty water systems should be designed and constructed in such a way so as to prevent cross contamination between the clean and dirty water systems; and
- The clean and dirty water systems should be designed to contain the 50 year storm event, and should not lie within the 1:100 year floodline or within a horizontal distance of 100m from any watercourse.

Based on the mine plan and the associated discretisation of contributing catchments on the mine, discharge volumes for various storm events will be modelled and quantified, and from the results obtained, the required infrastructure (i.e. drainage channels, retention facilities, etc.) will be determined.

### 9.4.4 Hydrogeological Impact Assessment

The following will be undertaken in an effort to determine if the proposed Block Z project will impact on the groundwater reserves of the proposed Block Z project area:

- Perform a detailed hydro census of the study area, including a 1km radius around the total site. All existing hydrogeological boreholes will be sampled, as well as all external users' boreholes;
- The specialist will obtain six samples from the current monitoring network and an addition eight samples from external users;
- All samples will be analysed for a full spectrum of macro-constituents and selected micro constituents;
- The proposed six additional boreholes will be sited and drilled will be sampled. In total, 20 samples will be taken for the assessment. These boreholes are required to quantify the impact of combined mining of Block Z and Isibonelo on the dewatering of river systems;
- The results will be supplemented with data from the current monitoring system;

- Samples will be obtained from all geological units and submitted to ABA;
- A full geochemical leach will be performed on one coal sample for a minimum period of 13 weeks to determine the quality of the water following infiltration through the coal seam;
- Geochemist Workbench will be used to perform a series of geochemical modelling scenarios. This will be undertaken for the total Isibonelo pit complex;
- Modelling software will be used to simulate the potential for river interaction (on the western boundary). The model will predict the potential impact of dewatering and flooding on the adjacent surface water features. However, the model will not be expanded to include the total pit complex, but will focus on the proposed Block Z project related impacts;
- The regional and local baseline conditions for the new pit system will be determined to reflect aquifer parameters, ground water quality distribution, ground water yields, impact on aquifer systems, etc;
- Compile a stand-alone ground water balance for the proposed Block Z project, and update the mine wide water balance to reflect the change in the total Isibonelo pit layout. Annualised water make-up, storage capacities and recharge rates will be calculated and provided to Isbonelo Colliery for inclusion in the overall water balance; and
- An Impact assessment will be performed using the Anglo Thermal Coal impact assessment methodology.

### 9.4.5 Soils and Land Capability Impact Assessment

Earth Science Solutions will undertake the following in order to determine the impact on the soil and land capability of the proposed Block Z project:

- The investigation will concentrate on the updating of any existing baseline information and the re-assessment of the area that is proposed for the project;
- The assessment will determine the status of the natural soils in terms of their chemical and physical properties; and
- A detailed survey of the proposed mining activities that will impact on the materials and their natural ability and capabilities, as well as recommending a rehabilitation and soil utilisation plan for the areas that may be impacted;

The studies will employ the following systems and classifications:

- The taxonomic soil classification system to characterise and classify the soils of the overall area.
- The SA Chamber of Mines methodology for assessing land capability.

The following methodology will be applied to the soils and land capability assessment in order to determine the impact of the proposed Block Z project:

#### 9.4.5.1 Baseline Assessment

A desktop study will be undertaken which takes into account existing pedological information and any additional information (geological and / or geotechnical) that may be available.

#### 9.4.5.2 Walk Over

A site investigation will be undertaken to determine where the areas of concern are located and to characterise and map the soils and rate the land capability of the study area.

The methodologies applied to the soil (Pedology) and the land capability assessments are separated for ease of reference. The pedological assessment methodology is provided below and the land capability assessment will follow.

#### 9.4.5.3 Pedological Study

A Pedological Study will be undertaken in order to achieve the following:

- To characterise the soils of the total area;
- To map the soils in detail and record the baseline conditions that exist pre any development or detailed (BFS) planning; and
- Utilise the information obtained from the soil characterisation in conjunction with the new mining and development plan to assess the impacts and develop a management plan.

In order to acquire the desired information, the following approach will be followed:

- The investigation of the soils will involve the traversing of the areas of concern on a detailed grid base using a conventional 1.5m-bucket auger to expose and characterise the soils (classify and log the soil profile).
- Selected terrain information, topography and any other infield data (geomorphology) of significance and / or relevance to the pedological and land capability investigation will also be recorded and stored in an electronic format (data base), and the information mapped on a recognised Geographic Information System (GIS).
- The identification and classification of the soil profiles will be carried out using the Taxonomic Soil Classification, a System for South Africa (Mac Vicar et al, addition 1991).

The procedure adopted when classifying the soil auger profiles is as follows:

- Demarcate master horizons;
- Identify applicable diagnostic horizons by visually noting the physical properties such as:
  - Depth;
  - Texture;
  - Structure;
  - Mottling;
  - Visible pores;
  - Concretions; and
  - Compaction.
- Determine from (i) and (ii) the appropriate Soil Form; and
- Establish provisionally the most likely Soil Family (pending the outcome of the laboratory tests).

Sampling of representative areas of the differing Soil Forms is carried out and submitted for analysis.

Factors that will be considered in the laboratory include:

- Determination of the pH;
- Exchangeable bases;
- C.E.C. (cation exchange capacity) cmol + / kg;
- Texture (% clay);
- Nutrient status mg / kg; and
- Organic carbon content of topsoil.

#### 9.4.5.4 Land Capability

A land capability study will be undertaken in order to achieve the following:

- The assessment and verification of all / any existing information; and
- Characterisation and rating of the land capability of the total study area.

In order to acquire the desired information, the following approach will be followed:

- The study area will be classified in terms of its land capability according to the soils identified and their physical and chemical characteristics in relation to the other known geomorphological variables (climate, topography, aspect, altitude etc.).
- This information will be captured on a GIS, and mapped using the classification system according to the Chamber of Mines, and the Canadian Land Information System.

The acquired information will be utilised to determine the land capability of the proposed Block Z project area.

## 9.4.6 Socio-Economic Impact Assessment

The social impact assessment (SIA) process will be undertaken in an effort to determine the impact of the proposed Block Z project on the local and regional socio-economic environment surrounding the proposed Block Z project area.

The SIA will involve the following: collection of primary data, analysis and interpretation of primary and secondary data, and compilation of a report to incorporate the above aspects.

### 9.4.6.1 Primary Data Collection

During the scoping phase of the S&EIR process, the specialist will undertake interviews with key stakeholders and representatives of potentially affected communities in order to obtain the necessary data and information for the aspects outlined above.

Primary data will be obtained through interviews with key local stakeholders, such as community representatives and local authorities, to obtain an overview of larger communities within a 50km radius of the proposed Block Z project (as this is likely to be the main catchment for labour and area of economic influence of the mine). The smaller local communities, including farmers, local businesses and farm tenants, are likely to be engaged through focus groups and direct interviews, as appropriate.

It is anticipated that interviews with key local stakeholders would serve to enable the project team to:

- Generate an overview of the issues, claims and concerns that interested and affected parties might have with the proposed Block Z project;
- Determine and understand land use systems and practices of the people in and around the study area; and
- Investigate the potential socio-economic impacts as identified.
- Interviews are proposed to be undertaken with key local stakeholders, including:
- Local authorities (e.g. local and district municipality, ward councillor / s and provincial authorities, as necessary);
- Local community representatives; and
- Other local stakeholders, such as local businesses, Community-Based Organisations (CBOs) and Non-Governmental Organisations (NGOs).

The specialist will undertake interviews with key community representatives to establish employment, education and skills levels in the major towns, as well as with farm and mining labour communities within proximity of the site. These interviews, together with discussions with local municipality representatives will also be used to determine the socio-economic needs of the local communities (including farming communities, the colliery and other mining communities in the area), as well as the institutional and community structure analysis.

#### 9.4.6.2 Analysis and Interpretation

Information gathered from the surveys and the stakeholder engagement process which forms part of the S&EIR process, will be collated and analysed to enable the specialist to generate an overview of the perceptions, issues and concerns that stakeholders might have with the proposed Block Z project, and against those captured in the scoping phase.

The social issues will be analysed from the information available. It is envisaged that the issues would be considered in two streams. Firstly, the potential negative issues associated with the proposed Block Z project and associated infrastructure, and secondly, the potential positive issues associated with the development. As such the task would estimate the anticipated negative and positive socio-economic impacts to the various socio-economic groups, and an overview of potential fatal flaws, if any, would be generated.

The following key aspects are likely to be considered during the analysis and interpretation stage:

- Employment and skills development - Existing and required levels and opportunities;
- Health and Safety – Awareness, implications and services;
- Economic implications and opportunities – Regional and national implications and local opportunities;
- Infrastructure and services - Existing and required capacity and quantity, including house, health and recreation;
- Social structures - Community relations and power structures; and
- Social and Labour relations – Implications for Social and Labour Plan.

The economic analysis of the local, regional and national context will make use of the data gathered during the scoping and primary data phases. The aim will be to provide an overview of the economic context and the potential broad economic implications of the mine.

Finally, social sensitivity map / s will be produced, so as to delineate the different areas in terms of social impacts, identifying zones of land use, and the different livelihoods that these land uses support. This will assist with the analysis of potential issues and perceptions, and provide a visual representation of the potential socio-economic impacts.

#### 9.4.6.3 Reporting and Recommendations

A report incorporating the above elements will be produced, including the rating of impacts according to significance (severity), probability, duration, spatial extent and stakeholder sensitivity. The report will make recommendations for mitigation measures to be considered in the design and operation of the proposed mining, for possible inclusion into a management plan (outside of this study).

The report will – based upon issues raised above – identify and evaluate the positive and negative impacts of the alternatives on various groups of affected parties (with and without mitigation). The study will conclude with recommendations in order to reduce anticipated impacts.

### 9.4.7 Heritage Impact Assessment

A heritage impact assessment (HIA) will be undertaken in order to ensure that the heritage resources in the area be identified and correctly documented. The aim of the HIA study is to assess the presence of archaeological remnants in the proposed Block Z project area which may be negatively impacted upon. The following will be undertaken in order to achieve the assessment objectives:

- Identify all objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) located on the property via desktop assessment and a site inspection;
- Assess the significance of the cultural resources in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value;
- Describe the possible impact of the proposed Block Z project on these cultural remains, according to a standard set of conventions;

- Propose suitable mitigation measures to minimise possible negative impacts on the cultural resources;
- Recommend suitable mitigation measure should there be any sites of significance that might be impacted upon by the proposed Block Z project; and
- Review applicable legislative requirements.

## 9.4.8 Air Quality Impact Assessment

The main purpose for conducting the AQIA is to identify key activities that might have significant air quality impacts during the project planning, construction and operational phases. In order to sufficiently understand the possible impact of the proposed Block Z project the following activities will be undertaken:

### 9.4.8.1 Baseline Air Quality Assessment

The baseline assessment will consist of:

- A site visit to determine the footprint and layout of the proposed Block Z project, as well as any significant surrounding sources of emissions;
- A description of the receiving environment, focusing on sensitive receptors;
- Assessment of the existing air quality situation in the area with the use of ambient monitoring data, if this data is available;

Information gathering, inclusive of but not limited to:

- Baseline climatic and air quality characterisation.
- Existing sources of emissions.
- Existing air quality monitoring data.
- A detailed list of sensitive receptors in the vicinity of the proposed mining operation.

### 9.4.8.2 Develop of Emission Inventory

A detailed, accurate source emissions inventory is extremely important to produce an accurate dispersion model. The inventory will be developed through the calculation of emissions by mass, source, time period and pollutant. These variables are calculated by using individual emission source information with their associated emission factors, and the respective operational parameters over a determined period of time. These parameters are then used to calculate the total source related emissions at the Isibonelo Colliery, including:

- Calculation of emissions from the proposed Block Z project; and
- Verification of the existing emissions inventory and capturing into an electronic format.

### 9.4.8.3 Dispersion Modelling

Source inventory data will be used as input for the creation of a dispersion model that demonstrates the impact of emissions associated with the proposed Block Z project to the existing situation.

AERMOD or ADMS 4 will be used to model the proposed Block Z project. Both AERMOD and ADMS 4 are new generation air dispersion models designed for short-range dispersion of airborne pollutants in steady state plumes. Both systems:

- Use hourly sequential meteorological files with pre-processors to generate flow and stability regimes for each hour.
- Produce output maps of plume spread with key isopleths for visual interpretation.

Statistical output of the models allows for direct comparisons with the latest national and international ambient air quality standards for compliance testing.

The model will be setup to compute ambient ground level concentrations based on both long-term (annual / chronic) and short-term (worst-case / acute) averaging periods. Model scenarios will be for cumulative impacts (i.e. where available, background concentrations will be included), such that statistical output will be compared with applicable ambient air quality standards for compliance assessment purposes. Additionally, model predictions will be compared to actual monitored data, where possible.

#### 9.4.8.4 Air Quality Impact Assessment

An AQIA will be required as part of the EIA process to demonstrate the impacts of the proposed operations on the existing air quality situation of the area. The report will include all methodological and technical information required to support the findings, as well as focusing on the potential impacts on the sensitive receptors.

Kindly note, the AQIA will be submitted approximately 6 – 8 weeks after the receipt of the last required information.

#### 9.4.8.5 Development of an Air Quality Management Plan

The AQIA report will also include an air quality management plan (AQMP) that details an emissions management and monitoring plan for key pollutants. Focus will be afforded to the following air pollutants:

- Particulate matter smaller than 10 microns (PM10);
- Dust fallout, and
- Any other pollutants of concern that become evident during the course of the project.

Mitigation recommendations will also be provided for those sources identified as key emitters, where emission reduction strategies should be implemented.

### 9.4.9 Noise Impact Assessment

The following methodology is proposed in order to successfully carry out the Noise Impact Assessment.

#### 9.4.9.1 Baseline Assessment

The baseline assessment will consist of site orientation, assessment of onsite processes, a site specific literature review regarding associated noise sources, identification of sensitive receptors, a meteorological review and an assessment of the existing noise climate in the region through ambient environmental noise monitoring.

Environmental noise monitoring is used to understand the baseline noise at the proposed Block Z project site. The key focus of such monitoring is to investigate the baseline noise levels at the existing mining operations and surrounding sensitive receptors through:

- Day and night-time noise monitoring conducted using a CasellaTM Type 1 integrating noise level meter, with all monitoring being conducted according to SANS 10103:2008 specifications;
- Monitoring locations will be selected in and around the existing mine operations and at surrounding sensitive receptors, with both day and night-time monitoring being conducted at each site;
- Monitoring will be conducted in fifteen minute intervals, with the daytime monitoring period being from 06:00 – 22:00, and the night-time period from 22:00 – 06:00; and
- All monitoring results will be compared with the guideline rating levels as provided in SANS 10103:2008.

#### 9.4.9.2 Noise Inventory

A detailed inventory of all noise sources associated with the proposed reserve swop will be developed and sound pressure levels (SPLs) for each of these proposed sources will be obtained. Sound level data will be sourced from the Noise Navigator™ sound level database (Berger et al., 2010) or from previous experience and associated research / literature. The sound level database provides sound (pressure) levels of over 1700 occupational and non-occupational noise sources.

#### 9.4.9.3 Environmental Noise Modelling

Environmental noise modelling will be conducted using the internationally accredited noise modelling software, CadnaA (Computer Aided Noise Abatement). The CadnaA software provides an integrated environment for noise predictions under varying scenarios and calculates the cumulative effects of various sources. The model uses ground elevations in the calculation of the noise levels in a grid and uses meteorological parameters that have an effect on the propagation of noise. CadnaA has been utilised in many countries across the globe for the modelling of environmental noise and town planning. It is comprehensive software for 3-dimensional calculations, presentation, assessment and prediction of environmental noise emitted from industrial plants, parking lots, roads, railway schemes or entire towns and urbanized areas.

The noise source inventory detailed above will be utilised as input for the CadnaA model. Gridded outputs from CadnaA will then be input into ArcGIS to provide a visual representation (isopleth output) of noise levels throughout the region. The noise contribution of the proposed Block Z project to the existing noise levels will be calculated, with comparisons being made to relevant national guidelines.

#### 9.4.9.4 Noise Impact Assessment

A detailed environmental noise impact assessment report will be provided detailing the findings of the baseline assessment, ambient environmental noise monitoring, acoustic modelling results and impacts, as well as detailed recommendations, including mitigation measures if deemed necessary.

### 9.4.10 Blasting and Vibration Assessment

In order to complete the blasting and vibration assessment the following actions will be undertaken by the specialist:

- Conduct a site visit to understand the structure profile of the proposed Block Z project. During the site visit structures and installations that are found in within a 3500m radius from the proposed Block Z project area will be focused upon;
- Obtain all relevant data and information on proposed mining methods and methodology; and
- Modelling the expected impact based on planned drilling and blasting information for the proposed Block Z project. Various accepted mathematical equations are applied to determine the attenuation of ground vibration, air blast and fly rock. These values are calculated over distance from proposed Block Z project site and shown as amplitude level contours. Overlay of these contours with the location of the various receptors then give indication of the possible impact and expected result of potential impact. Evaluation of each receptor according to the predicted levels will indicate level of possible influence and required mitigation if necessary. The possible environmental or social impacts will be addressed in the EIR phase.

### 9.4.11 Block Z project Programme for the EIA

The programme for the S&EIR suggests the following timeframes with respect to the most important activities to be undertaken:

- Submission of the Draft WULA for public comment – October / November 2014
- Submission of the Draft EIR / EMP for public comment – October 2014
- Public meetings – October r 2014
- Submission of the Final EIR / EMP and WLR for authority review – December 2014

The S&EIR process is iterative by nature and it should therefore be appreciated that the above dates are provided as guidance only and are subject to change.

## 9.5 Conclusions and Recommendations

This plan of study for EIR phase is aimed at meeting the requirements of GNR 543 and the guidelines issued in respect thereof as a minimum. The methodologies proposed for obtaining the information required to effectively identify and assess the potential environmental impacts of the project are considered to be comprehensive and sufficient to allow for the compilation of an EIR / EMPR which addresses stakeholder concerns and which will provide the competent authority with the appropriate information necessary to allow for informed decision-making on the application for authorisation.

# 10 Way Forward

This DSR contains:

- A description of the existing and proposed activities;
- A description of the alternatives considered to date;
- An outline of the proposed process to be followed;
- Information on the proponent, EAP and stakeholders who have chosen to participate in the project;
- An outline of the environment in which the projects fall;
- Information on the potential environmental impacts to be studied in more detail during the EIR phase of the project; and
- Information on the proposed specialist studies to be undertaken.

Based on the desktop studies undertaken to date, no environmental fatal flaws have been identified at this stage of the process that would prohibit the proposed Block Z project from continuing. However, a number of potential environmental impacts have been identified and require more in-depth investigation and the identification of detailed mitigation measures. Therefore, a detailed EIR is required to be undertaken in order to provide an assessment of these potential impacts and recommend appropriate mitigation measures, where required.

The recommendation of this report is that detailed specialist studies are undertaken on the proposed site and the no-go alternative. The scope of work required in the EIR phase of the project is included in the PoS for EIA (**Section 10**).

You are hereby invited to review the DSR that is available for public review from **8 August – 12 September 2014**. Please note that substantiated issues and comments must be submitted in writing to WSP before **12 September 2014**. It would be appreciated if comments could be made well within this period in order for us to address these comments appropriately. If you have any further enquiries, please feel free to contact:


WSP Environmental (Pty) Ltd

Attention: Zaffar Hussain

PO Box 98867, Sloane Park, 2152

Tel: 011 361 1387

Fax: 011 361 1381

E-mail: Zaffar.hussain@wspgroup.co.za


After the DSR comment period the report will be updated with comments received and a FSR will be submitted to the delegated competent authorities responsible for authorising this project, in this case the MDEDET, DEA and the DMR, who will consider the findings in consultation with various other authorities and issue a decision to proceed onto the next phase, that being the EIR phase.

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# Appendix A – Competent Authority Communication

# A1 – MDEDET

A2 – DMR

# A3 – DWA

# Appendix B – Stakeholder Engagement

# B1 – Stakeholder database and comments

B2 – Advertisements

# B3 – Site Notices

B4 – BIDs

# B5 – Public Review

WSP House
Bryanston
199 Bryanston Drive
Bryanston
2191

South Africa
Tel: +27 11 361 1392
Fax: +27 11 361 1381
www.wspenvironmental.co.za

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