GLENCORE OPERATIONS SOUTH AFRICA (PTY) LTD

PILLAR MINING AT ATCOM EAST SECTION OF THE IMPUNZI COMPLEX

FINAL BASIC ASSESSMENT REPORT

Report No.: JW189/12/C053 - Rev 3

October 2014

Jones & Wagener
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DOCUMENT APPROVAL RECORD

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NATIONAL ENVIRONMENTAL MANAGEMENT ACT – BASIC ASSESSMENT REPORT CHECKLIST

Description	Checklist	Reference in report
FINAL BASIC ASSESSMENT REPORT		
1. A description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity.	√	Section 4
2. An identification of all legislation and guidelines that have been considered in the preparation of the basic assessment report.	√	Section 2
3. Details of the public participation process conducted in terms of Regulation 21(2)(a) in connection with the application, including – (i) the steps that were taken to notify potentially interested and affected parties of the proposed application; (ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given; (iii) a list of all persons, organisations and organs of state that were registered in terms of regulation 55 as interested and affected parties in relation to the application; and (iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues.	√	Section 6
4. A description of the need and desirability of the proposed activity;	√	Section 3.3
5. A description of any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives will have on the environment and on the community that may be affected by the activity.	√	Section 5
6. A description and assessment of the significance of any environmental impacts, including— (i) cumulative impacts, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the activity; (ii) the nature of the impact; (iii) the extent and duration of the impact; (iv) the probability of the impact occurring; (v) the degree to which the impact can be reversed; (vi) the degree to which the impact may cause irreplaceable loss of resources; and (vii) the degree to which the impact can be mitigated.	√	Section 7
7. Any environmental management and mitigation measures proposed by the EAP.	√	Section 8
8. Any inputs and recommendations made by specialists to the extent that may be necessary.	√	Section 4 and 8
9. A final environmental management programme containing the aspects contemplated in regulation 33.	√	Section 8
10. A description of any assumptions, uncertainties and gaps in knowledge.	√	Section 9
11. A reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	√	Section 10
12. Any representations and comments received in connection with the application or the basic assessment report.	√	Appendix C8

Description	Checklist	Reference in report
FINAL BASIC ASSESSMENT REPORT		
13. The minutes of any meetings held by the EAP with interested and affected parties and other role players which record the views of the participants.	√	Appendix C8 and C9
14. Any responses by the EAP to those representations, comments and views.	√	Appendix C7
15. Any specific information required by the competent authority.	-	N/A
16. Any other matters required in terms of sections 24(4)(a) and (b) of the Act.	-	N/A

PURPOSE OF THIS DOCUMENT

The iMpunzi Complex of Glencore Operations South Africa (Pty) Ltd (Glencore), previously known as Xstrata Coal South Africa (Pty) Ltd, is located 23km south east of eMalahleni in the Mpumalanga Province, near the towns of Ogies and Kriel. The area is located within the eMalahleni magisterial district and falls under the Highveld Regional Services Council. The Complex consists of four sections, namely: Arthur Taylor Colliery Opencast Mine (ATCOM), Phoenix Colliery, Arthur Taylor Colliery (ATC), and ATCOM East. Middelburg and Douglas Colliery form part of BHP Billiton Energy Coal South Africa (BECSA).

Glencore's ATCOM, a section of iMpunzi Complex, is expanding their mining operations to incorporate new mining reserves. The proposed new mining venture includes opencast mining of historical underground bord and pillar operations, previously owned by BECSA. The new mining operations are situated near Vandyksdrift (VDD), and are called ATCOM East.

Mining at ATCOM East will be a combination of truck and shovel and dragline. The ATCOM East mining operations will be mined in four opencast operations, namely: River South; VDD South; River West; and VDD West Pits.

Glencore has appointed Jones & Wagener Engineering and Environmental Consultants (Pty) Ltd (J&W), an independent company, to undertake the Basic Assessment (BA) process required for mining through wetland areas at the ATCOM East Section, in order to evaluate the potential environmental and social impacts of the proposed project.

As per the National Environmental Management Act (NEMA), Act 107 of 1998 as amended, Interested and Affected Parties (I&APs) must be provided with the opportunity to comment on the proposed project and verify that all their issues that have been raised have been recorded. As such this Final BA Report is being made available for comment for the period 28 October 2014 to 17 November 2014. Comments received during the review period of the Draft BA Report have been considered in this Final BA Report which will be submitted to the lead authority, the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) for approval to proceed with the proposed project.

Summary of what the Final Basic Assessment Report Contains

This report contains the following for comment by stakeholders:

- Details of the Environmental Assessment Practitioner (EAP) who prepared the report;
- The background and description to the proposed project;
- A description of the existing environment in the project area prior to mining;
- A description of the applicable legislative requirements;
- An overview of the public participation process followed;
- A list of comments raised and responses to date (Comments and Response Report);
- A description of the need and desirability of the proposed development;
- A description of alternatives to the proposed operation and alternative means of carrying out the proposed operation;
- The potential anticipated environmental, social and cultural impacts which have already been identified to date;
- Mitigation measures to minimise the identified impacts; and
- The EAPs recommendation in terms of whether or not the project should be approved.

A BASIC ASSESSMENT PROCESS CONSISTS OF THE FOLLOWING PHASES

Initial Phase		Impact Assessment Phase		Decision-making Phase
To identify issues, to identify sites, to focus the BA	→	Detailed studies of potential impacts, positive and negative, Consolidate findings of impact assessment studies	→	Proponent and authorities use BA findings to decide if project goes ahead

YOUR COMMENT ON THE FINAL BASIC ASSESSMENT REPORT

The Final BA Report is available for comment from 28 October 2014 to 17 November 2014 (21 days). This Final BA Report has been made available to the key commenting authorities, key stakeholders, all those that have requested a copy and those registered on the stakeholder database. Copies of the report are available at strategic public places in the project area (see below) and on the following website www.jaws.co.za.

List of public places where the Final BA Report is available:

Venue	Street Address	Contact No
iMpunzi Mine Reception	Portion 31 of the Farm Blesbokfontein, Bethal	(013) 687 8299
eMalahleni Library	28 Hofmeyer Street, eMalahleni	(013) 699 1057

You may comment on the Final BA Report by:

- Completing the comment sheet enclosed with the report; and / or
- Writing a letter, or producing additional written submissions directly to J&W.

DUE DATE FOR COMMENT ON THIS FINAL BASIC ASSESSMENT REPORT:

17 NOVEMBER 2014

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TERMS AND ABBREVIATIONS

ATC ..... Arthur Taylor Colliery
ATCOM ..... Arthur Taylor Colliery Opencast Mine
BA ..... Basic Assessment
BECSA ..... BHP Billiton Coal South Africa
DAFF ..... Department of Agriculture, Forestry and Fisheries
DEA ..... Department of Environmental Affairs
DME ..... Department of Minerals and Energy
DMR ..... Department of Mineral Resources
DWS ..... Department of Water and Sanitation
DWF ..... Dry Weather Flow
EA ..... Environmental Authorisation
EAP ..... Environmental Assessment Practitioner
EC ..... Electrical Conductivity
ECA ..... Environmental Conservation Act
EIA ..... Environmental Impact Assessment
EIR ..... Environmental Impact Report
EISC ..... Ecological Importance and Sensitivity Class
ELM ..... eMalahleni Local Municipality
EMP ..... Environmental Management Plan
EMPr ..... Environmental Management Program (NEMA)
EMPR ..... Environmental Management Program (MPRDA)
GN ..... Government Notice
HIA ..... Heritage Impact Assessment
I&APs ..... Interested and Affected Parties
IEM ..... Integrated Environmental Management
IWULA ..... Integrated Water Use Licence Application
J&W ..... Jones and Wagener
km ..... kilometres
LOM ..... Life of Mine
m ..... metres
m^3 ..... cubic metres
mamsl ..... metres above mean sea level
MA ..... Minerals Act
MAP ..... Mean Annual Precipitation
MAR ..... Mean Annual Runoff
MDEDET ..... Mpumalanga Department of Economic Development, Environment and Tourism
MPRDA ..... Mineral and Petroleum Resources Development Act
NEMA ..... National Environmental Management Act

NEM:WA..... National Environmental Management Waste Act
NDM ..... Nkangala District Municipality
NSBA..... National Spatial Biodiversity Assessment
NWA..... National Water Act
PC ..... Pollution Control
PES ..... Present Ecological State
R..... Regulation
ROM ..... Run of Mine
S&EIR..... Scoping and Environmental Impact Reporting Process
SAHRA..... South African Heritage Resources Agency
SANBI..... South African National Biodiversity Institute
SANS..... South African National Standards
SIA..... Social Impact Assessment
SLP..... Social and Labour Plan
SR ..... Scoping Report
ToR..... Terms of Reference
VDD..... Vandyksdrift
WCS ..... Wetland Consulting Services
WHO..... World Health Organisation
WRC..... Water Research Commission
WUL ..... Water Use Licence
WULA..... Water Use Licence Application

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PILLAR MINING AT ATCOM EAST SECTION OF THE IMPUNZI COMPLEX

FINAL BASIC ASSESSMENT REPORT REPORT NO: JW189/12/C053 - Rev 3

1. INTRODUCTION

1.1 Background Information

Glencore Operations South Africa (Pty) Ltd's (Glencore) Tavistock Collieries is located south of eMalahleni in the Mpumalanga Province, and for management purposes is divided into two complexes, namely the iMpunzi and Tweefontein South Complexes.

The iMpunzi Complex is located 23km south east of eMalahleni in the Mpumalanga Province, near the towns of Ogies and Kriel (Refer to Figure 1-1). The Complex consists of four (4) sections, namely: Arthur Taylor Colliery Opencast Mine (ATCOM), Phoenix Colliery, Arthur Taylor Colliery (ATC), and ATCOM East.

ATCOM East is a proposed new Section of the iMpunzi Complex, and Glencore intends expanding their mining operations to incorporate new mining reserves. The proposed new mining venture includes opencast mining of historical underground bord and pillar operations, previously owned by BHP Billiton Energy Coal South Africa (BECSA). The new mining operations are situated near Vandyksdrift (VDD), and are called ATCOM East.

Jones & Wagener Engineering and Environmental Consultants (J&W) has been appointed by Glencore to undertake the Basic Assessment (BA) and Integrated Water Use Licence Application (IWULA) processes for the proposed mining through wetlands in terms of the National Environmental Management Act (NEMA, Act 107 of 1998) at the ATCOM East Section.

Mining at ATCOM East will be a combination of truck and shovel and dragline. The ATCOM East mining operations will be mined in four (4) opencast operations, namely:

- River South Pit: It is proposed to commence mining at River South Pit in 2021 and mining will continue until approximately 2031. Due to the restricted area of this pit it will most likely be mined using the truck and shovel method.
- VDD South Pit: This is the largest pit. Mining will commence in 2017 and should continue until 2036. The pit will be mined by means of dragline and possibly a truck and shovel fleet.

- River West Pit: Mining of this pit will commence in 2014 and continue until 2026. Although not finalised yet mining will probably also be done by means of a truck and shovel fleet.
- VDD West Pit: This pit will be mined from 2014 until 2036 by means of using truck and shovel. Mining will occur concurrently with the River West pit.

Although Glencore intends to commence with the opencast operations at River West Pit and VDD West Pit during 2014, the relevant environmental authorisations will have to be obtained first before any activity can commence.

1.2 Regional Setting

The regional location of the proposed project area is described in the section below (Refer to Figure 1-1).

1.2.1 Magisterial District

The proposed project is situated within the Nkangala District Municipality in the eMalahleni Local Municipality specifically in Wards 25 and 32 (Refer to Figure 1-2)

1.2.2 Direction and distance to neighbouring towns

The distances to neighbouring towns from the proposed project are as follows:

Vandyksdrift	±5 kilometres north east
Phoenix	±7 kilometres north west
Lehlaka Park	±10 kilometres south west
Kriel	±15 kilometres south
Phola	±25 kilometres north west
eMalahleni (Witbank)	±25 kilometres north
Middelburg	±36 kilometres north east

1.3 Project Team Details

1.3.1 Applicant Details

In the section below, the details of the applicant are listed. This is the institution that will be legally responsible for the proposed ATCOM East mining area. The environmental authorisation and licences to mine the pillars, construct the required infrastructure and operate the mine will also be in the name of this legal institution.

Name:	Mr Pravin Chetty
Company Represented:	Glencore South Africa (Pty) Ltd
Address:	Private Bag X16, Witbank, 1035
Telephone:	013 687 8210
Fax:	013 690 5608
E-mail:	pravin.chetty@glencore.co.za

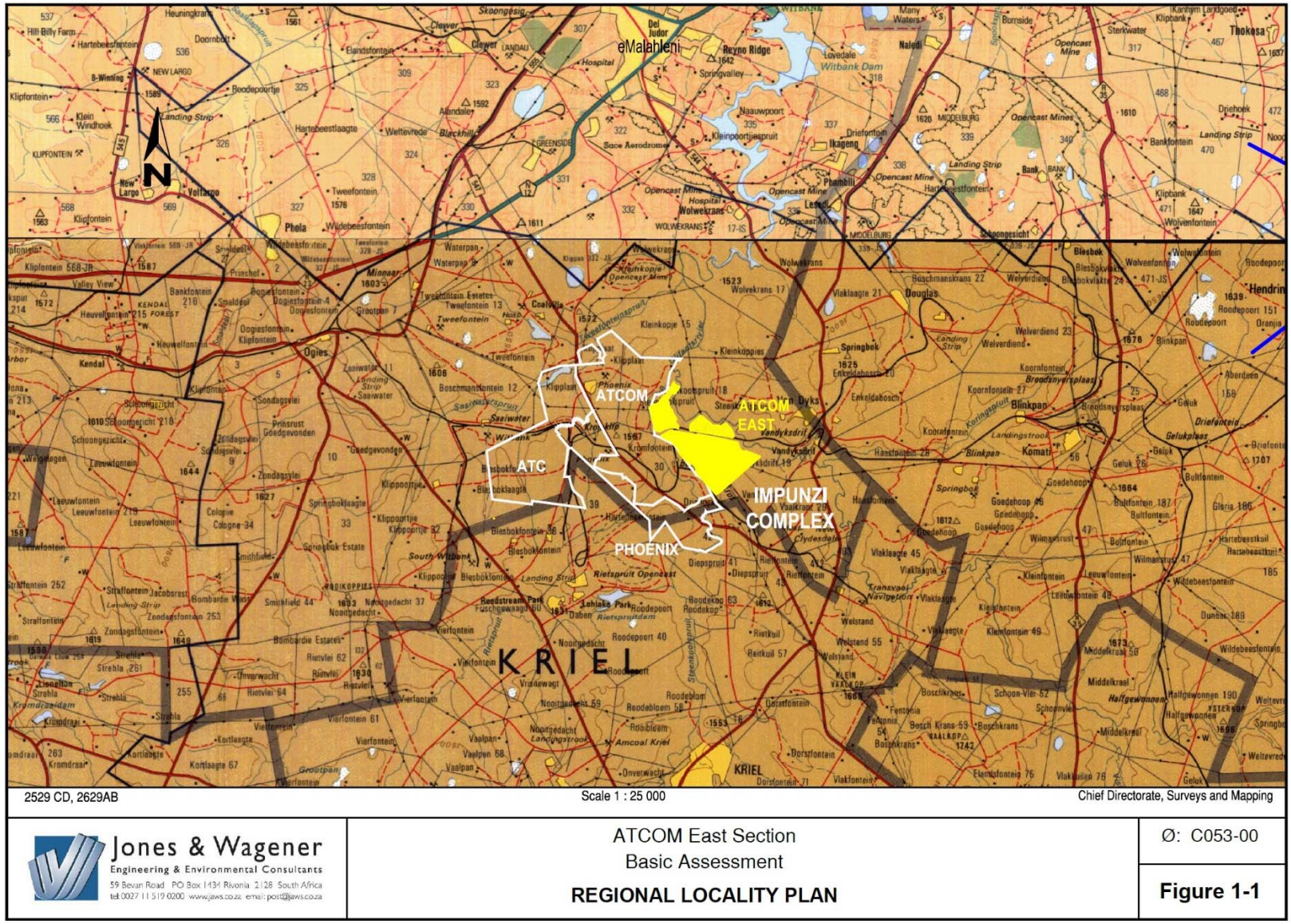

Figure 1-1: Regional locality of the proposed study area.

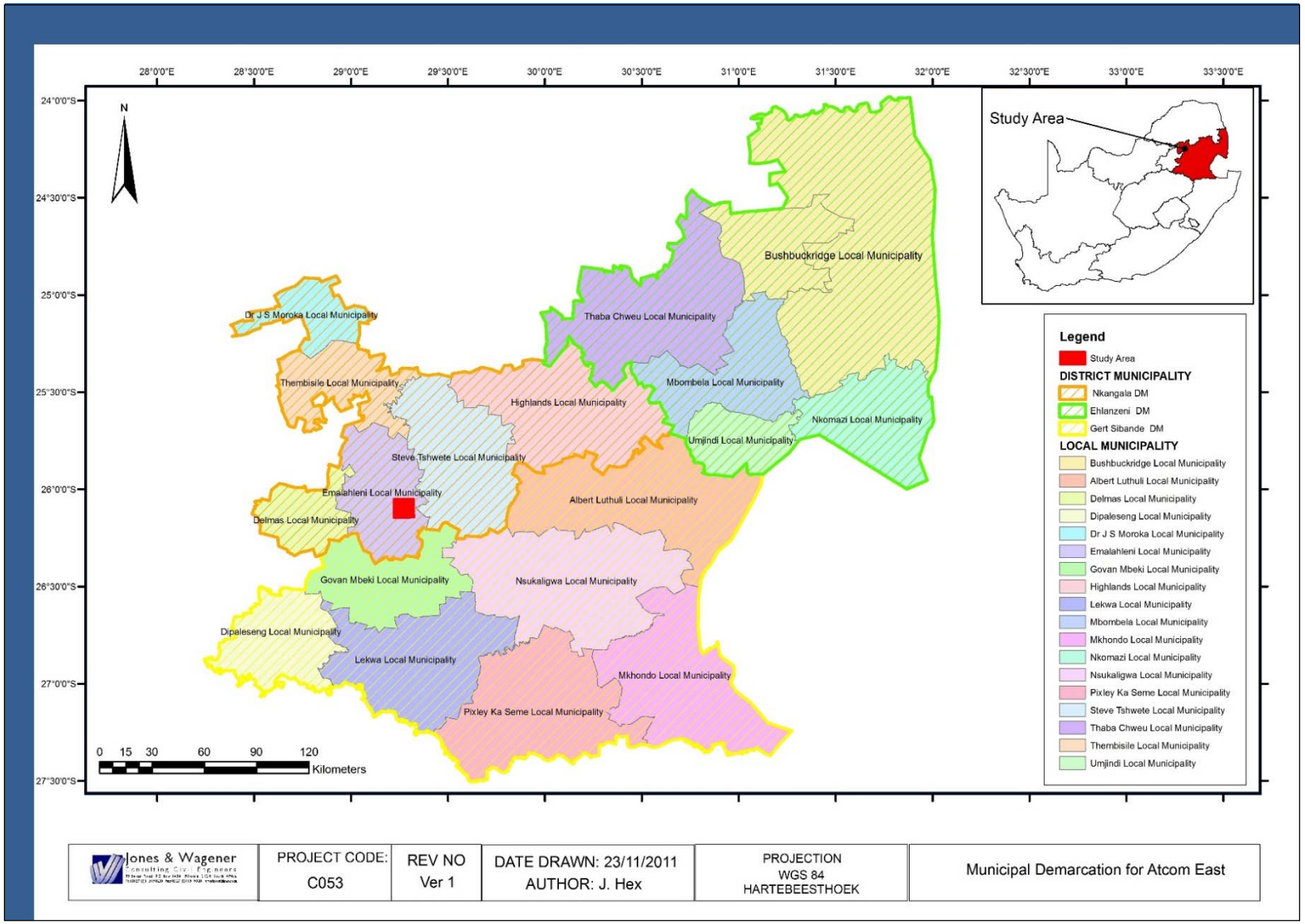

Figure 1-2: Municipal demarcation of the study area.

1.3.2 Environmental Assessment Practitioner Details

In terms of the NEMA, the proponent must appoint an independent consultant to undertake the BA process for any activity regulated in terms of the aforementioned Act. In this regard, Glencore appointed Jones & Wagener Engineering and Environmental Consultants (Pty) Ltd (J&W) to undertake the BA for the proposed pillar mining project at ATCOM East.

Key areas in which J&W operate include the following:

- Geotechnical engineering;
- Structural engineering;
- Waste and Tailings;
- Environmental engineering;
- Hydrological engineering;
- Environmental sciences and management; and
- Mining support infrastructure.

J&W has no vested interest in the proposed project and hereby declares its independence.

The details of the J&W representatives are listed below.

Name:	Gerhard Cronje
Company Represented:	Jones & Wagener (Pty) Ltd.
Address:	PO.Box 1434; Rivonia; 2128
Telephone:	(011) 519 0200
Fax:	011 519 0201
E-mail:	cronje@jaws.co.za

1.3.2.1. Expertise of the Team

Table 1-1 below summarises the expertise of the main J&W team members.

Table 1-1: EAP Team Members

Name	Organisation	Highest Qualifications	Experience	Professional Registrations
Gerhard Cronje	J&W	BSc Geography (Hons)	6 years	-
Jacqui Hex	J&W	MSc Environmental Management	8 years	Pr.Sci.Nat, EAPSA

1.3.3 Competent Authority Details

The Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) is the competent authority responsible for issuing the relevant environmental authorisation for the proposed project.

1.4 Context of this Report

This report is the Final BA Report, a key component of the environmental authorisation process for the pillar mining at ATCOM East near Vandyksdrift in the Mpumalanga Province.

1.5 Objectives of this Report

This report addresses the requirements for a BA Report as outlined in the NEMA regulations. The aim of this Final BA Report is to:

- Provide information to the authorities as well as Interested and Affected Parties (I&APs) on the proposed project;
- Provide information regarding alternatives that are being considered;
- Indicate how I&APs have been and are still being afforded the opportunity to contribute to the project, verify that the issues they raised to date have been considered, and comment on the findings of the impact assessments;
- Describe the baseline receiving environment;
- Present the findings from the specialist investigations that have been undertaken for this BA;
- Propose mitigation and management measures to minimise any identified potential negative environmental impacts and to enhance positive impacts; and
- Present the findings of the Impact Assessment Phase in a manner that facilitates decision-making by the relevant authorities.

1.6 Project Progress

A BA comprises of an Announcement Phase, an Impact Assessment Phase and a Decision Making Phase. The project is currently in the Impact Assessment Phase where the following has been completed:

- Pre-application consultation with relevant stakeholders and authorities (MDEDET);
- Completion and submission of the relevant application documentation;
- Placement of announcement advertisements;
- Compilation and distribution of a Background Information Document (BID);
- Compilation of the Draft BA Report and an Environmental Management Program (EMPr);
- Compilation of the Final BA Report and an Environmental Management Program (EMPr);
- Placing the above-mentioned documentation on public review.

Further information on the process being followed is outlined in Section 6 of this report.

2. APPLICABLE LEGISLATIVE REQUIREMENTS

Environmental legislation in South Africa was promulgated with the aim of, at the very least, minimising and at the most preventing environmental degradation. The following Acts and Regulations are applicable to the proposed project:

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

Section 24 of the Constitution states that: Everyone has the right

(a) to an environment that is not harmful to their health or well-being; and

(b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that-

- 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 current environmental laws in South Africa concentrate on protecting, promoting, and fulfilling the Nation's social, economic and environmental rights; while encouraging public participation, implementing cultural and traditional knowledge and benefiting previously disadvantaged communities.

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

The MPRDA is the central Act governing mining in South Africa. The MPRDA repealed the Minerals Act, 50 of 1991 (MA) when it entered into force on 1 May 2004. The preamble to the MPRDA affirms the State's obligation to protect the environment for the benefit of present and future generations, to ensure ecologically sustainable development of mineral and petroleum resources and to promote economic and social development.

Broadly speaking, the MPRDA seeks to fulfil the obligation of the State to protect the environment and to ensure ecologically sustainable development through a system requiring a person who wishes to conduct mining operations to prepare and have approved an Environmental Management Plan (EMP) or EMPR and to manage the environmental impacts of its mining operations in accordance with the provisions contained in such an EMPR. The legislative bases relating to the management of the environmental impact of mining operations are set out in Chapter 4 (sections 39 to 47) of the MPRDA. The formal and substantive requirements with respect to the management of the environmental impacts of mining operations are fleshed out in Part III of Chapter 2 of the Mineral and Petroleum Resources Development Regulations (MPRDR) promulgated in terms of Government Notice Regulation (GNR) 527 of 23 April 2004 (as amended).

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

The BA for this proposed project will be conducted in terms of the EIA Regulations that were promulgated in terms of Section 24 (5) of the NEMA, as amended. The MDEDET is the competent authority responsible for issuing the relevant environmental authorisation for the proposed project.

2.3.1 Environmental Impact Assessment Regulations: 543-546 of 18 June 2010

A BA is required for projects with less significant impacts or impacts that can easily be mitigated. In terms of GNR 544 the following activities required a BA process to be undertaken for the pillar mining project at ATCOM East Section, and they are tabulated below in Table 2-1.

Table 2-1: Activities applied for at ATCOM East for the pillar mining project that required a BA to be undertaken.

Activity No	Description of Activity as per GNR	Activity or Infrastructure Triggering the Activity
544-11	The construction of: (i) canals; (ii) channels; and	Constructing: (i) Clean water diversion canals; (ii) Water management infrastructure;

Activity No	Description of Activity as per GNR	Activity or Infrastructure Triggering the Activity
	(xi) infrastructure or structures covering 50 square meters or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	(xi) any other infrastructure or structures associated with the new mining areas at ATCOM East in excess of 50 square meters; which are located within 32m from areas that are classified as wetlands or watercourses.
544-18	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from: (i) a watercourse But excluding where such infilling, depositing, dredging, excavation, removal or moving (i) Is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or (ii) Occurs behind the development setback line	Dredging from a watercourse: The amount of material to be removed from areas that are classified as watercourses / wetlands as part of the opencast mining of historical underground bord and pillar operations will be in excess of 5 cubic metres.
544-22	The construction of a road, outside urban areas (i) with a reserve wider than 13.5m or; (ii) where no reserve exists where the road is wider than 8m	The construction of new sections of haul road and bridge (28 m wide) which will service the ATCOM East opencast pit areas.
546-4a(ii)	The construction of a road wider than 4m with a reserve less than 13.5m in - (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	Construction of access roads in Critical Biodiversity Areas or Environmental Sensitive Areas.
546-14(a)	The clearance of an area of 5hectares or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation (i) All areas outside urban areas	The removal of vegetation for the establishment of the opencast pit areas.
546-16(iv)	The construction of infrastructure covering 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse. (a) ii (ff) Critical Biodiversity areas or ecosystem service areas as identified in	The construction of abovementioned infrastructure associated with the establishment of the opencast pit areas located within a watercourse or within 32 metres of a watercourse

Activity No	Description of Activity as per GNR	Activity or Infrastructure Triggering the Activity
	systematic biodiversity plans adopted by the competent authority or in bioregional plans.	

The NEMA can be regarded as the most important piece of general environmental legislation. It provides a framework for environmental law reform and covers three areas, namely:

- Land, planning and development;
- Natural and cultural resources, use and conservation; and
- Pollution control and waste management.

The law is based on the concept of sustainable development. The objective of the NEMA is to provide for co-operative environmental governance through a series of principles relating to:

- The procedures for state decision-making on the environment; and
- The institutions of state which make those decisions.

The NEMA principles serve as:

- A general framework for environmental planning;
- Guidelines according to which the state must exercise its environmental functions; and
- A guide to the interpretation of NEMA itself and of any other law relating to the environment.

2.3.2 What are the NEMA principles?

Some of the most important principles contained in NEMA are that:

- Environmental management must put people and their needs first;
- Development must be socially, environmentally and economically sustainable;
- There should be equal access to environmental resources, benefits and services to meet basic human needs;
- Government should promote public participation when making decisions about the environment;
- Communities must be given environmental education;
- Workers have the right to refuse to do work that is harmful to their health or to the environment;
- Decisions must be taken in an open and transparent manner and there must be access to information;
- The role of youth and women in environmental management must be recognised;
- The person or company who pollutes the environment must pay to clean it up;
- The environment is held in trust by the state for the benefit of all South Africans; and

- The utmost caution should be used when permission for new developments is granted.

2.4 Environment Conservation Act (No. 73 of 1989)

The Environment Conservation Act (ECA) is a law that relates specifically to the environment. Although most of this Act has been replaced by the NEMA there are still some important sections that remain in operation. These sections relate to:

- Protected natural environments;
- Littering;
- Special nature reserves;
- Limited development areas; and
- Regulations on noise, vibration and shock.

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

The National Water Act, Act 36 of 1998, as amended, (NWA) guides the management of water in South Africa as a common resource. The NWA aims to regulate the use of water and activities which may impact on water resources through the categorisation of 'listed water uses' encompassing water extraction, flow attenuation within catchments as well as the potential contamination of water resources, where the Department of Water and Sanitation (DWS) is the administering body in this regard. Should the proposed activities associated with the proposed project impact on water resources e.g. cross through rivers, the applicant would be responsible to obtain a WUL from the DWS.

Section 21 of the NWA defines various water uses, while Section 22 requires that a person may only use water if licensed in terms of the NWA. The use of water does not necessarily mean the consumptive use thereof, but covers any aspects that have or could have an impact on a watercourse.

Water uses are defined in the NWA and include the following activities as described in Section 21 of the Act:

21 (a) taking water from a water resource;

(b) storing water;

(c) impeding or diverting the flow of water in a watercourse;

(d) engaging in a stream flow reduction activity contemplated in section 36;

(e) engaging in a controlled activity identified as such in Section 37(1) or declared under Section 38(1);

(f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;

(g) disposing of waste in a manner which may detrimentally impact on a water resource;

(h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;

(i) altering the bed, banks, course or characteristics of a watercourse;

(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and

(k) using water for recreational purposes.

In terms of Section 22(1) a person may only undertake the abovementioned water uses if it is appropriately authorised:

22 (1) A person may only use water

(a) without a licence

(i) if that water use is permissible under Schedule 1;

(ii) if that water use is permissible as a continuation of an existing lawful use; or

(iii) if that water use is permissible in terms of a general authorisation issued under Section 39;

(b) if the water use is authorised by a licence under this Act; or

(c) if the responsible authority has dispensed with a licence requirement under subsection (3).

Table 2-2: Water uses applied for in terms of Section 21 of the NWA requiring licensing in terms of the provisions of Section 22 of NWA.

Water Use	Description of Water Use	Activity requiring a Water Use Licence
Section 21(c)	Impeding or diverting the flow of water in a watercourse, and	• Mining through wetlands at the proposed River South Pit, Vandyksdrift (VDD) South Pit, River West Pit; and VDD West Pit.
Section 21 (i)	Altering the bed, banks, course or characteristics of a watercourse	

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

The object of this Act is -

- To protect the environment by providing reasonable measures for -
  - The protection and enhancement of the quality of air in South Africa;
  - The prevention of air pollution and ecological degradation; and
  - Securing ecologically sustainable development while promoting justifiable economic and social development.
- Generally to give effect to Section 24(b) of the Constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people.

2.7 The National Heritage Resources Act (No. 25 of 1999)

The National Heritage Resources, 1999 (Act No. 25 of 1999) legislates the necessity for cultural and Heritage Impact Assessment (HIA) in areas earmarked for development, which exceed 0.5 ha. The Act makes provision for the potential destruction to existing sites, pending the archaeologist's recommendations through permitting procedures. Permits are administered by the South African Heritage Resources Agency (SAHRA). Should the proposed activities impact on heritage resources, application to SAHRA would be required to obtain the necessary permits. The requirements of the National Heritage Resources Act have thus been addressed as an element of this process, specifically by the inclusion of a Heritage Assessment.

2.8 National Environmental Management: Biodiversity Act, 2004 (No. 10 of 2004)

The purpose of the Biodiversity Act is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed. Should protected species and ecosystems be impacted on by the proposed opencast mining, this Act may be applicable and the necessary measures should be taken for implementation.

2.9 National Spatial Biodiversity Assessment

The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection based on their biophysical characteristics, which are ranked according to priority levels.

2.10 Protected species – Provincial Ordinances

Provincial ordinances were developed to protect particular plant species within specific provinces. The protection of these species is enforced through permitting requirements associated with provincial lists of protected species. Permits are administered by the provincial departments responsible for environmental affairs.

2.11 Occupational Health and Safety Act (No. 85 of 1993)

This Act makes provisions that address the health and safety of persons working at the mine. The Act addresses amongst others the:

- Safety requirements for the operation of plant machinery;
- Protection of persons other than persons at work against hazards to health and safety, arising out of or in connection with the activities of persons at work;
- Establishment of an advisory council for occupational health and safety; and
- Provision for matters connected therewith.

The law states that any person undertaking upgrades or developments for use at work or on any premises shall ensure as far as is reasonably practicable that nothing about the manner in which it is constructed or operated makes it unsafe or creates a risk to health when properly used.

2.12 Department of Environmental Affairs and Tourism Integrated Environmental Management Information Series

The Department of Environmental Affairs (DEA) Information Series of 2002 and 2006 comprise 23 information documents. The documents were drafted as sources of information about concepts and approaches to Integrated Environmental Management (IEM). The IEM is a key instrument of NEMA and provides the overarching framework for the integration of environmental assessment and management principles into environmental decision-making. The aim of the information series is to provide general guidance on techniques, tools and processes for environmental assessment and management.

3. PROJECT DESCRIPTION

3.1 Project Location

The area that is proposed for pillar mining at ATCOM East situated approximately 23km south east of eMalahleni in the Mpumalanga Province, near the towns of Ogies and Kriel within the eMalahleni Local Municipality in Wards 25 and 32. The eMalahleni Local Municipality also forms part of the bigger Nkangala District Municipality.

3.2 Background

As aforementioned, Glencore intends expanding their mining operations to incorporate new mining reserves. The proposed new mining venture includes the opencast mining of historical underground bord and pillar operations, previously owned by BECSA. These are collectively referred to as ATCOM East.

Mining at ATCOM East will be a combination of truck and shovel and dragline. The ATCOM East mining operations will be mined in four (4) opencast operations, namely:

- River South Pit;
- VDD South Pit;
- River West Pit; and
- VDD West Pit.

All of the abovementioned pit areas contain wetlands. J&W was appointed by Glencore to undertake the BA process for the proposed mining through wetlands in terms of the NEMA at the ATCOM East Section.

A separate application for a Water Use Licence for the mining through wetlands has been lodged with the Department of Water and Sanitation (DWS – previously Department of Water Affairs) by J&W.

3.3 Need and Desirability

The majority of electricity in South Africa is currently generated from coal. Eskom being the national electricity utility that generates and distributes electricity to industrial, mining, commercial, agricultural and residential electricity consumers and re-distributors. Eskom currently relies on coal fired power stations to produce approximately 95% of the electricity generated in South Africa and until such time as alternative energy generation options can be implemented on a sufficiently large scale, Eskom is completely dependent on coal mining in order to supply coal for electricity generation.

Glencore intends expanding their mining operations to incorporate new mining reserves, which includes the opencast mining of historical underground bord and pillar operations. The coal remaining in the pillars is of good quality, therefore making it desirable for Glencore to extract these pillars from the previously undermined areas.

3.4 Existing Infrastructure supporting the ATCOM East Operations

The following infrastructure / components form part of the ATCOM East operations, and have already been applied for and authorised in a separate application to the relevant competent authorities. These components are required in order to transport, store and process coal from the new mining reserves at ATCOM East Section, and include the following:

- ATCOM Central Hard Park, which includes
  - Shift change facilities and admin offices;

- Refuelling facilities; and
- Sewage treatment plant

- Run of Mine (ROM) Tip
  - ROM stockpile;
  - Conveyor route to processing plant; and
  - Clean and dirty water separation canals
- ATCOM ROM Pollution Control (PC) Dam
  - Area 3 ha, capacity 50 000m^3 at full supply level.
  - Steenkoolspruit and Olifants River crossings
- Heavy Duty Vehicle (HDV) Workshops
  - Workshops, offices and wash bay facility;
  - Bulk oil storage facility;
  - Sewage treatment plant.
- Dewatering pipeline, which includes river/stream crossings; and
- Phoenix discard dump PC dam (25 000m^3 capacity).

A haul road, and associated crossings of the Olifants River and Steenkoolspruit, has been constructed between the Steenkoolspruit pit and the existing ATCOM processing plant, and was commissioned at the beginning of March 2011. With the commissioning of the bridge crossings and haul roads, coal is temporarily trucked to the existing ATCOM tip until new infrastructure is constructed to facilitate storage and handling.

In order to commence opencast mining of the historical bord and pillar workings at ATCOM East Section, water from the underground workings needs to be removed. The workings will be dewatered via the abovementioned pipeline (which has been already been authorised), that will discharge water into the proposed ATCOM ROM PC Dam. From there it will be pumped via a second pipeline and discharged into the existing underground workings at ATC which is interlinked with Witcons Section, where sufficient storage exists.

3.5 New Proposed Infrastructure

During the construction phase, surface water management infrastructure will need to be constructed before opencast mining takes place at the proposed pits at ATCOM East. This infrastructure include advancing sacrificial drains, clean water diversion canals, clean waste rock berms, and high intensity dissipation structures that will ensure that the wetlands that are proposed to be mined through, where a portion of the wetland will remain, do not flood the opencast workings or result in stability issues later on (Refer to Figure 3-1 below).

Golder Associates was appointed to undertake the preliminary engineering design of stormwater management measures for the proposed pits at ATCOM East during December 2013 (**Appendix B.8**).

*Please note that the proposed pit names as illustrated in Figure 3-1 and listed in the report "Preliminary Engineering Design of Stormwater Management Measures" by Golder Associates (**Appendix B.8**), do not correspond with the proposed pit names as mentioned earlier in this report. The pit names as used by Golder Associates are therefore provided next to the corresponding pit names as used in this BA report in brackets below:*

VDD South Pit (ATCOM East Pit 1)

The sub-catchments related to ATCOM East Pit 1 (hatched in orange in Figure 3-1) can be broadly categorised as follows:

- Draining in a South-Westerly direction discharging into the Steenkoolspruit; and
- Draining in a North-Easterly direction discharging into the Olifants River.

VDD West Pit (ATCOM East Pit 2)

The sub-catchments related to ATCOM East Pit 2 (hatched in green in Figure 3-1) can be broadly categorised as follows:

- Draining in a South-Westerly direction discharging into the Steenkoolspruit; and
- Draining in a North-Westerly direction discharging into the Olifants River.

River West Pit (ATCOM East Pit 3)

ATCOM East Pit 3 (hatched in pink in Figure 3-1) is bounded by the Steenkoolspruit to the West and North, the Olifants River to the East and existing railway line and haul road to the South. The sub-catchments related to Open Pit 3 can be broadly categorised as follows:

- Draining in a North-Westerly direction and
- Draining in a North-Easterly direction.

River South Pit (ATCOM East Pit 4)

ATCOM East Pit 4 (hatched in yellow in Figure 3-1) is bounded by the Olifants River to the North, East and West and by an existing railway line to the South. The sub-catchments related to Open Pit 4 can be broadly categorised as follows:

- Draining in a North-Westerly direction, and;
- Draining in a North-Easterly direction.

Haul Roads

The existing haul road network will be extended to service the new mining areas of VDD South Pit, VDD West Pit, and River South Pit. The haul roads will have a width of 28m, and a bridge crossing over the existing Richards Bay railway line will be constructed (Refer to Figure 3-1 below).

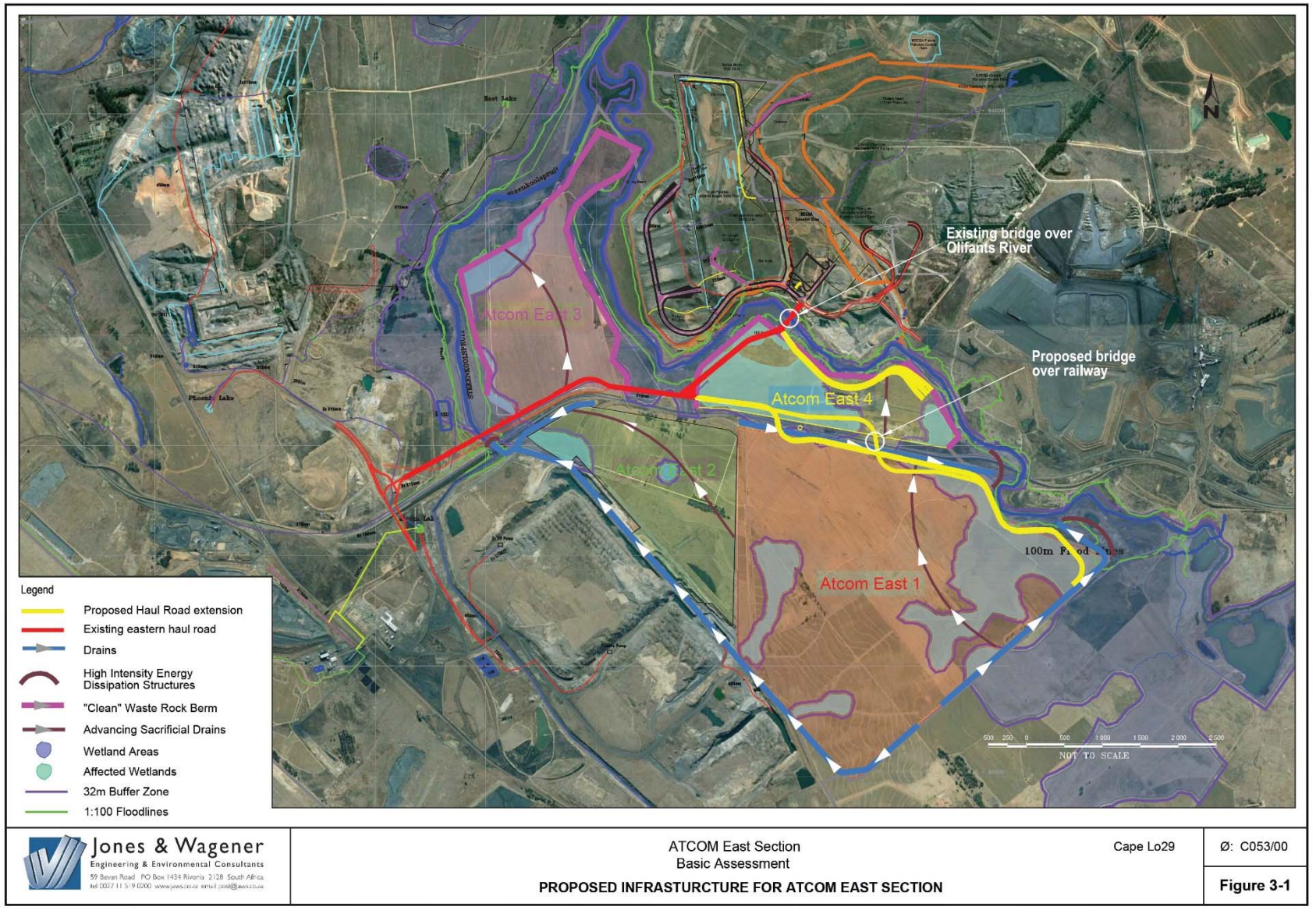

Figure 3-1: Proposed infrastructure for the ATCOM East opencast operations.

3.6 Main Phases of the Overall Project

There are five main phases within the proposed project, namely:

- Planning / Definition Phase;
- Construction Phase;
- Rehabilitation Phase;
- Operational and Maintenance Phase; and
- Decommissioning / Closure Phase.

A short description of each phase is outlined below.

3.6.1 Planning / Definition Phase

The planning phase for the proposed project involves the following pre-construction activities/processes/applications:

- Prefeasibility Study;
- BA process (BA Report and EMPr); and
- Other pre-construction authorisation processes

3.6.2 Construction Phase

Various activities will be undertaken during the construction phase which include:

- Vegetation clearance and topsoil stockpiling;
- Access and service roads construction; and
- Transportation of equipment and materials to construction camps and existing laydown areas at ATCOM to be used etc.

3.6.3 Rehabilitation Phase

Areas that have been disturbed during the construction phase will be rehabilitated in line with the requirements stipulated in the EMPr (**Appendix A**).

3.6.4 Operational and Maintenance Phase

Dirty water is currently stored in the historic undermined areas. Once these undermined areas are dewatered, activities associated with the opencast mining of the proposed pit areas can commence. Active dewatering of each of the opencast pits will continue for the duration of the life of the pits.

3.6.5 Decommissioning / Closure Phase

This report focuses on the construction and operational phases. A separate detailed assessment will have to be undertaken for the decommissioning, and closure of the ATCOM East section. The reason for not addressing the decommissioning phase at this stage is that the ATCOM East Section will operate at least until 2036, and new legislative requirements could be developed in the operative period which could replace current thinking and requirements. Although closure will only take place towards the end of 2036, progressive rehabilitation of the opencast pits will be implemented throughout the operational phase as mining progresses.

3.7 Life of Mine and Mining Methods

It is projected that the new coal reserves to be opencast mined at ATCOM East Section will have a lifespan of approximately 22 years.

According to the most recent Life of Mine (LOM) plan (

Figure 3-2 below) provided by Glencore, the various pits will have the following lifespans:

- River South Pit: It is proposed to commence mining at River South Pit in 2021 and mining will continue until approximately 2031. Due to the restricted area of this pit it will most likely be mined using the truck and shovel method.
- VDD South Pit: This is the largest pit. Mining will commence in 2017 and should continue until 2036. The pit will be mined by means of dragline and possibly a truck and shovel fleet.
- River West Pit: Mining of this pit will commence in 2014 and continue until 2026. Although not finalised yet mining will probably also be done by means of a truck and shovel fleet.
- VDD West Pit: This pit will be mined from 2014 until 2036 by means of using truck and shovel. Mining will occur concurrently with the River West pit.

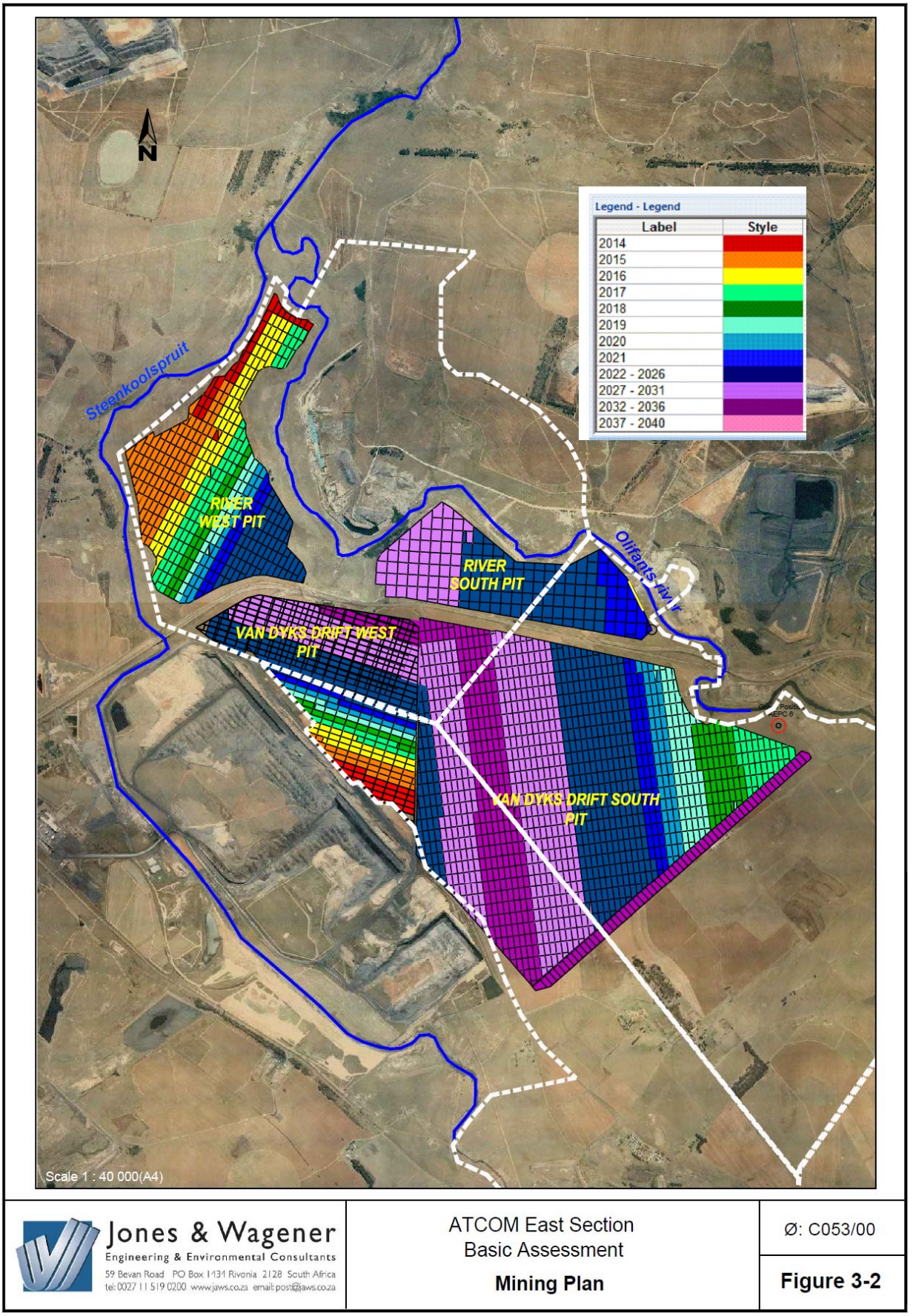

Figure 3-2: Life of Mine plan for ATCOM East Section (Glencore, 2014).

4. DESCRIPTION OF THE BASELINE RECEIVING ENVIRONMENT

4.1 Introduction

This section provides a general description of the environment in which the proposed project will be located. The purpose of this section is to provide a perspective of the local environment within which the proposed pits will be located, with a view to identify sensitive issues/areas, such as wetlands or other ecological aspects, which need to be considered when conducting the impact assessment and designing the various components of the project.

4.2 Bio Physical Environment

4.2.1 Climate

4.2.1.1. Data Collection

Climate information was obtained from data from rainfall gauges situated closest to the study area as well as from Ogies and Witbank weather stations. This information has been supported by the Air Quality Specialist Study that was undertaken by Airshed Planning Professionals in February 2010 (**Appendix B.1**).

4.2.1.2. Regional Description

The study area is located in the summer rainfall region of Southern Africa. The climate can be described as temperate with characteristically warm summers and cold, dry winters. Frost is also a common occurrence during the winter months. Summer precipitation occurs in the form of mist, drizzle, hail and more frequently thunderstorms.

Precipitation occurs as showers and thunderstorms mainly from October to March with maximum events occurring in November, December and January. Rainstorms are often violent (up to 80 mm can occur in one day) with severe lightning and strong winds, sometimes accompanied by hail. The winter months are typically dry with the combined rainfall for June-August making up only 3.9% of the annual average total.

4.2.1.3. Mean Monthly Maximum and Minimum Temperatures

Temperature information was obtained from the Witbank weather station (0515412) and is presented in Table 4-1. The highest average maximum daily temperatures occur during November to March ranging from 25.2°C to 27.5°C. June-August can be regarded as the coldest months with the average minimum temperatures ranging from 5°C to 6°C.

Table 4-1: Average monthly maximum and minimum temperatures.

Month	Average daily maximum (°C)	Average daily minimum (°C)	Average daily Mean (°C)
January	26.0	15.1	20.6
February	27.5	14.7	21.1
March	26.9	14.0	20.5
April	24.6	11.0	17.8
May	20.4	8.0	14.2
June	19.4	5.0	12.2
July	18.6	5.6	12.1
August	21.3	6.0	13.7
September	22.7	8.6	15.7
October	24.7	10.2	17.5
November	25.7	14.3	20.0
December	25.2	14.8	20.0
Year	**23.6**	**10.6**	**17.1**

4.2.1.4. Rainfall

The proposed ATCOM East mining activities are within an area of mean annual precipitation (MAP) that ranges from 600 to 750 mm. Rainfall gauges situated closest to the study area are Ogies (0478093), Vandyksdrift (0478546) and Witbank (0515412). The Ogies rainfall gauge (0478093) is 9 km from the western catchment boundary, Vandyksdrift (0478546) is 6 km from the eastern boundary and Witbank (0515412) is 12 km in a north-easterly direction. The Water Research Commission (WRC) report rainfall figures were adjusted to incorporate the most current data received from the South African Weather Bureau.

Table 4-2 indicates the average annual rainfall recorded at the selected gauges sited closest to the site. The MAP adopted for the site is 719 mm. Table 4-3 presents the average monthly precipitation typical for the tertiary drainage region B11 (rain zone B11F). It is common for this summer drainage region that within an average of seven months (October to April), 90% of the rainfall occurs.

Table 4-2: Mean annual rainfall over the periods shown.

Weather Bureau Gauge No.	Station name	Latitude		Longitude		Record used	Useable years	MAP in (mm)
		D	M	D	M			
0478093	Ogies	26	03	29	04	1907-2003	97	740
0478546	Vandyksdrift	26	03	29	19	1928-2003	76	694
0515412	Witbank	25	52	29	14	1956-1989	34	716
Adopted MAP for the site in (mm)								719

Table 4-3: Average monthly rainfall (mm).

Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
% Distribution	10.54	16.63	15.65	17.21	13.06	10.98	6.39	2.62	1.22	1.09	1.14	3.46	100
Monthly rain	75.78	119.57	112.52	123.74	93.60	78.95	45.94	18.84	8.77	7.84	8.20	24.88	719

4.2.1.5. Evaporation

Evaporation data was taken from the recordings at station 0478/867 Bethal and is summarised in Table 4-4. The gross annual average for Class "A" pan evaporation at Bethal is 1,702 mm as is to be expected, given the high temperatures experienced during the summer months. Table 4-4 shows that the maximum evaporation occurs in summer between October and January.

Table 4-4: Evaporation records from station 0478/867 Bethal.

Month	Mean monthly Evaporation (mm)
January	179.8
February	151.1
March	147.8
April	111.1
May	94.8
June	79.2
July	89.0
August	132.0
September	167.0
October	186.6
November	167.6
December	195.9
Annum	**1702.0**

4.2.1.6. Wind

The hourly average meteorological data for wind was recorded at Eskom's Kendal Station during January 2007 to December 2008.

The prominent wind direction is from the west north-west (13%) as well as from the east (11%), with calm wind conditions (wind speeds of less than 1m/s) occurring 8% of the time. Nearly 50% of the wind speeds recorded are below 3m/s with wind speeds from 1m/s to 2m/s, accounting for 20% of the measured wind speeds. Wind speeds in excess of 10m/s measured during 2007 to 2008 occur less than 1% (Figure 4-1).

A noticeable diurnal shift in wind direction can be seen for the period 2007 to 2008. Wind direction during the day time shows a very dominant west-north west flow with calm conditions occurring for 3.6% of the time. The frequency of west north westerly wind flow decreases substantially during night-time conditions during which a higher frequency of easterly winds can be seen (~13%). The frequency of calm conditions increases to 12% as is typical of night –time conditions.

The seasonal variability in the wind field recorded is shown in Figure 4-2.

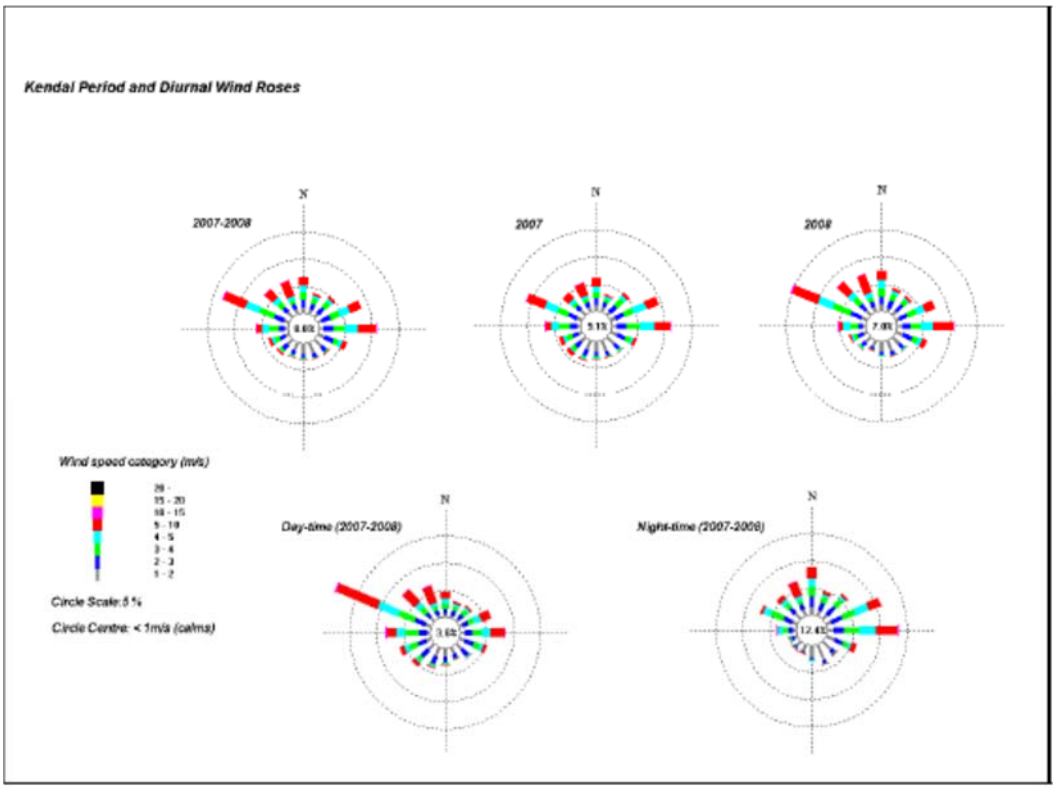

Figure 4-1: Kendal period and diurnal wind roses.

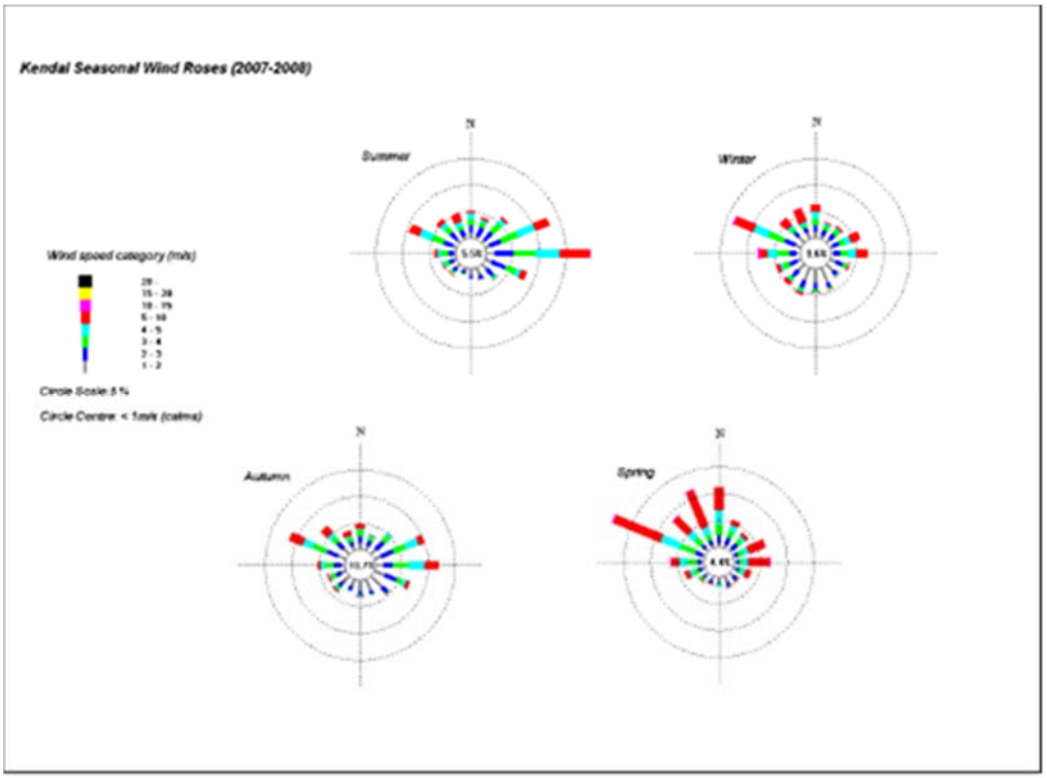

Figure 4-2: Kendal seasonal wind roses

4.2.1.7. Sensitivities

Individual homes and small communities in close proximity to the study area are regarded as sensitive receptors. In the event of strong winds, nuisance dust may be blown in the direction of these sensitive receptors which may cause complaints to arise.

4.2.2 Air Quality

4.2.2.1. Data Collection

Airshed Planning Professionals (Pty) Ltd (Airshed) was appointed by J&W to undertake an Air Quality Impact Assessment as part of the EMPR amendment for the proposed Pillar Mining Project at ATCOM East Section. A baseline and air quality impact assessment was undertaken where nuisance and health impacts for the proposed operations were assessed in order to identify all possible detrimental impacts on human health.

Airshed subsequently reviewed Glencore's ambient air quality monitoring system for the Witbank Group during September 2012.

4.2.2.2. Regional Description

The study area falls within a the Highveld Priority Air Quality Management Area in terms of the National Environmental Management Air Quality Act (NEM:AQA, No 39 of 2004). The Highveld was declared a priority area in November 2007 and covers an area of approximately 31 106km² which include parts of Gauteng and Mpumalanga Province. This area was declared as priority due to the poor air quality and elevated concentrations of criteria pollutants by industrial and non-industrial sources.

4.2.2.3. Site Description

The local study area for the assessment was selected based on the expected extent of air quality impacts and possible sensitive receptors such as individual homes and communities. A study area of 20 km east-west and 20 km north-south was identified.

Due to the nature of mining activities, particulates represent the main pollutant of concern, contributing to visibility reduction, posing a threat to human health, or simply being a nuisance due to their soiling potential. It is for these reasons that the ambient monitoring of this pollutant is strongly supported.

A background ambient air quality site could not be identified at the Glencore Witbank Group due to the numerous mining activities in the area. It is recommended that boundary sampler sites be considered to characterise background levels in conjunction with wind field data.

No dust fall monitoring results representative of the project site conditions are available. PM_{10} measurements are available for the Eskom monitoring station at Elandsfontein, located approximately 25 km south-east of the project site. Elandsfontein has no local source of PM_{10} adjacent to it and values there may thus be considered representative of the general background in that region of the Highveld. Monthly average concentrations of PM_{10} in 2005, the latest year for which data is available, ranged from 21 µg/m³ (March) to 63 µg/m³ (August) with an annual average of 42 µg/m³.

No incremental PM_{10} annual exceedances are predicted at any of the sensitive receptor locations for the mitigated and unmitigated scenarios. Incremental PM_{10} daily exceedances are however predicted at Phoenix and Van Dyks for all the unmitigated scenarios as described in detail in the Air Quality Assessment (**Appendix B.1**).

However, as per the report titled "Review and Optimization of the Xstrata South Africa's Ambient Air Quality Monitoring System for the Witbank Group" (**Appendix B.1**) which was undertaken by Airshed during September 2012, Glencore will be installing PM_{10} and $PM_{2.5}$ monitors at strategic locations. The locations provided for dust fallout buckets and PM_{10}/$PM_{2.5}$ samplers are estimates, with the final decision for new sites to take aspects such as security, vegetation, and location of sensitive receptors into account when siting the station.

In order to maximize the utility of the ambient air quality monitoring network in terms of more effectively supporting Glencore's critical monitoring objectives it is recommended that changes to the current network as proposed in the report titled "Review and Optimization of the Glencore's Ambient Air Quality Monitoring System for the Witbank Group", be considered.

4.2.2.4. Sensitivities

Four dust sensitive environments were identified in the Air Quality Impact Assessment. These are:

- Reedstream Park;
- Lehlaka Park;
- Phoenix; and
- Van Dyks.

4.2.3 Soils, Land Use and Agricultural Potential

4.2.3.1. Data Collection

Red Earth CC Soils and Land Use Planning consultants undertook a Soil, Land Use and Land Capability assessment during July 2009. A 150m grid survey was conducted in order to quantify the soils, erosion hazard and slope, agricultural potential, land capability, present land use as well as sensitive landscapes. For further information please refer to the detailed report attached as **Appendix B.6**.

4.2.3.2. Regional Description

It is important to have a good understanding of soils in a particular area as they assist in determining the faunal and floral biodiversity as well as the agricultural potential of an area. The area in which the study site is located contains mostly ferricrete which occurs as an intermittent underlying band. Sandstone is also a dominant parent material encountered in the area while shale occurs on the western boundary to a lesser extent. Colluvium of a mixed origin is present in a number of the valley bottom areas. A narrow intermittent band of alluvium on the edge of the Olifants River and Steenkoolspruit were also encountered.

4.2.3.3. Site Description

Various land uses are encountered within the study area and its surrounds. These include cultivated land, grassland, rehabilitated areas, wetland vegetation as well as various types of man-made infrastructure.

The soil types that were identified in the study area can be divided into ten different groups which include the following:

- *Red apedal soils*

These well drained intermediate to very deep soils are widespread in crest and sloping mid-slope areas. The variation in texture which depends on the parent material shows that both texture and soil form should be considered in determining the suitability of the various soil materials to be used for agriculture, rehabilitation purposes and waste dump cover. The high quality orthic A and red apedal B-horizons have a very favourable soil structure, therefore making it suitable for cropping and for use as topsoil material.

- *Yellow-brown apedal soils*

  These soils have a depth that ranges from moderate to deep, and are less common than the red apedal soils. The soil texture is generally sandy-loam to loamy-sand in the topsoil and sandy-loam to sandy-clay-loam in the subsoil. Yellow-brown apedal soils develop on parent material which have a lower ferrous iron reserve than their red counterparts, as well as in areas with a higher average moisture status. The high to moderate quality orthic A and yellow-brown apedal B-horizons of these soil forms are also suitable for crop growing and for use as topsoil.

- *Neocutanic soils*

  These relatively slightly poorly drained shallow to deep soils occur in patches in lower midslope, footslope and concave positions, bordering the E-horizon and wetland soils. Textures are generally loamy-sand or sand, and occasionally sandy-loam in a number of the subsoils. These soils contain moderate to poor quality orthic A and neocutanic B-horizons therefore making it suitable for use as topsoil material. These soils are also not ideal for crop growing due to their shallow depth and sandy nature.

- *Shallow soils*

  These soils are poorly to moderately drained and have a texture that ranges from sand to sandy-loam. The orthic A-horizon of these soils is unsuitable for growing crops and for forage plants due to it being a poor rooting medium since the very low total available moisture causes the soil to be drought prone. These poor topsoils are also not recommended for rehabilitation purposes as a surface placement medium. However, they may be used further down in the rehabilitated profile.

- *E-horizon soils*

  These soils are also poorly drained and have a sandy to loamy-sand composition. The poor quality orthic A-horizons of these soils, having favourable structure and consistence, are capable of supporting indigenous grassland and wetland vegetation. These soils may not be used for crop production since they fall into the wetland capability class. These soils are also not recommended for rehabilitation purposes as a surface placement due to the fact that they have a low moisture holding capacity and are relatively erodible.

- *Wetland soils*

  Hydromorphic soils of the Westleigh and Katspruit forms occur in gently sloping concave valley-bottom positions. These poorly drained soils have a sandy-loam to sandy-clay-loam texture in the topsoil and a sandy-clay-loam to clay texture in the subsoil. Such soils have formed due to either a fluctuating water table or a permanent water table. The poor quality orthic A-horizons of these soil types may not be cropped since they occur in wetland areas. These topsoils are recommended for rehabilitation purposes in future drainage/wetland areas only.

- *Vertic soils*

These soils are relatively poorly to moderately drained and occur in two small patches in floodplain/valley-bottom slope positions. These strongly structured fine grained clay-loam to clay textured vertic topsoils are found between depths of 0,5 – 0,8m and are probably derived from base rich parent material. Due to their high clay content and the predominance of smectitic clay minerals, vertic soils possess the capacity to swell and shrink markedly in response to moisture changes.

This material is most useful for underlying slimes/pollution control dams or overlying rehabilitated slimes/pollution control dams or discard dumps, since it naturally displays a slow permeability once moist and possibly a very slow permeability once compacted.

- *Structured/ Pedocutanic soils*

  These relatively poorly drained clay-loam to clay textured shallow soils occur in five small patches on basic parent material types (colluvium and dolerite) in concave, footslope and valley-bottom positions. The poor quality orthic A-horizon is not suitable for cultivation and rehabilitation purposes. However, both the A- and B-horizons are useful for sealing purposes as with Vertic soils.

- *Alluvial soils*

  Small narrow intermittent bands of alluvial soils occur along the edges of the Olifants River and the Steenkoolspruit. These poorly and occasionally moderately drained soils generally display a sandy to loamy-sand texture. These riparian areas must not be disturbed.

- *Man-made soils*

  Rehabilitated areas occur in a number of patches in the survey area where shallow to intermediate depth topsoil material overlies spoil, discard or coal.

4.2.3.4. Sensitivities

The soils which are likely to be more sensitive to erosion include wetland, E-horizon, pedocutanic, vertic and shallow broad soil groups. Wetlands and riparian areas are especially sensitive landscapes.

4.2.4 Geology

4.2.4.1. Regional/Site Description

The geology underlying the study area is dominated by sandstone of the Vryheid Formation, which forms part of the Ecca Group of the Karoo Sequence. Almost the entire proposed mining area is underlain by these sandstones. A narrow band of recent alluvial deposits occurs along the Olifants River, with a larger alluvial deposit also occurring at the confluence of the Olifants River with the Steenkoolspruit.

4.2.4.2. Sensitivities

No dykes or faults are known to occur in the direct vicinity of the study area. Glencore will appoint the relevant specialist to undertake a detailed Geotechnical investigation prior to any mining activities taking place at ATCOM East.

4.2.5 Surface Water and Wetlands

4.2.5.1. Data collection

A Biodiversity Assessment was undertaken by WCS during June 2009 which included an Aquatic Impact Assessment. For further information the detailed report is attached as **Appendix B.2**. Baseline surface water information was attained from previous studies performed in the area. WCS also undertook a Wetland Specialist Assessment for the study area during February 2009. A more recent wetland assessment was subsequently undertaken by WCS during October 2013. For more detailed information please refer to these reports attached under **Appendix B.7**.

4.2.5.2. Regional Description

ATCOM East coal mine is located within two different quaternary catchment areas, namely:

- Olifants River catchment. The eastern portion of the site drains to the Olifants River and falls within quaternary sub-catchments B11B of the Limpopo-Olifants primary drainage region. The Olifants River in turn flows through the Witbank Dam.
- Steenkoolspruit catchment. The western portion of the mining area drains to the Steenkoolspruit, which in turn drains into the Olifants River just downstream of the mine, and falls within quaternary sub-catchment B11E of the Limpopo-Olifants primary drainage region.

All portions of the mining area ultimately drain to the Olifants River. The Olifants River flows through the central part of the Kruger National Park and into Mozambique. It eventually joins the Limpopo River and discharges to the Indian Ocean on the east African coastline.

4.2.5.3. Site Description

The aquatic ecosystems on site include two water courses, the Olifants River and the Steenkoolspruit, seasonal drainage lines and one pan. Each one of these systems supports a range of species which reflect the conditions in each of these systems. Aquatic sampling sites were selected based on the diversity of habitats, accessibility, and position relative to the study area boundaries (Figure 4-3 below).

Water quality in the Olifants River was characterised by high concentrations of sulphate, originating upstream from the current workings. The water was hard, and concentrations of tin at all three sampling sites exceeded World Health Organisation (WHO) (1993) potable water quality guidelines. Water quality in the Steenkoolspruit was characterised by high concentrations of nitrates and phosphates, particularly at Site S1 (Refer to Figure 4-3 below), which was covered in a thick layer of duckweed (*Lemna gibba*).

The pan (site P5) had clear water with moderate to low conductivity (72 mS/m). Fluoride was the only variable measured that exceeded potable water quality standards, although concentrations of potassium, antimony, molybdenum and rubidium were high compared to other sites sampled.

Aquatic invertebrates were characterised by a very low variety, consisting mainly of tough, widespread species. A number of dead caddisflies were found in the Steenkoolspruit at Sites S1 and S2. Ten species of indigenous fish are expected to have occurred within the study site under natural conditions. Five species of fish were recorded in the Steenkoolspruit at site S2. A number of dead fish were also noted at site S2. Two of the five species recorded at site S2 were indigenous, two were translocated, and one was exotic. No fish were found in the Olifants River. The fish in the Steenkoolspruit comprised mainly exotic and translocated species.

The poor state of both the stretches of the Steenkoolspruit and the Olifants River in the study area cannot be ascribed to the current land use practices adjacent to the stretches, but rather to the changes that have occurred in the catchment.

No red data fish species have been recorded or are expected within the study area, although a single specimen of the Rock catfish (*Austroglanis sclateri*), was recorded in the Steenkoolspruit near Kriel in September 1999 (Ecosun 2000).

4.2.5.4. Surface Water Quality

Water quality data relating to the ATCOM East mining area was obtained from BECSA for the Olifants River and from Glencore for the Steenkoolpsruit. Regular monitoring is undertaken due to extensive mining in the surrounding area, and therefore water quality data is readily available.

The Olifants River Catchment is sub-divided into management units, which in turn have been sub-divided into a number of sub-units, for each of which an objective has been set in terms of water quality. The catchment area which is of relevance to ATCOM East is the Olifants River Catchment which comprises nine management units. ATCOM East Colliery falls within Management Unit 9a. The water quality objectives for these management units are provided in Table 4-5 below and are highlighted in blue.

The water quality values for the iMpunzi Complex are provided in Table 4-6 below. The values represent the average values as measured between January 2012 and March 2013. The monitoring points that are relevant to ATCOM East specifically, are ACSR-2 and ACSR-3. The values highlighted in red represent areas of non-compliance to the catchment objectives.

4.2.5.5. Sensitivities

Sensitive aquatic ecosystems in the study area include the Olifants River, Steenkoolspruit, as well as the associated floodplains, riparian zones and seepage wetlands. In terms of terrestrial biodiversity management it is recommended that a buffer area adjoining the length of both the Olifants River and Steenkoolspruit be set aside as a biodiversity management area. If this buffer area is wide enough (150 – 200m) then it will also include all of the species rich and sensitive rocky ridge habitats and associated sheet rock seeps.

It should be noted however, that the application of buffer zones around the abovementioned sensitive systems is unlikely to afford the level of protection that will be required to maintain them, in the event that there are significant changes in the current land use.

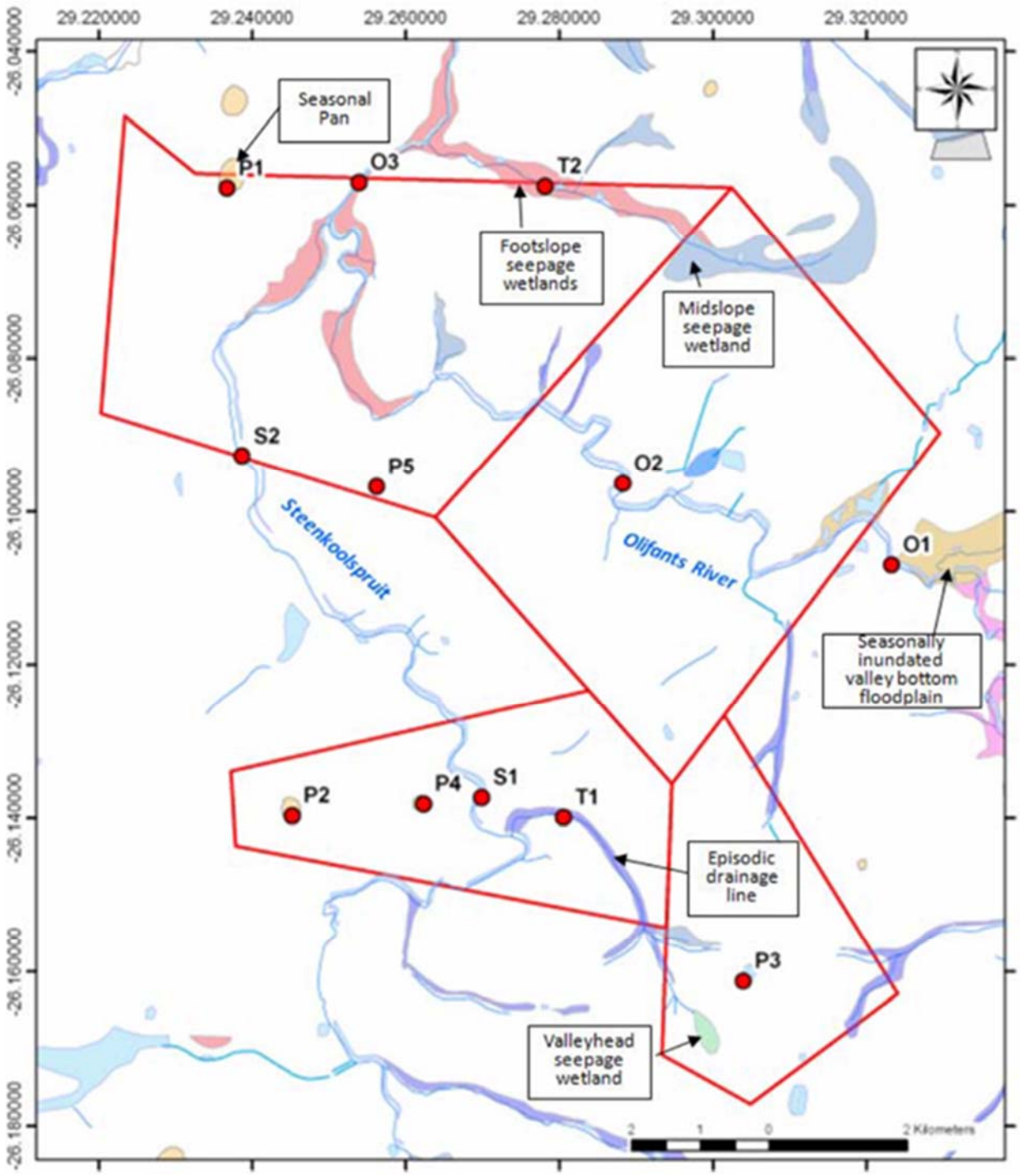

Figure 4-3: Location of aquatic sampling sites and wetland types

Table 4-5: Water quality objectives for Olifants River Catchment Water Quality.

Water Quality Variable	Units	Management Units								
		1	2	3	4	5	6	7	8	9
PHYSICAL										
Conductivity	mS/m	*35	70	-	-	70	-	70	70	35
pH		6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0
Dissolved Oxygen	%sat	70	70	70	70	70	70	70	70	70
Suspended Solids	mg/l	-	25	25	25	25	-	-	-	25
Turbidity	NTU	100	50	50	50	50	-	-	-	50
CHEMICAL, INORGANIC										
Alkalinity, $CaCo_3$	mg/l	120	-	-	-	-	-	-	-	120
Barium, Ba	mg/l	-	0.5	-	-	0.5	-	0.5	0.5	0.5
Boron, B	mg/l	2.0	0.5	2.0	2.0	0.5	2.0	0.5	0.5	0.5
Bromide, Br	mg/l	-	1	-	-	1	-	1	1	1
Calcium, Ca	mg/l	24	150	-	-	150	-	150	150	24
Chloride, Cl	mg/l	20	25	-	-	25	-	25	25	25
Fluoride, F	mg/l	1	1	1.5	1.5	1	1.5	1	1	1
Magnesium, Mg	mg/l	15	70	-	-	70	-	70	70	15
Potassium, K	mg/l	50	50	50	50	50	50	50	50	50
Sodium, Na	mg/l	30	70	-	-	70	-	70	70	70
Sulphate, SO_4	mg/l	30	200	1200	1450	200	380	200	200	155+
TDS	mg/l	-	-	-	-	-	-	-	-	500
SAR	$Meql^{0.5}$	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
METALS (DISSOLVED)										
Iron, Fe	mg/l	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.1
Manganese, Mn	mg/l	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.05
Aluminium, Al	mg/l	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Table 4-6: Surface water quality at iMpunzi (Average January 2012 to March 2013)

Surface Water Monitoring Point	Description	Constituents Measured									
		pH	EC (mS/m)	Al (mg/l)	SO4 (mg/l)	Fe (mg/l)	Mg (mg/l)	Na (mg/l)	Cl (mg/l)	K (mg/l)	F (mg/l)
ATC Colliery											
ATSD-1	Gilfillan Stream overflow to Phoenix Dam	7.40	186.9	<0.1	905.1	0.4	134.7	78.3	45.4	11.9	0.0
ATSD-2	Between railway line and ATC Discard Dumps	7.66	209.8	<0.1	1207.6	0.1	168.9	46.4	17.7	10.3	0.0
ATSD-3	Saaiwaterspruit, upstream of ATSR-1	8.14	632.9	<0.1	4279.2	0.1	678.5	399.7	194.3	47.3	0.0
ATSI-1	Suez Canal from ATC Plant area	7.89	331.3	<0.1	2897.4	0.1	415.3	89.6	22.0	21.4	0.6
ATSI-2	ATC Discard Dump No. 2 toe drain	7.20	684.9	2.3	4568.0	0.1	366.6	253.1	46.8	85.8	0.4
ATSI-3	ATC Discard Dump No. 1 toe drain	7.16	415.9	<0.1	2808.8	0.5	366.0	162.9	21.3	14.7	0.1
ATSR-1	Saaiwaterspruit inflow to Phoenix Dam	5.45	412.5	4.5	3064.3	0.2	386.3	171.4	101.1	37.3	0.8
ATSR-3	Alpha Stream just north of Discard Dumps	7.10	385.2	0.5	2425.1	0.1	269.6	164.2	41.1	16.9	0.2
ATSR-5	Alpha stream outflow off ATC property	7.75	298.8	<0.1	1873.7	0.1	262.5	88.4	24.1	11.3	0.1
ATSR-6	SWCM Stream outflow off property	8.20	238.0	<0.1	1141.8	0.1	109.3	192.9	80.1	6.9	0.2
ATSR-7	SWCM Stream, before Witcons inflow	7.80	261.6	<0.1	1375.6	0.1	139.0	187.0	82.2	6.3	0.2
ATSR-9	Tweefonteinspruit at Van Jaarsveld Dam wall	7.85	246.7	<0.1	1388.7	0.1	189.7	58.8	32.6	10.6	0.0
ATSR-10	SWCM Stream, upstream of Butterfly Pit	8.40	21.2	<0.1	26.7	0.0	6.0	18.6	27.7	3.0	0.1
ATSR-11	Alpha stream, upstream of Butterfly Pit	8.60	22.0	<0.1	12.1	0.1	5.4	19.0	21.3	1.3	0.0
Phoenix Colliery											
PHSD-4	Gilfillan Dam overflow	7.70	428.6	<0.1	2995.6	0.0	403.0	108.0	34.0	20.6	0.1
PHSR -3	Steenkoolspruit (weir B1H021)	8.44	37.1	<0.1	52.2	0.1	15.9	26.4	17.8	4.8	0.2
PHSR-5	Tweefonteinspruit adjacent to R547 Road	8.90	230.8	<0.1	1288.3	0.1	175.0	55.0	34.0	7.0	0.0
ATCOM Colliery											
ACSD-1	ATCOM Plant Pollution Control Dams	8.16	355.0	<0.1	2448.0	0.1	280.0	83.4	14.8	14.5	0.0
ACSD-2	Bridge Dam (NW corner South Pit)	8.13	343.0	0.0	2480.0	0.0	334.0	85.0	10.6	16.2	0.5
ACSD-4	Ramp 2 Pollution Control (dust suppression) Dams	9.00	526.5	0.0	3848.5	0.0	646.0	215.0	18.4	22.0	0.0
ACSD-5	Trout (Kromfontein) Dam	7.98	206.1	<0.1	1298.2	0.1	131.0	79.8	19.1	15.5	0.3
ACSD-6		8.00	449.7	-	2979.6	-	386.5	146.1	19.1	19.8	0.0
ACSD-7	ATCOM Workshop Area Pollution Control Dam	7.90	294.4	<0.1	1847.3	0.9	228.3	84.0	19.8	11.4	0.1
ACSD-8	Trout (Kromfontein) Dam overflow	8.01	205.1	<0.1	1240.6	0.1	135.0	77.0	17.0	14.6	0.3

Surface Water Monitoring Point	Description	Constituents Measured									
		pH	EC (mS/m)	Al (mg/l)	SO4 (mg/l)	Fe (mg/l)	Mg (mg/l)	Na (mg/l)	Cl (mg/l)	K (mg/l)	F (mg/l)
ACSD-13	Beath Pit void	1.70	2861.1	260	4955.7	2761.2	285.7	25.2	0.0	0.5	0.0
ACSD-16	ATC Linear Stockpile Pollution Control Dam	8.14	426.5	0.0	3196.5	0.0	420.5	185.5	0.23	17.6	0.8
ACSI-2	ATCOM / Phoenix Dump	7.78	381.5	0.0	2863.5	0.0	391.5	108.5	8.38	15.9	0.4
ACSR-1	Saaiwaterspruit downstream of North Dump	8.10	305.9	<0.1	1710.6	0.3	242.8	105.0	72.3	27.6	0.0
ACSR-2	Olifants River (Pump station)	8.20	65.3	<0.1	211.0	0.1	35.0	42.0	24.1	6.8	0.0
ACSR-3	Olifants River (Upstream Steenkoolspruit Pit)	8.30	154.6	<0.1	697.3	0.1	102.0	85.2	36.9	9.0	0.0
ACSR-4	Steenkoolspruit (Downstream South Pit)	8.30	48.0	<0.1	106.5	0.0	23.0	23.7	16.4	4.8	0.2
ACSR-5	Kromfonteinspruit at slurry lagoon	5.10	444.0	<0.1	2734.7	0.3	350.1	140.0	17.0	20.4	0.0

Note: The values highlighted in red represent areas of non-compliance to the catchment objectives.

4.2.5.6. Mean Annual Runoff

The Mean Annual Runoff (MAR) in the Olifants River and Steenkoolspruit at two crossing locations is given in Table 4-7 together with that for the Olifants River at Witbank Dam.

The MARs were determined using the data given in "Surface Water Resources of South Africa, 1990", WRC (1994).

Table 4-7: Mean Annual Runoff for ATCOM East.

Node	Point of Measurement	Catchment Area (km^2)	MAR ($x10^6m^3$)	% of MAR at receiving water body
Olifants (O1)	Witbank Dam	3627	125	100
Olifants (O2)	River crossing	1384	48	38
Steenkoolspruit (S1)	River crossing	1398	48.5	39

4.2.5.7. Dry weather flow

In the absence of any streamflow monitoring, the conventional approach to compute the dry weather flow (also referred to as "normal flow") is to analyse the long term synthetic monthly streamflow time series in order to develop a flow-duration relationship. An accepted definition of the dry weather flow in a stream is the flow that is equalled or exceeded for 70% of the time, a value which can readily be ascertained from an analysis of the flow-duration relationship.

The dry weather flows were determined using the data given in Volume 1 of the Surface Water Resources of South Africa - 1990 in conjunction with calculations performed using the WRSM 90 synthetic streamflow generation model for Douglas Colliery. The dry weather flows (DWF) for the points which were used are given in Table 4-8 below.

Table 4-8: Computed dry weather flows in the affected streams at ATCOM East.

Node	Point of Measurement	Computed monthly flow exceeded in 70% of months modelled (m^3/s)
Olifants River (O2)	River crossing	0.34
Steenkoolspruit (S1)	River crossing	0.34

4.2.5.8. Surface Water Use

Downstream users have been identified as far as the Witbank Dam. This includes aquatic, recreational and municipal (eMalahleni Local Municipality) use. Refer to Table 4-9 below for an indication of the downstream surface water users. A surface water questionnaire was distributed to the identified users in Table 4-9 below.

Kleinkopje Colliery and Middelburg Mine (Douglas Colliery) are the two major water users between the study area and the Witbank Dam.

There are no major dams between the site and Witbank Dam. The water downstream of the site, up to Witbank Dam, is used primarily for agricultural and mining purposes. It is worth noting that all the land is owned by Glencore, with the directly adjacent land owned by BECSA and Anglo American. Aquatic life is also present as an important downstream user.

Table 4-9: Water users around ATCOM East mining area

Downstream User	Water Use	Volume of Use
Kleinkopje Colliery (Anglo)	Mining	66 000 m^3/month
Douglas Colliery	Mining	58 000 m^3/month
eMalahleni Local Municipality		

4.2.5.9. Wetlands

WCS undertook a Wetland Specialist Assessment for the study area during February 2009. During October 2013 an updated assessment was undertaken in which a larger study area was considered and also included the wetlands at ATCOM's North Pit for the Dragline Walkway project.

It should be noted that the North Pit does not form part of the scope of work for this BA.

Within the study area five different wetland types and two riparian zones were identified, namely:

- Channelled valley bottom wetland;
- Floodplain wetland;
- Hillslope seepage wetland;
- Pan/depression wetland; and
- Riparian Zone.

The wetlands within the defined study area cover approximately 850.97 hectares, or 24.2% of the study area (the study area is 3 516 ha).

The present ecological state (PES) of the wetlands on site has been altered significantly from the un-impacted state of the wetlands (Refer to Figure 4-4 below). This is reflected in the results of the PES assessment which classes the wetlands on site as being predominantly *moderately to largely modified* (PES categories C and D), with 52% classed as moderately modified and 45% as largely modified. The *largely natural* wetlands on site (PES category B), which include less than 2% of the wetlands on site, consist of a number of small footslope seepage wetlands located along the Olifants River and associated with rocky outcrops.

The wetlands within the study area all form part of the Olifants River Primary catchment which is a heavily utilised and economically important catchment. Wetlands and rivers within the Olifants River Catchment upstream of Loskop Dam have been greatly impacted upon by various activities, which include mining, power stations, water abstraction, urbanization, agriculture etc. As a result of these impacts serious water quality concerns and also water quantity concerns have been raised within the sub-catchment. Given this situation, and the fact that wetlands can support functions such as water purification and stream flow regulation, a high importance and conservation value is placed on all wetlands and rivers within the catchment that have as yet not been seriously modified.

Within this context an Ecological Importance and Sensitivity (EIS) assessment was conducted for every hydro-geomorphic wetland unit identified within the study area (Refer to Figure 4-5 below). Further considerations that informed the EIS assessment include:

- The location of the study area within a vegetation type (Eastern Highveld Grassland) considered to be extensively transformed and threatened, and classed as Vulnerable;

- The wetland ecosystem type of the area, Mesic Highveld Grassland Group 4 wetlands, are considered to be Critically Endangered.

Based on the EIS assessment, 18% of the wetlands, consisting mostly of hillslope seepages, pans/depressions and the section of floodplain along the Olifants River, are placed in an ecological management class of Moderate to High. This indicates wetlands which are ecologically important on a provincial or national scale and which play a role in moderating the quantity and quality of water of major rivers, and are also considered to play an important role in supporting biodiversity, including protected species. The remaining wetlands were rated as being of Moderate (72%) or Low/Marginal (10%) ecological importance. The wetlands classed as being of low/marginal ecological importance consist mostly of hillslope seepage wetlands that have been seriously modified due to a range of activities.

In total, the proposed mining activities will result in the direct destruction of 321.4 hectares of wetland, consisting mostly of hillslope seepage wetlands (304.55 ha), but including 14.5 ha of pan habitat, 12.8 ha of which makes up the northern pan, which does not form part of the scope work of this BA.

It is important to note that the wetlands and the riparian zones form part of the water resource and any development that impacts on the wetland or the riparian zones will only be permissible if authorised by a Water Use Licence under Section 21 of the National Water Act and in terms of GNR 543 of the NEMA. As mentioned earlier, J&W has been appointed to undertake the IWULA which will be submitted to the Department of Water and Sanitation (DWS) once completed.

Glencore is planning on conducting a desktop study wetland reserve determination for the iMpunzi area.

4.2.5.10. Sensitivities

18% of the wetlands in the study area, consisting mostly of hillslope seepages, pans/depressions and the section of floodplain along the Olifants River, have an EIS rating of Moderate to High. The remaining wetlands were rated as being of Moderate (72%) or Low/Marginal (10%) ecological importance. The wetlands classed as being of low/marginal ecological importance consist mostly of hillslope seepage wetlands that have been seriously modified due to cultivation taking place within the wetlands, that have been impacted by erosion and head cutting due to animal trampling, and cutoff trenches to divert water flow towards constructed impoundments.

Figure 4-6 below illustrates how the footprint of the proposed opencast pit areas will impact on the wetlands occurring within the ATCOM East Section.

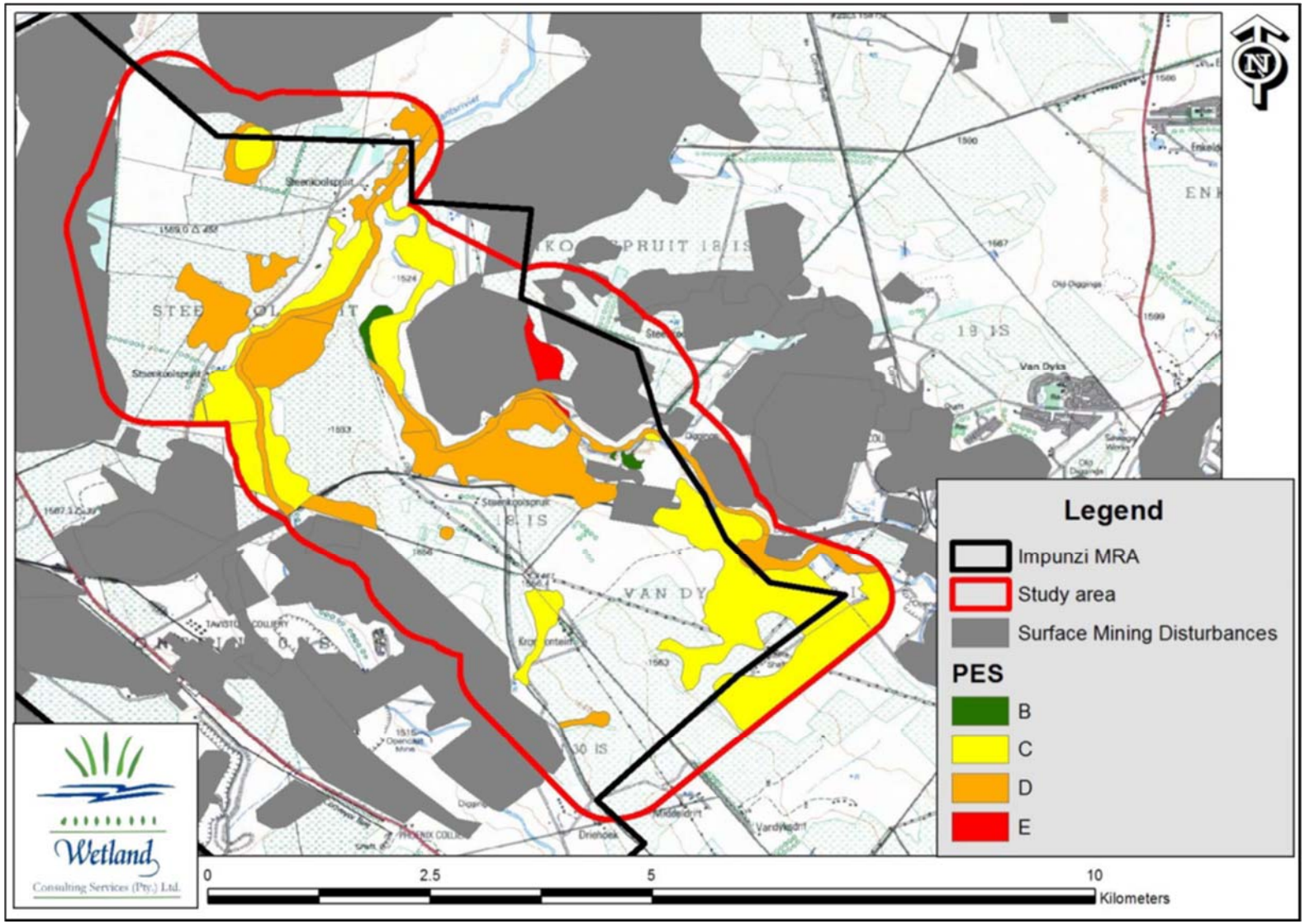

Figure 4-4: Results of the PES assessment

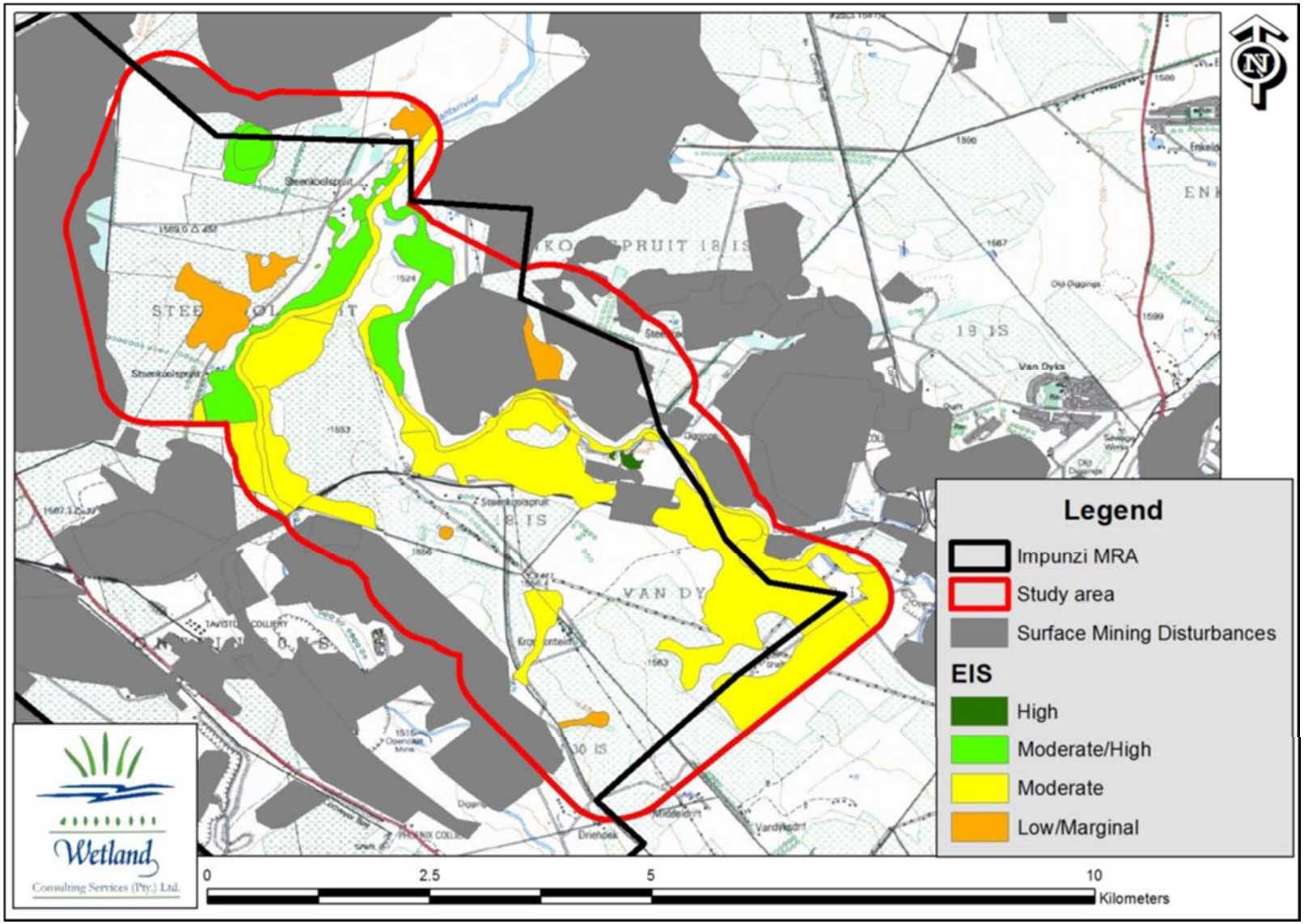

Figure 4-5: Results of the EIS assessment

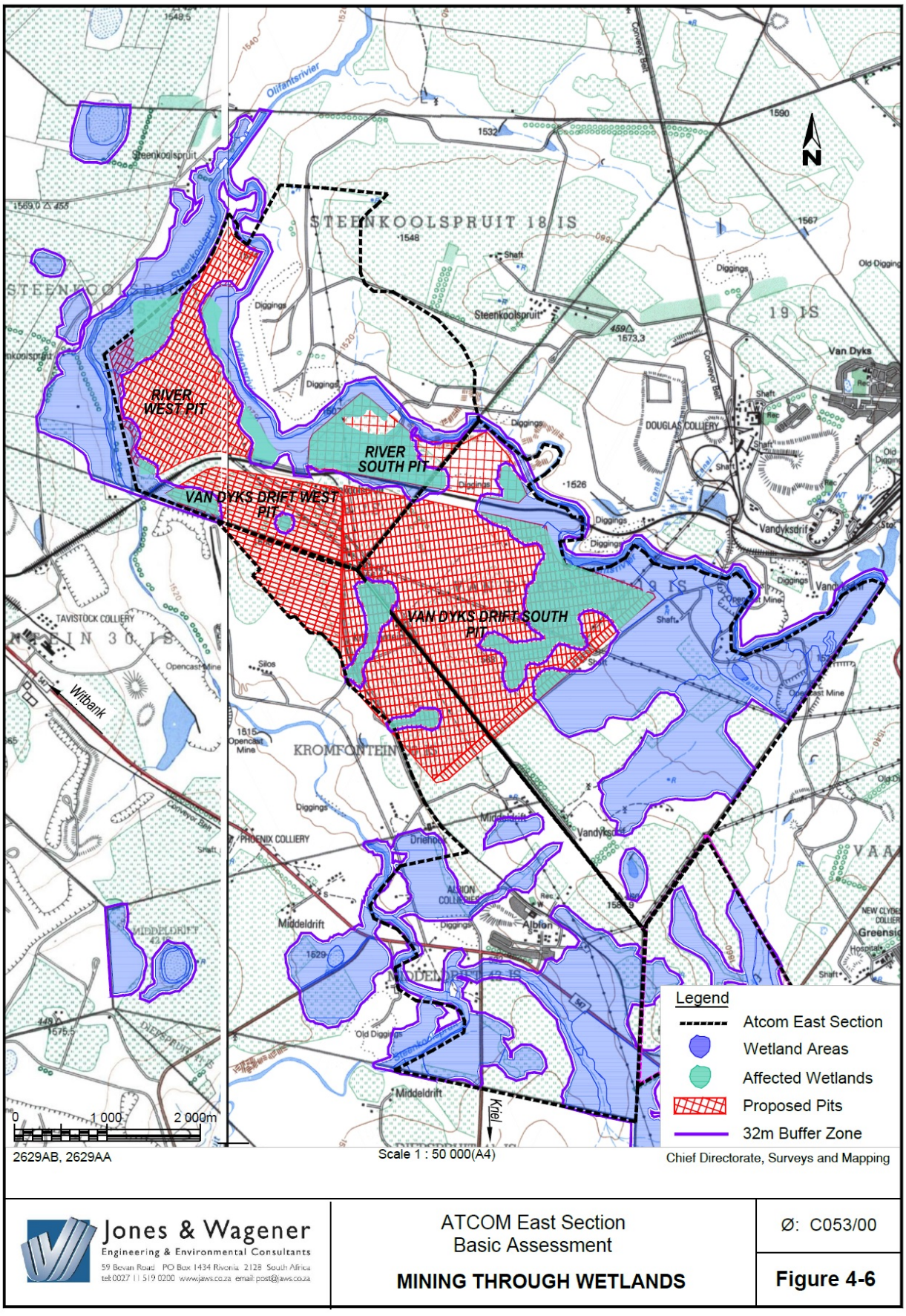

Figure 4-6: Extent of wetlands being affected by the opencast pits

4.2.6 Groundwater

4.2.6.1. Data Collection

Issues concerning groundwater management have previously been noted in documents such as:

- Jones & Wagener. 2010: Xstrata South Africa iMpunzi Division: Integrated Water and Waste Management Plan (IWWMP);
- Clean Stream Groundwater Services. 2006: Calculation of Bulk Water Volumes in the Underground Workings of the Xstrata South Africa, Witbank Mines, with Assessment of Water Management Options;
- Institute for Groundwater Studies, 2006: Mine Water Balance and Intermine Flow for Douglas Colliery;
- Frank Hodgson 2012: Update of the Mine-water balance for Xstrata collieries, Witbank; and
- All the Various EMP's compiled for iMpunzi's Collieries.

The most recent groundwater information for ATCOM East was obtained from Geohydrology Specialist Study which was undertaken by JMA Consulting during July 2014. The information below is drawn from this report. For further information please refer to the detailed report attached as **Appendix B.3**.

4.2.6.2. Aquifer characterisation

The Karoo aquifer which is present in the study area can be separated into three different zones which can be classified as separate aquifers on their own. These include –

- Perched conditions in the soil horizon

  The shallow perched conditions are basically limited to finite extending clay lenses present in the soil horizon. The perched aquifer has unconfined conditions, and no major lateral extensions of these zones were encountered.

- The shallow weathered zone Karoo aquifer and the deep fractured Karoo aquifer

  The parent rock associated with these two aquifer types is known as clastic Karoo sedimentary rock and coal seams. A large range of grain-size distribution is present for the argillic (grain size < 0.0625 mm) to arenaceous (grain size 0.0625 to 2 mm) sedimentary rocks, which will necessarily influence the storativity and hydraulic characteristics of the host rock. The coal seams are considered to be uniform in their hydraulic characteristics except for on their contact zones. The shallow weathered zone aquifer displays unconfined to semi-unconfined conditions, while the deep aquifer predominantly displays confined conditions.

The flow of groundwater in all three the above aquifer types are essentially horizontal. However, interconnection between these aquifer types can present vertical flow components. Dolerite dykes and also large sills are occasionally present in the Karoo aquifer that may cause localised compartmentalisation. The presence of the dykes and sills may also influence the yielding capacity in some areas.

Opencast pits will not represent natural occurring aquifers but will represent areas of increased storage and permeability in the post closure phase within the Karoo acquifer. The piezometric distribution within the future opencast pits will be unconfined.

4.2.6.3. Groundwater quality

The assessment of the background groundwater quality was based on data which was obtained from collecting samples from boreholes and fountains. A process of elimination, subject to certain criteria, resulted in the selection of samples believed to represent background groundwater quality for the study area. The criteria includes -

- Boreholes that are affected by mine-related pollution over a long term usually have a change in pH values. Therefore, all boreholes that did not fully comply with the recommended value of the SANS 241:2006 Drinking Water Standard for pH values were discarded.
- Indicators, especially NO_3, were used to assess possible agricultural related influences. Some influences from agricultural activities were found and these samples were not included in the background.
- Elevated values for SO_4 and Fe are the first indicators for possible mine-related pollution occurring. Fe is however often naturally elevated and because of this, only SO_4 was used as a further screening tool and samples with SO_4 values exceeding 50 mg/l were not included in the background.

Through this process of elimination a certain background image emerged. This image is distinct both in terms of hydro-chemical image and in water quality ranges. Finally, all localities which obviously did not fit this background groundwater quality profile were eliminated.

New boreholes situated at ATCOM East have been included in the iMpunzi sampling regime as from March 2011 onwards:

- AEGM-1;
- AEGM-2;
- AEGM-3;
- AEGM-4;
- AEGM-5;
- AEGM-6; and
- AEGM-7 (Figure 4-7).

All the above mentioned ATCOM East boreholes are drilled into the existing mined out underground mines that Glencore is planning to re-mine as opencast pits in the future. The samples from these boreholes therefore represent the quality of water that Glencore will be extracting from the existing underground workings in order to dewater them, so that opencast operations can commence.

Table 4-10 below summarises the background groundwater quality for the iMpunzi Complex area.

Table 4-10: Typical background groundwater quality for ATCOM East.

Variable	Minimum	Maximum	Average
pH	5.6	8.7	7.3
EC (mS/m)	7	59	20
TDS (mg/l)	58	442	187

Variable	Minimum	Maximum	Average
Ca (mg/l)	1	40	15
Mg (mg/l)	2	23	7
Na (mg/l)	7	118	24
K (mg/l)	1	6	3
Si (mg/l)	5	220	71
T-Alk (mg/l)	1	22	9
Cl (mg/l)	4	44	16
SO4 (mg/l)	0.10	6.00	1.67
NO3 (mg/l)	0.07	4.90	0.79
F (mg/l)	0.01	0.48	0.17
Al (mg/l)	0.01	6.04	1.72
Fe (mg/l)	0.01	0.46	0.11
Mn (mg/l)	5.6	8.7	7.3

Based on the background groundwater qualities listed in Table 4-10 above, groundwater qualities were assigned an intervention priority such as “low”, “medium”, “high” and “severe” (shown in Table 4-11).

The groundwater quality data for the ATCOM East monitoring points are represented in Table 4-12 below. It represents the average of data collected from January 2012 to March 2013. The sampling points for ATCOM East are presented visually in Figure 4-7 below.

Table 4-11: Groundwater quality key and intervention priority ranking

	Level	DNHPD Rating	Intervention Priority
EC mS/m	<170	Ideal	**Target**
	170-300	Insignificant risk off-site	**Low**
	300-400	Low risk on site	**Medium**
	400-1000		**High**
	>1000		**Severe**
SO_4 mg/l	<500	Ideal	**Target**
	500-600	Insignificant risk off-site	**Low**
	600-1200	Low risk on site	**Medium**
	1200-2000		**High**
	>2000		**Severe**
pH	5.0-9.7	Ideal	**Target**
	4.5-5.0 & 9.7-10	Insignificant risk off-site	**Low**
	4.0-4.5 & 10.0-10.5	Low risk on site	**Medium**
	3.0-4.0 & 10.5-11.0		**High**
	<3 & >11		**Severe**

4.2.6.4. Sensitivities

- Groundwater quality at ATCOM East in general is of good quality. pH is within the ideal and low risk levels. Significant levels of dissolved metals are therefore not expected.
- Electrical Conductivity (EC) is also within the ideal and low risk levels, with the only exception being point AEGM-5 which falls within the “insignificant risk” class as per Table 4-11 above.
- The levels of five of the groundwater monitoring points at ATCOM East fall within the “ideal and low risk” class for SO_4, with only two monitoring points falling within the “low risk on site” class.

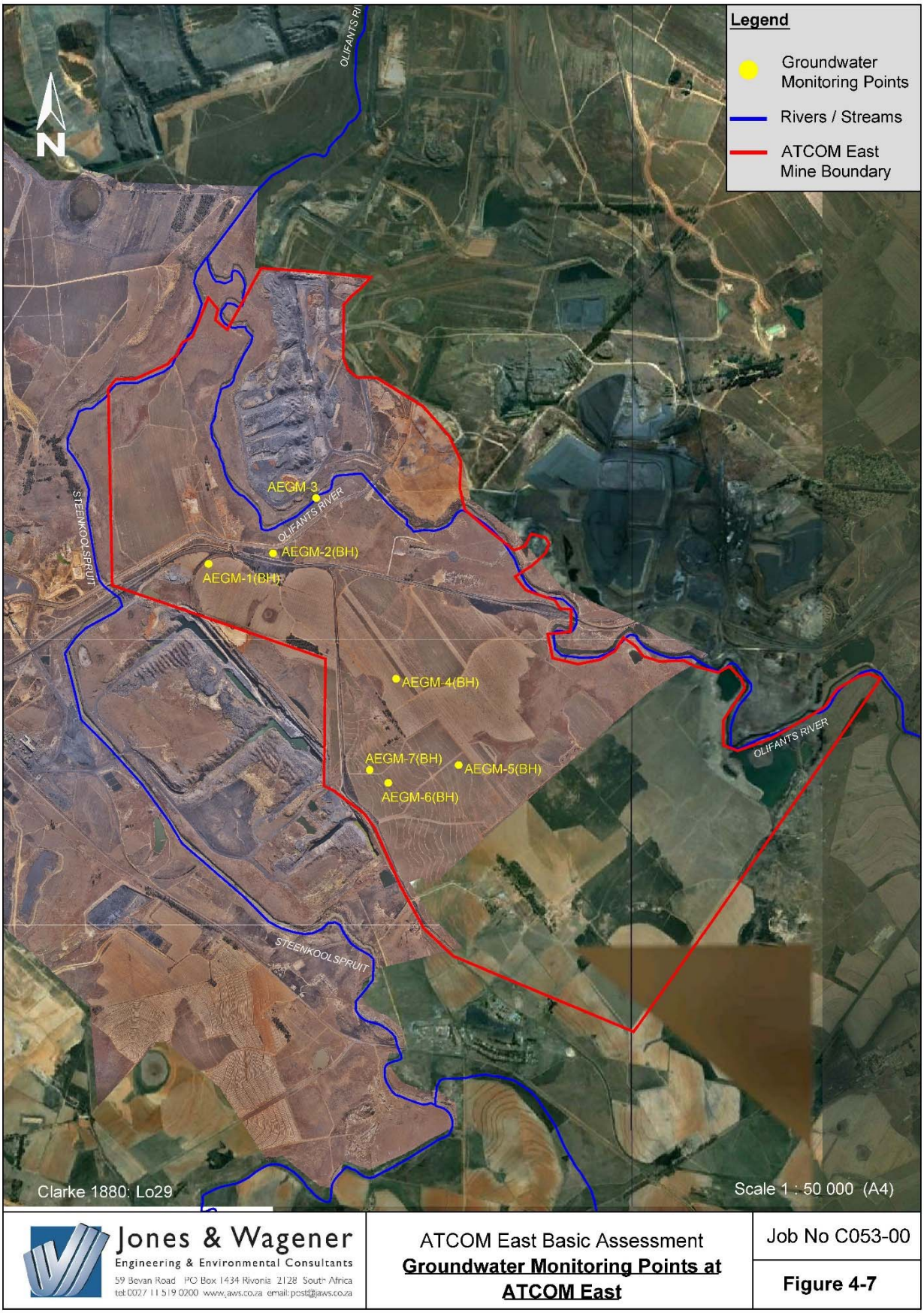

Figure 4-7: Groundwater Monitoring Points at ATCOM East.

Table 4-12: Groundwater Quality Data for ATCOM East monitoring points (average values from January 2012 to March 2013)

Ground Water Monitoring Point	Description	Constituents Measured									
		pH	EC (mS/m)	SO_4 (mg/l)	Al (mg/l)	Fe (mg/l)	Mg (mg/l)	Na (mg/l)	Cl (mg/l)	K (mg/l)	F (mg/l)
ATCOM East											
AEGM-1	Between ATCOM South Pit and Steenkoolspruit Pit	7.06	19.9	39.2	<0.1	<0.1	5.3	15.6	13.8	3.8	0.1
AEGM-2	S of Steenkoolspruit Pit, adjacent and S of haul road	6.82	57.1	38.5	<0.1	<0.1	21.5	37.5	70.7	5.7	0.1
AEGM-3	Between Steenkoolspruit Pit and River (south)	7.89	152.1	636.5	<0.1	<0.1	50.1	153.4	19.2	4.3	1.7
AEGM-4	W of ATCOM South Pit	6.94	12.5	14.0	0.3	<0.1	4.0	14.2	4.7	2.2	0.1
AEGM-5	S of AEGM-4	7.43	195.5	856.5	<0.1	0.3	108.3	90.6	64.2	9.2	0.5
AEGM-6	W of AEGM-5	7.00	38.2	56.0	<0.1	0.4	13.8	42.7	14.1	5.2	0.1
AEGM-7	NW of AEGM-6	7.39	83.2	246.5	<0.1	0.6	32.1	68.9	8.5	9.0	0.6

4.2.7 Terrestrial Faunal Biodiversity

4.2.7.1. Data Collection

Wetland Consulting Services (Pty) Ltd (WCS) was appointed to conduct a Baseline Biodiversity Study of the Vandyksdrift area in 2009. Below follows a summary of the findings of the Baseline Biodiversity report in terms of Terrestrial Fauna. For further information please refer to the full report attached as **Appendix B.2**.

4.2.7.2. Regional Description

The Mpumalanga province can be regarded as being moderately diverse with 163 mammal species, 567 bird species as well as 51 species of amphibian. However, the grassland biome and associated habitats are also considered to be poorly conserved and seriously utilised for a variety of land uses which includes forestry, agriculture and mining. These land use activities, if not managed correctly, may lead to significant impacts which directly influence the faunal biodiversity.

4.2.7.3. Site Description

While anthropogenic activity was obvious within the boundaries of the study area, so were signs, observations, spoor and faeces of numerous faunal taxa. This means that suitable habitat remains for shelter, breeding and feeding purposes of the faunal species encountered and possibly many others not observed during the assessment.

The riparian habitat which is available for use by faunal species includes aquatic vegetation as well as inundated soils. Reptiles likely to be encountered within this habitat type are generally niche habitat specialists such as Water snakes, Skinks, Monitor and Terrapins. Amphibian species such as frogs are almost exclusively dependent on these habitats within the general area. Mammal species are encountered both within the open water (Otters and Water mongoose) and the dense marginal and riverbank vegetation (Shrews, Cane rats, Vlei rats).

The grassland habitat types are known to have high species diversity with a high number of endemic and threatened species. Dense grass cover, stones/rocks, forbs, shrubs and termite mounds all provide for favorable habitat for a wide variety of faunal species. Frogs venture into the grasslands during the wet season and particularly after heavy rainfall events, when temporary pools and inundated grass patches develop. Secondary grassland originates as a result of previously ploughed, cultivated crops or rehabilitated mining areas and are characterised by greater homogeneity and lower floral species richness.

Rocky outcrops provide niche habitats in the form of cracks, crevices and overhangs which are suitable for adapted faunal species. Rocky outcrops are the prime habitat for a large number of reptiles including snakes, lizards, skinks and geckoes.

The tall trees and dead logs provide a habitat for shelter, perching and nesting sites to local and migrating fauna. Reptile species (those associated with trees and related habitat type) comprise a significant portion of expected biodiversity within the habitat type. Table 4-14 below indicates the anticipated species as expected to occur in the habitats of the study area.

Table 4-13: Anticipated species per taxa as expected in the habitats of the study area.

Taxa	Habitat					
	Grassland		Wetland		Rocky Outcrops	Alien Plantations
	Moist	Secondary	Riparian	Pan		
Amphibians	0	0	14	14	0	0
Reptiles	33	12	17	9	38	16
Birds	83	73	80	82	61	37
Mammals	40	23	31	20	27	8
Total	**156**	**108**	**142**	**125**	**126**	**61**

4.2.7.4. Sensitivities

The key to maintaining or increasing faunal diversity is the maintenance of the habitat and floral characteristics of the areas. No red data mammals were recorded during the assessment. However, based on the available habitat in the study area, there is good potential for species such as Spotted-neck Otter, Reddishgrey Musk Shrew, Swamp Musk Shrew, Water Rat and Bushveld Gerbil to occur on site.

The study area is considered to be of low significance with regards to herpetofauna (reptiles and amphibia) making use of the site as habitat. Habitats on site and records (Minter *et al*, 2004) suggest that the Giant Bullfrog may be encountered on the property although no individuals were observed during the assessment. Evidence of burrows on inactive termite mounds also suggests that the Striped Harlequin snake may be found within the study area.

Habitat conditions and suitable food source in the form of *Leersia hexandra* were abundant on the study site which would suggest that the Marsh Sylph (*Metisella menix*) may well be breeding on site. No individuals were observed during the assessment.

Trapdoor, Baboon and Purse-web spiders were not observed on site. The sandy soil conditions are however regarded as suitable for construction of burrows and these species may therefore occur within the study area.

4.2.8 Terrestrial Floral Biodiversity

4.2.8.1. Data Collection

WCS was appointed to conduct a Baseline Biodiversity Study of the Vandyksdrift area (2009). Below follows a summary of the findings of the Baseline Biodiversity report in terms of Terrestrial Flora. For further information please refer to the full report attached as **Appendix B.2**.

4.2.8.2. Regional Description

According to Mucina and Rutherford, 2006, the study area falls within the Grassland Biome and the Mesic Highveld Grassland Bioregion. The Grassland Biome is restricted to the high central plateau and summer rainfall areas while the Mesic Highveld occurs on the eastern, high rainfall regions of the Highveld. At a finer level, the study area is classed as Eastern Highveld Grassland.

Eastern Highveld Grassland is considered to be endangered, with <1% conserved of a target of 24% and 44% already transformed, mostly by pine plantations and cultivation (Mucina et al. 2006), but also mining and dam building.

4.2.8.3. Site Description

Various vegetation units were identified as part of the Biodiversity study. Some habitat and vegetation have been transformed as a result of anthropogenic impacts such as mining, invasion of alien and exotic floral taxa.

Rocky grassland was found to have the highest floristic species richness of all the habitats which were surveyed. Due to the presence of woody species and the unique geomorphological features it is likely to provide the most diverse habitat for utilisation by small mammals, reptiles and birds.

The moist grassland, footslope grassland, hill slope and sheet rock seepage habitats were all found to have similar species richness values and each of the habitat types offers its own unique characteristics making it suitable for a diversity of faunal species. Even though the true wetland/aquatic habitats had the lowest floristic species diversity, these habitats are likely to contain the true niche specialist floristic and faunal species. These species are often scarce due to the restricted and localised habitat requirements. An excess of small mammal, bird and amphibian species are likely to occur in these habitats. Table 4-14 below summarises the species richness for the different vegetation/habitat types and provides a biodiversity value to each.

Table 4-14: Vegetation units and communities of the study area and the biodiversity value.

Vegetation unit	Communities	Floristic Species richness	Biodiversity value
Grassland	Moist Grassland Footslope Grassland	47-52 52-60	High due to species richness
Wetland	Floodplain pan Hill slope seepage Sheet rock seepage Pan Riparian	15 51 55 8 38	High despite relatively low species diversity. Species tend to be niche specialists and habitat suitable for reptiles, small mammals and amphibian species.
Rocky grassland		65-77	High due to species richness and niche habitats for woody species, mammals, reptiles and bird species
Disturbed	Agricultural Fallow Other Alien	8 14 26-36 5-12	Low due to poor species diversity, transformed nature and profusion of weedy, annual species

4.2.8.4. Sensitivities

No red data species have been recorded for the quarter degree grid 2629AB, and only one species has been collected for the quarter degree grid 2629AA.

Some 10% of the 30,000 recorded plants in South Africa are believed to have medicinal properties of which approximately 350 species are commonly used and traded with (Van Wyk, *et al.,* 2005). Many of these medicinal species are threatened as a result of over exploitation. Please refer to the Biodiversity report for a full list of medicinal species encountered within the study site.

4.2.9 Avi-fauna

4.2.9.1. Data Collection

WCS undertook a Biodiversity Study which included an Avi-fauna investigation during June 2009. The information below is extracted from the specialist report. For further information the detailed report is attached as **Appendix B.2.**

4.2.9.2. Regional Description

Mpumalanga possesses a great avifaunal diversity with more than 567 bird species recorded in the province. Approximately 71 Red Data species, of which 35 are threatened, occur within Mpumalanga. There are no species endemic to Mpumalanga, but the province is the centre of distribution for two species which are endemic to Mpumalanga, and accommodates a species that is endemic to the Subregion (Emery *et al*, 2002).

4.2.9.3. Site Description

Within the study area, 195 and 160 bird species have been recorded for the quarter degree grids 2629AA and 2629AB respectively resulting in a total list of 208 species (refer to the full list of species in the Biodiversity Report). The highest species diversity is found in the wetlands and moist grasslands on the study site, with 96 and 95 species expected to occur in the two habitat types respectively. The lowest species diversity is found in the cultivated fields. Five species are expected to occur within all of the 5 habitat types, with a further 9 species occurring across 4 of the habitat types. Wetlands show the highest number of unique species, with 62 species expected to only occur in wetlands with open water on site, while cultivated fields have no species restricted to this habitat type.

4.2.9.4. Sensitivities

Thirteen Red Data bird species were recorded from the two quarter degree grids within which the study area is located. Additionally, the study area falls within the known distribution range of an additional 11 species. The possible presence of African Marsh Harrier (*Circus ranivorus*), Grass Owl (*Tyto capensis*), and Greater Painted Snipe (*Rostratula benghalensis*) on site needs to be highlighted. These species have a preference for wetland habitats.

The only Red Data species recorded during the site visits was the Southern Bald Ibis, which was recorded on two occasions within the natural grasslands on site.

The complete list of Red Data species possibly occurring on site is provided in the full Avifauna specialist report attached as **Appendix B.2.**

4.3 Socio-Economic Environment

4.3.1 Social Setting

4.3.1.1. Data Collection

The information below is extracted from Stats SA, 2011 as well as the Social and Labour Plan (SLP) provided by Glencore. For further information please refer to the SLP attached as **Appendix D.**

4.3.1.2. Regional Description

The Mpumalanga province occupies approximately 6% of the total surface area of South Africa, and has a population estimated at 3 657 181 of which 48% are male and 52% are female. (Stats SA, 2011). The main languages which are spoken in the province include Afrikaans, English, Ndebele, IsiZulu, SiSwati, and Sepedi. Approximately 7.23% of South Africa's total population resides in this province. The population can be dived into the following ethnic groups:

- White;
- Indian/Asian;
- African/Black; and
- Coloured.

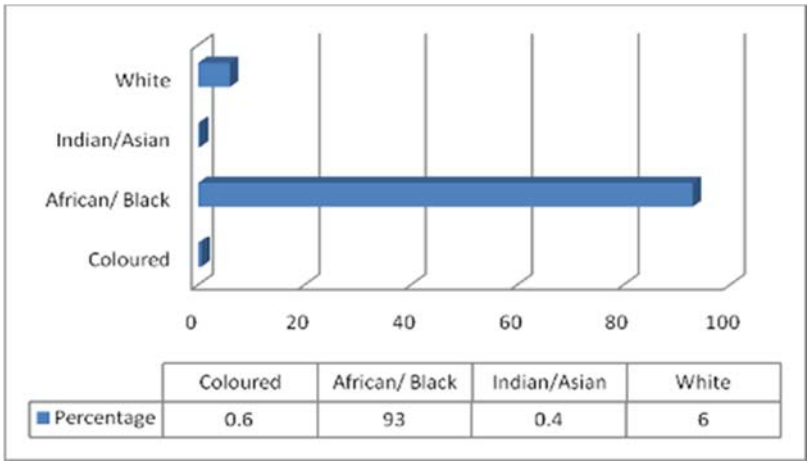

Figure 4-8: Ethnic Delineation (Stats SA)

4.3.1.3. Local Description

The data contained in this section was obtained from the SLP provided by Glencore(unless otherwise indicated). The study area falls within the eMalahleni Local Municipality (ELM), with a population estimated at well over 500 000 which makes it the most populated municipality in the Nkangala District. The gender ratio in ELM is at 51:49 for male to female.

Approximately 65% of the local municipal population falls within the economically active age group while 38% of the population is unemployed. Within the Nkangala District Municipality (NDM) almost 72% of the population has no monthly income while a further 9% earn between R400 and R800 monthly. Mining provides employment to almost 7% of the ELM population.

The majority of the population (75%) live in formal dwellings, while 20% live in informal settlements. The remaining 5% live in traditional dwellings. Although the area is well serviced in terms of transport by means of bus and taxi, much of the areas' population is still reliant on walking as a means of transport.

Within the NDM 25% of the population is uneducated while 14% of the population of the ELM have not received any form of education.

The majority of the local population (68%) has piped water available within their dwelling, while the rest of the population often have to walk long distances in order to obtain water. Approximately 4% of the population obtains water from stagnant water sources such as dams, ponds and rain tanks.

Electricity supply is available to over 70% of the local and regional population with the NDM having a better supply than the ELM. The remainder of the population is reliant on candles, paraffin and gas for energy.

4.3.1.4. Sensitivities

The following potential sensitivities relating to the social environment may occur as a result of the proposed operations:

- Loss of agricultural productivity due to the change in land use. The land is currently being used for agriculture; therefore the construction activities will cause a loss in agricultural land;
- Noise and visual impacts of construction and operational activities on surrounding properties;
- Possible influx of job seekers into the area; and
- Interactions between the local population and construction workers if construction workers are sourced from outside the immediate surroundings.

4.3.2 Traffic

4.3.2.1. Data Collection

Information on the number of coal haul trucks to be used at ATCOM East, the type of trucks, the routes, as well as the number of trips per day were provided by Glencore.

4.3.2.2. Site Description

Seven trucks (Cat 785 C) will be operated at the proposed operations of ATCOM East section. The aim of production totals to nine (9) trips per day per truck. This is however influenced by the area of loading as there will be a difference between loading at Ramp 1 and Ramp 6.

The new proposed haul road extensions which will service all of the pits at ATCOM East will be used for the transportation of coal to the primary crushing plant at the ATCOM ROM stockpile.

4.3.2.3. Sensitivities

The proposed operations at ATCOM East are not foreseen to have a negative impact on the flow of traffic of the area and its surrounds. This is mainly because of the fact that the haul trucks will be operated on the ATCOM East section mine property and would therefore not impact on road users of the area.

4.3.3 Noise

4.3.3.1. Data Collection

Information on the ambient noise levels and sensitivities was taken from a noise impact assessment that was undertaken by M2 Environmental Connections in January 2010 for ATCOM East section. For further information please refer to the detailed report attached as **Appendix B.5**. M2 Environmental Connections was also commissioned by Glencore to undertake a specialist study to determine the current ambient sound environment near eMalahleni in Mpumalanga in order to develop a long-term environmental noise monitoring programme during 2012.

4.3.3.2. Site Description

Background noise levels were measured during the day and night time in accordance with the South African National Standard (SANS) 10103:2003, with the results ranging from 36.7 dBA to 74.6 dBA. The results are reflected in

Table 4-15 below. The locations which were used to measure the ambient (background) sound levels are considered sufficient to provide a good representation. Substantial background noise sources in the area include the following:

- The R547 road traversing the area;
- The plant at ATCOM;
- The operational noises at Van Dyksdrift;
- Coal hauling activities between the opencast pits and the plant at ATCOM; and
- The opencast activities at ATCOM North-pit.

Table 4-15: Results of ambient (background) sound level monitoring

Point name	Location, Latitude	Location, Longitude	$L_{Aeq,T}$ (dBA)	$L_{A,max}$ (dBA)	$L_{A,min}$ (dBA)	Temperature (°C)	Humidity (%)
ATCOM1 (Day)	26.054798°	29.218595°	74.6	94.3	44.3	21.2	44.1
ATCOM2 (Night)	26.121972°	29.275050°	36.7	48.5	31.9	19.2	69.1
ATCOM3 (Day)	26.085299°	29.209062°	70.0	88.4	49.0	25.1	37.0
ATCOM3 (Night)	26.085299°	29.209062°	61.9	88.8	37.4	19.5	69.1
ATCOM4 (Day)	26.110462°	29.228263°	73.3	90.1	54.9	32.1	34.9
ATCOM4 (Night)	26.110462°	29.228263°	61.9	87.9	55.7	17.9	72.2

4.3.3.3. Regional Description

During 2012, Glencore appointed M2 Environmental Connections to undertake a specialist desktop study (Refer to **Appendix B7**) to determine the current ambient sound environment near eMalahleni in Mpumalanga in order to develop a long-term environmental noise monitoring programme. The study area comprises a 1300 km^2 area where Glencore holds mining rights in the area. This study supplied sufficient information in order to determine an environmental noise monitoring programme.

By making use of GIS maps and GoogleEarth, the abovementioned desktop study identified the relevant information required to recommend a long-term monitoring programme, namely:

- Noise Sensitive Developments (NSD's) in and around the proposed study area;
- Mining localities of Glencore and other mines in the study area that would contribute the most noise to the ambient soundscape;
- Main, and secondary roads and railway lines in and around the study area; and
- Due to constraints of a desktop study, berms and barriers was not considered.

Please refer to **Appendix B7** for the desktop ambient Noise Study undertaken by M2 Environmental Connections for the development of a long term environmental monitoring programme for Glencore.

4.3.3.4. Sensitivities

Potentially sensitive receptors were identified using Google Earth and topographical maps, supported by a site visit to confirm the status of the dwellings (Refer to Figure 4-9 below). There are also a few receptors that are situated directly on the footprint of the proposed mining area. It is understood from the mine that they will be relocated. The location of the identified receptors is indicated in Table 4-16 below.

Table 4-16: Locations of the identified receptors (Datum type: Cape Clark 1880, LO29).

Receptor	Location X	Location Y
PSR1	26,791.1	-2,890,407.0
PSR2	26,904.1	-2,890,481.8
PSR3	26,647.7	-2,890,596.2
PSR4	27,159.2	-2,890,605.0
PSR5	28,638.8	-2,890,534.8
PSR6	29,603.3	-2,890,360.4
PSR7	29,063.6	-2,889,069.3
PSR8	28,526.6	-2,887,575.6
PSR9	30,541.1	-2,889,059.4
PSR10	30,279.1	-2,887,650.9
PSR11	30,284.6	-2,888,711.2
PSR12	30,334.2	-2,887,977.0
PSR13	29,825.8	-2,888,372.4
PSR14	30,371.5	-2,888,287.6
PSR15	28,112.8	-2,890,292.9

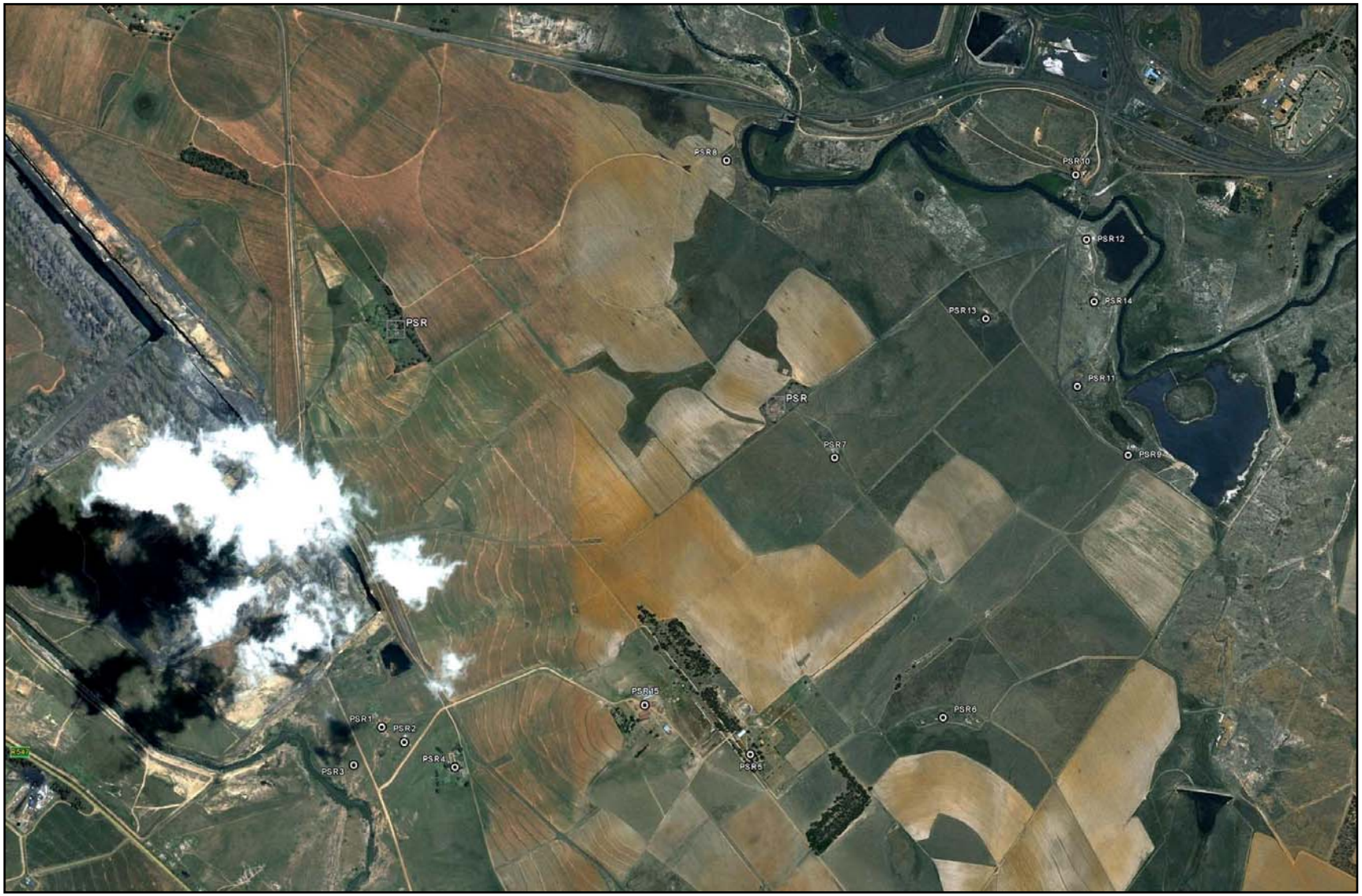

Figure 4-9: Potential sensitive noise receptors within the study area

4.4 Cultural Environment

4.4.1 Historical Setting and Significance

4.4.1.1. Data Collection and Methodology

During a survey of the area which was undertaken by Cultmatrix CC in September 2009, a number of Heritage sites were identified. Subsequently, these findings were confirmed during a field survey by Professional Grave Solutions (Pty) Ltd (PGS) in February 2012. PGS undertook a Heritage Impact Assessment (HIA) for the study area during July 2012. The information below was extracted from the abovementioned assessment. The complete HIA report is attached as **Appendix B.4**.

4.4.1.2. Regional Description

The region in which the study area is located, has a fairly long history of human use and occupation, started by Stone and Iron Age communities and concluding in permanent colonial settlement in the 1850s. It includes a range of heritage resources as defined in the National Heritage Resources Act (Act 25 of 1999), such as buildings, structures and equipment of cultural significance, historical settlements and townscapes as well as graves and burial grounds.

4.4.1.3. Site Description

The heritage sites which are labelled K and KR in the HIA report by PGS, as well as most of the cemeteries, are associated with African tenant farmers. Many of them were forced to relocate to townships and homelands in the 1960s under the previous apartheid legislation as well as in more recent years due to coal mining.

Through experience of similar sites and the knowledge of cultural customs and traditions, it is known that stillborn babies and deceased infants occasionally were buried within the occupied settlements of African rural communities. These children were sometimes buried underneath the floors and walls of houses and huts. These burials were not marked, but were known to the immediate family. The sites which are labelled FH, AR and AS in the HIA report, as well as Grave Site 7, are associated with white farmers and their farmsteads. White farmsteads are usually constructed from brick or sandstone and many of these structures are still present in some form, such as old ruins or abandoned structures. Some of these structures have been re-used by farmworkers and converted to homesteads.

Eleven grave sites were identified, of which three falls just outside of the study area (Grave Sites 1, 2 and 9). An additional 26 historical farmworker homesteads that could contain infant and stillborn burials were identified.

4.4.1.4. Sensitivities

Destruction permits will be required for heritage sites AR5 and AR19 before any demolition is permitted. An evaluation of heritage sites FR1 and FR2 is required in order to determine any possible historical middens. Should any middens be present, a phase 2 excavation will be necessary in order to collect the material.

The development layout should be adjusted as to incorporate at least a 20m buffer around all grave sites. In the event that the grave sites with their associated buffer zones cannot be excluded from the development footprint, a grave relocation process needs to be implemented.

5. DESCRIPTION OF REASONABLE ALTERNATIVES

In terms of the EIA regulations consideration must be given to alternatives. Alternatives are different approaches and ways of meeting the need, purpose and objectives of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, processes or technology alternatives, temporal alternatives, etc. The no-go alternative or option is also considered, as it provides the baseline against which the impacts of other alternatives can be compared. The objective of assessing the feasible alternatives during the Impact Assessment Phase, is to identify the preferred option.

5.1 Project Alternatives

No project alternatives were considered for this assessment. The reason for this being that the mining right was obtained for the sole purpose of mining coal on the properties described in this report.

5.2 Site Alternatives

No site alternatives are being assessed since no other areas within the ATCOM East Section contain coal that has been left in old underground bord and pillar operations which can be exploited by means of opencast operations.

5.3 Activity Alternatives

The opencast mining method was selected due to the low strip ratio, the ability to maximise the coal extraction and use of the coal resource, and to recover the coal reserves remaining in the areas that were previously mined by underground methods.

A dragline will be used for the removal of primary overburden due to the lower operating costs and the safer exposure of coal in previously mined underground areas for VDD South pit. Truck and shovel operations will be used at River South, VDD South, River West as well as VDD West Pits due to access restrictions. Large 190 ton payload trucks (Cat 785 C) will be used for the hauling of coal to the primary crushing plant at the ATCOM/ROM stockpile.

These mining methods are standard practise for opencast mining operations. The reasons for the abovementioned methods being implemented, is that it comes down to the dimensions and sizes of the pits to be mined, but is also based on the required amount of coal that the complex has to produce to comply to Life of Mine targets.

5.4 No-Go Alternative

The No-Go alternative is therefore not a desirable option in this case as it suggests that the remaining coal reserves not be exploited from the old underground bord and pillar undermined areas. This will have a negative impact on Eskom's ability to produce electricity as it currently relies on coal fired power stations to produce approximately 95% of the electricity needed South Africa.

6. PUBLIC PARTICIPATION

Public participation is an essential and legislative requirement in a BA process. The principles that demand communication with society at large are best embodied in the principles of the NEMA, South Africa's overarching environmental law. In addition, Chapter 6, Regulations 54-57 of GNR 543 under the NEMA EIA Regulations, guide the public participation process that is required.

6.1.1 Identification of interested and affected parties

Potential I&APs were identified through the use of the existing Glencore I&AP databases. The existing databases included landowners, neighbouring landowners, community members and non-governmental organisations (NGOs) who have participated in previous EIA processes in the area.

A list of all parties that were consulted during the public participation and authority consultation process is provided in **Appendix C.2**.

6.1.2 Notifications to Interested and Affected Parties

Potential I&APs were notified about the project by means of:

- Letters to affected landowners adjacent to the new mining areas at ATCOM East Section (**Appendix C.1**);
- Media advertisements and site notices (**Appendix C.5 and C.6)**; and
- Written notifications to the Municipal Manager and Councillor of eMalahleni Local Municipality and Nkangala District Municipality.

6.1.3 Notifications to Relevant Authorities

The following Provincial Departments and Organs of State were notified about the project:

- Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET).
- The Department of Water Affairs (DWA);
- The Department of Agriculture, Forestry and Fisheries (DAFF);
- The Department of Mineral Resources (DMR);
- The South African Heritage Resources Agency (SAHRA);
- The Mpumalanga Department of Agriculture, Rural Development and Land Administration (DARDLA);
- The Mpumalanga Department of Tourism and Parks Agency;
- Nkangala District Municipality; and
- Emalahleni Local Municipality

6.1.4 Advertisements and Site Notices

Newspaper advertisements were placed in the following newspapers:

- Witbank News; and
- Middelburg Observer.

Site notices were also placed at various locations on 28 February 2014.

Copies of the advertisements and site notices are included in **Appendix C.5 and C.6**.

6.1.5 Background Information Document

A Background Information Document (BID) (**Appendix C.3**) was circulated to all surrounding landowners, while all other identified I&APs received a copy via e-mail or registered mail.

The BID highlighted the proposed Pillar Extraction Project and invited participants to participate in the BA process. A reply sheet was attached to the BID on which I&APs could provide written comments on the proposed development.

6.1.6 Review of the Draft Basic Assessment Report

This draft BA Report was made available for public and authority review for 40 calendar days from 12 September 2014 to 22 October 2014. All registered I&APs was notified in writing of the availability of the document for review and was requested to submit comments. A list of comments raised and responses received to date forms part of the Final BA Report in the form of a Comments and Response Report (**Appendix C7**). Minutes of any meetings held by the EAP with I&APs and other role players are included in **Appendix C8.**

The draft BA Report was made available for review by means of the following:

- Distribution at eMalahleni Public Library;
- iMpunzi Mine Reception;
- Jones & Wagener Website www.jaws.co.za;
- On request from Gerhard Cronje from Jones & Wagener: Tel: 011 519 0200, email: cronje@jaws.co.za

6.1.7 Finalisation of the Draft Basic Assessment Report

Following the 40 day review period of the Draft BA Report, from 12 September 2014 to 22 October 2014, one comment was received from the Mpumalanga Agricultural Department. For a response to the comment received, please refer to the Comments and Response Report under **Appendix C7**. This Final BA Report is therefore being submitted to the decision making authority, being the MDEDET for consideration.

7. POTENTIAL ENVIRONMENTAL, SOCIAL AND CULTURAL IMPACTS

7.1 Impact Assessment Methodology

In order to ensure uniformity, a standard impact assessment methodology has been utilised so that a wide range of impacts can be compared. The impact assessment methodology makes provision for the assessment of impacts against the following criteria:

- Significance;
- Spatial scale;
- Temporal scale;
- Probability; and
- Degree of certainty.

A combined quantitative and qualitative methodology was used to describe impacts for each of the aforementioned assessment criteria. A summary of each of the qualitative descriptors along with the equivalent quantitative rating scale for each of the aforementioned criteria is given in Table 7-1.

Table 7-1: Quantitative rating and equivalent descriptors for the impact assessment criteria.

RATING	SIGNIFICANCE	EXTENT SCALE	TEMPORAL SCALE
1	VERY LOW	*Isolated site / proposed sit*	Incidental
2	LOW	*Study area*	Short-term
3	MODERATE	*Local*	Medium-term
4	HIGH	*Regional / Provincial*	Long-term
5	VERY HIGH	*Global / National*	Permanent

A more detailed description of each of the assessment criteria is given in the following sections.

7.1.1 Significance Assessment

Significance rating (importance) of the associated impacts embraces the notion of extent and magnitude, but does not always clearly define these since their importance in the rating scale is very relative. For example, the magnitude (i.e. the size) of area affected by atmospheric pollution may be extremely large (1000 km^2) but the significance of this effect is dependent on the concentration or level of pollution. If the concentration is great, the significance of the impact would be HIGH or VERY HIGH, but if it is diluted it would be VERY LOW or LOW. Similarly, if 60 ha of a grassland type are destroyed the impact would be VERY HIGH if only 100 ha of that grassland type were known. The impact would be VERY LOW if the grassland type was common. A more detailed description of the impact significance rating scale is given in Table 7-2 below.

Table 7-2: Description of the significance rating scale.

RATING		DESCRIPTION
5	VERY HIGH	Of the highest order possible within the bounds of impacts which could occur. In the case of adverse impacts: there is no possible mitigation and/or remedial activity which could offset the impact. In the case of beneficial impacts, there is no real alternative to achieving this benefit.
4	HIGH	Impact is of substantial order within the bounds of impacts, which could occur. In the case of adverse impacts: mitigation and/or remedial activity is feasible but difficult, expensive, time-consuming or some combination of these. In the case of beneficial impacts, other means of achieving this benefit are feasible but they are more difficult, expensive, time-consuming or some combination of these.
3	MODERATE	Impact is real but not substantial in relation to other impacts, which might take effect within the bounds of those which could occur. In the case of adverse impacts: mitigation and/or remedial activity are both feasible and fairly easily possible. In the case of beneficial impacts: other means of achieving this benefit are about equal in time, cost, effort, etc.
2	LOW	Impact is of a low order and therefore likely to have little real effect. In the case of adverse impacts: mitigation and/or remedial activity is either easily achieved or little will be required, or both. In the case of beneficial impacts, alternative means for achieving this benefit are likely to be easier, cheaper, more effective, less time consuming, or some combination of these.
1	VERY LOW	Impact is negligible within the bounds of impacts which could occur. In the case of adverse impacts, almost no mitigation and/or remedial activity is needed, and any minor steps which might be needed are easy, cheap, and simple. In the case of beneficial impacts, alternative means are almost all likely to be better, in one or a number of ways, than this means of achieving the benefit. Three additional categories must also be used where relevant. They are in addition to the category represented on the scale, and if used, will replace the scale.
0	NO IMPACT	There is no impact at all - not even a very low impact on a party or system.

7.1.2 Spatial Scale

The spatial scale refers to the extent of the impact i.e. will the impact be felt at the local, regional, or global scale. The spatial assessment scale is described in more detail inTable 7-3.

Table 7-3: Description of the spatial rating scale.

RATING		DESCRIPTION
5	Global/National	The maximum extent of any impact.
4	Regional/Provincial	The spatial scale is moderate within the bounds of impacts possible, and will be felt at a regional scale (District Municipality to Provincial Level). The impact will affect an area up to 50 km from the proposed site.
3	Local	The impact will affect an area up to 5 km from the proposed site.
2	Study Area	The impact will affect an area not exceeding the boundary of the site.
1	Isolated Sites / proposed site	The impact will affect an area no bigger than the site.

7.1.3 Duration Scale

In order to accurately describe the impact it is necessary to understand the duration and persistence of an impact in the environment. The temporal scale is rated according to criteria set out in Table 7-4.

Table 7-4: Description of the temporal rating scale.

RATING		DESCRIPTION
1	Incidental	The impact will be limited to isolated incidences that are expected to occur very sporadically.
2	Short-term	The environmental impact identified will operate for the duration of the construction phase or a period of less than 5 years, whichever is the greater.
3	Medium term	The environmental impact identified will operate for the duration of life of the project.
4	Long term	The environmental impact identified will operate beyond the life of operation.
5	Permanent	The environmental impact will be permanent.

7.1.4 Degree of Probability

The probability or likelihood of an impact occurring will be described as shown in Table 7-5 below.

Table 7-5: Description of the degree of probability of an impact accruing.

RATING	DESCRIPTION
1	Practically impossible
2	Unlikely
3	Could happen
4	Very Likely
5	It's going to happen / has occurred

7.1.5 Degree of Certainty

As with all studies it is not possible to be 100% certain of all facts, and for this reason a standard "degree of certainty" scale is used as discussed in Table 7-6. The level of detail for specialist studies is determined according to the degree of certainty required for decision-making. The impacts are discussed in terms of affected parties or environmental components.

Table 7-6: Description of the degree of certainty rating scale.

RATING	DESCRIPTION
Definite	More than 90% sure of a particular fact.
Probable	Between 70 and 90% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Between 40 and 70% sure of a particular fact, or of the likelihood of an impact occurring.

RATING	DESCRIPTION
Unsure	Less than 40% sure of a particular fact or the likelihood of an impact occurring.
Can't know	The consultant believes an assessment is not possible even with additional research.

7.1.6 Quantitative Description of Impacts

To allow for impacts to be described in a quantitative manner in addition to the qualitative description given above, a rating scale of between 1 and 5 was used for each of the assessment criteria. Thus the total value of the impact is described as the function of significance, spatial and temporal scale as described below:

$$\textit{Impact Risk} = \frac{(\text{SIGNIFICANCE} + \textit{Spatial} + \text{Temporal})}{3} \times \frac{\text{Probability}}{5}$$

An example of how this rating scale is applied is shown below:

Table 7-7: Example of Rating Scale.

IMPACT	SIGNIFICANCE	SPATIAL SCALE	TEMPORAL SCALE	PROBABILITY	RATING
	LOW	*Local*	Medium Term	*Could Happen*	
Impact to air	2	***3***	3	3	1.6

Note: The significance, spatial and temporal scales are added to give a total of 8, that is divided by 3 to give a criteria rating of 2,67. The probability (3) is divided by 5 to give a probability rating of 0,6. The criteria rating of 2,67 is then multiplied by the probability rating (0,6) to give the final rating of 1,6.

The impact risk is classified according to 5 classes as described in the table below.

Table 7-8: Impact Risk Classes.

RATING	IMPACT CLASS	DESCRIPTION
0.1 – 1.0	1	Very Low
1.1 – 2.0	2	Low
2.1 – 3.0	3	Moderate
3.1 – 4.0	4	High
4.1 – 5.0	5	Very High

Therefore with reference to the example used for air quality above, an impact rating of 1.6 will fall in the Impact Class 2, which will be considered to be a low impact.

7.2 Impact Assessment

The Impact Assessment will highlight and describe the impact to the environment following the above mentioned methodology and will assess the following components:

- Air;

- Geology;
- Soils, Land use and land Capability;
- Groundwater occurrence and use;
- Surface water;
- Terrestrial Ecology;
- Aquatic Ecology and Wetlands;
- Heritage;
- Social;
- Noise;
- Traffic; and
- Visual

The impact assessment was undertaken for the construction and operational phases of the project. Should any infrastructure be required to be decommissioned a separate assessment would be required.

This section provides a list of impacts (including cumulative impacts) together with associated mitigation measures (Table 7-9).

7.2.1 Construction Phase

The construction phase will comprise the following activities:

- Vegetation clearing for water management infrastructure to be constructed;
- Construction of infrastructure for the management of water from wetland areas which will be mined;
- Vegetation clearing for the proposed access roads leading to the proposed pit areas;
- Vegetation clearing for the proposed pit areas;
- Construction of new access roads;
- Construction of contractor / construction camps;
- Fencing and security; and
- Bringing in heavy machinery and materials required for the preparation of the pit areas.

The main impacts during construction occur as a result of the following construction activities associated with the site clearance - transportation of equipment and materials, laying of access roads, heavy vehicle movement, and any wastes generated.

7.2.2 Operational Phase

The operational phase will comprise of the following:

- Dewatering of the old underground workings in which excess water has accumulated in order for the proposed opencast mining operation to proceed. Active dewatering of each of the opencast pits will continue for the duration of the life of the pit (approved in a separate application).
- Topsoil is stripped and stockpiled;
- Overburden is removed and stockpiled;

- Establishment of opencast pits according to the mine plan; and
- Mining of the opencast pits according to the mine plan.

The major impacts that may occur during the operational phase are the destruction of wetlands and the subsequent loss of the functions that these wetlands provide, impacts on surface water quality and quantity, disturbance of graves, loss of ecological habitat, disturbance / destruction of sensitive fauna and flora, loss of agricultural land, and also visual impacts due to the opencast pits.

7.2.3 Closure Phase

The closure of the ATCOM East mining operations would be subject to a separate EIA, and environmental authorisation at the appropriate time and is therefore not further assessed in this document.

The findings from the impact assessment for both the construction and operational phases are tabulated in Table 7-9 below.

Table 7-9: Environmental Impact Assessment Rating.

Activity	Aspect	Impact	Mitigation	Criteria	Rating prior to project		Rating prior to mitigation		Cumulative rating		Rating post mitigation	
A - Construction Phase												
Contractor Camps establishment	**Terrestrial Ecology**	**NEGATIVE IMPACT** • Clearing of vegetation will result in loss of fauna and flora species • Alien invasive species may invade the disturbed area • Fires could result from cooking areas in the camp • Increased noise and visual activity may affect distribution and behaviour of fauna	• Removal and/ or relocation of protected plants should be implemented (a permit is required from Mpumalanga Parks and Tourism where applicable) • All construction areas should be demarcated prior to construction, to ensure that the footprint of the impacts is limited (including areas where vehicles may traverse), in order to minimise the extent of the construction footprint. • Movement of construction vehicles and workers is to be restricted from areas outside of the boundaries of the demarcated construction areas. • Sensitive vegetation should be avoided outside of the demarcated construction areas. • Demarcated buffer zones must be fenced during construction with permeable fencing. • All alien invasive species on site should be removed and follow up monitoring and removal programs should be initiated once construction is complete. • No cooking is permitted on site. This is in order to prevent potential fires. • Construction areas must be inspected for any occurrence of erosion. Appropriate remedial action (rehabilitation) must be undertaken should any areas be identified. • The construction staff should be educated about the value of wildlife and environmental sensitivity. • Construction personnel should be informed of the Animal Protection Act (Act 71 of 1962) and encouraged not to harm wildlife. • Workers on site should be prevented from hunting or harassing any fauna on site	Significance	1	**VERY LOW**	3	**LOW**	3	**LOW**	3	**LOW**
				Spatial	1		1		1		1	
				Temporal	3		2		3		2	
				Probability	3		3		3		3	
	Heritage	**NEGATIVE IMPACT**	• Report and evaluate any graves or archaeological features and artefacts if found during site preparation	Significance	**NO IMPACT**		4	**LOW**	4	**LOW**	3	**LOW**
				Spatial			1		1		1	

		• Heritage features including graves could be damaged or removed during establishment of contractor camps	work. • Should a grave or any other historically significant feature be identified in the construction footprint, the feature may not be removed and a heritage specialist and the SAHRA APM Unit (Mr Phillip Hine, tel: 021 462 4502) must be contacted immediately. • If a newly discovered heritage resource is found within the construction footprint and it is found to be archaeologically / palaeontologically significant then a phase 2 rescue operation might be necessary at the cost of the developer. • Demarcate grave sites with at least a 20 meter buffer.	Temporal			5		5		5	
				Probability			2		2		2	
	Social	**NEGATIVE IMPACTS** • Influx of workers • Noise generated • Visual impact • Power disruptions • Social interactions • Increased housing	• Where possible locate the construction camp/s in an area that is least visible. • Sources of light should be directed away from surrounding communities and farmers • Notify any affected parties of power disruptions expected during construction • Make use of local labour, as far as possible	Significance	1	**VERY LOW**	3	**LOW**	3	**LOW**	2	**VERY LOW**
				Spatial	3		3		3		3	
				Temporal	1		2		2		2	
				Probability	1		4		4		4	
		POSITIVE IMPACTS • Employment and related wage benefits for construction workers and their associated communities • Limited expenditure into local economy due to expenditure of goods, materials and services; • Potential education opportunities afforded to contractors through skill transferral during employment		**POSITIVE IMPACT**								
	Surface Water and Wetlands	**NEGATIVE IMPACT** • Eroded materials may	• Locate the construction camps outside of the 1:100 year floodline • Implement erosion control measures when removing vegetation	Significance	1	**VERY LOW**	3	**MOD**	3	**MOD**	3	**LOW**

		result in sedimentation • Loss of sensitive habitat and sensitive species.	• Demarcate the no-go areas • If generators are used they should be placed in a bunded area • Provide containment and settlement facilities for hazardous materials like fuel and oil • Spill-sorb or similar type product must be used to absorb hydrocarbon spills in the event that such spills should occur • Limit speed and traffic on dirt roads adjacent to sites (to minimise soil erosion) • Sediment traps should be put into place and should be maintained. • A comprehensive surface runoff and stormwater management plan must be compiled, indicating how all surface runoff generated as a result of the construction phase will be managed. • Plan construction to avoid any impact on the natural drainage of the site.	Spatial	1		4		4		2	
				Temporal	1		2		2		2	
				Probability	1		4		4		3	
	Visual	**NEGATIVE IMPACT** • Visibility of the construction camp/s may impact on aesthetics for nearby landowners	• Where possible locate the construction camp in an area that is least visible • Ablution facilities shall be located in minimal invasive areas away from public view where possible. • The contractor's camp shall be sited so as to cause the least amount of disturbance to adjacent landowners and must be fenced.	Significance	3	**MOD**	3	**VERY LOW**	3	**MOD**	3	**VERY LOW**
				Spatial	2		2		2		2	
				Temporal	2		2		2		2	
				Probability	5		2		5		2	
	Waste	**NEGATIVE IMPACT** • Litter • Waste water runoff • Soil pollution • Surface and groundwater pollution • Visual impact • Odours may	• A method statement is required from the Contractor that includes the layout of the camp, management of ablution facilities and waste management. • A waste contractor must be appointed to manage the removal and disposal of solid waste – both domestic and hazardous waste during the construction phase. • The Contractor camp shall have the necessary ablution facilities with portable chemical toilets where such facilities are not available at commencement of construction Toilet facilities supplied by the contractor for the workers shall occur at a minimum ratio of 1 toilet per 15 workers. All temporary / portable toilets shall be secured to the ground to prevent them from	Significance	**NO IMPACT**		4	**LOW**	4	**LOW**	2	**VERY LOW**
				Spatial			3		3		3	

		result	toppling due to wind or any other cause. • The Contractor shall supply a wastewater management system that will comply with legal requirements. Eating areas shall be designated and demarcated. Sufficient bins shall be present in this area for all waste material. No dishwashing facilities will be provided on site with the exception of kitchen within site buildings.	Temporal		2		2		2	
				Probability		3		3		2	
	Heavy Machinery	**NEGATIVE IMPACT** • Soil pollution • Increase in traffic • Surface water pollution from hydrocarbon spillage • Soil compaction	• Where possible and practical all maintenance of vehicles and equipment shall take place in the workshop area. Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediate to the satisfaction of the Environmental Specialist/Officer • No vehicles coming on sites must spill oil. All areas where heavy machinery has access must be rehabilitated in terms of soil pollution. • No construction equipment, vehicles or unauthorised personnel will be allowed onto areas that have been re-vegetated. The Contractor will control the movement of all vehicles and machinery on the site. All vehicles and machinery will remain on designated areas, and these vehicles will be distributed so as not to cause undue traffic concentration. • Ensure traffic safety measures (e.g. traffic warning signs, flagmen) are erected • Glencore to approve the contractor's traffic management plans before any activities may commence. • The Contractor will control the movement of all vehicles and machinery on the site. All vehicles and machinery will remain on designated routes, and these vehicles will be distributed so as not to cause undue traffic concentration. • Maintenance of equipment and vehicles will be performed off-site at a suitably designed workshop. • All vehicles and equipment will be kept in good working order and serviced regularly. Leaking equipment will be repaired immediately or removed from the site.	Significance	**NO IMPACT**	4	**MOD**	4	**MOD**	3	**LOW**
				Spatial		2		2		2	
				Temporal		2		2		2	
				Probability		4		4		3	
	Air Quality Monitoring	**NEGATIVE IMPACT** • Fugitive dust emissions may	• Traffic control measures aimed at reducing the entrainment of material by restricting traffic volumes and reducing vehicle speeds • Measures aimed at binding the surface material or	Significance	2	**LOW**	2	**LOW**	3	**MOD**	1	**LOW**
				Spatial	2		2		2		2	

		result from soil exposure; • Fumes from construction vehicles	enhancing moisture retention, such as wet suppression and chemical stabilization. • Measures aimed at reducing the extent of unpaved roads, e.g. paving • A spraying programme should be instituted on the construction sites and unpaved roads used for construction vehicles. Such a spraying programme is best managed by taking cognisance of rainfall and evaporation rates prevalent at the time.	Temporal	2		2		2		1	
				Probability	5		4		5		3	
	Soils	**NEGATIVE IMPACT** • Soil pollution • Soil Erosion • Loss of topsoil • Decrease in land capability	• All contaminated soil / yard stone shall be treated with spill kits and removed from site. • The area around the fuel storage container at the contractor's camp shall also be remediated upon completion of the contract • Vegetation clearing should be restricted to the footprint of the site under construction as far as possible • Construction areas should be inspected for any occurrence of erosion. Appropriate rehabilitation must be undertaken should any eroded areas be identified.	Significance	3		3		3		3	
				Spatial	1		1		1		1	
				Temporal	3		3		3		3	
				Probability	3	**LOW**	4	**LOW**	4	**LOW**	3	**LOW**
	Geology	No deep excavations are planned for the construction camp										
Construction of water management infrastructure and site clearing	**Terrestrial Ecology**	**NEGATIVE IMPACT** • Clearing of vegetation will result in loss of fauna and flora species • Alien invasive species may invade the disturbed area • Fragmentation and loss of habitats.	• All alien invasive species on site should be removed and follow up monitoring and removal programs should be initiated once construction is complete • Continuous rehabilitation should take place throughout construction. • Removal and relocation of protected plants should be implemented where required (a permit is required from Mpumalanga Parks and Tourism) • All construction areas should be demarcated prior to construction, to ensure that the footprint of the impacts is limited (including areas where vehicles may traverse), in order to minimise the extent of the construction footprint. • Movement of construction vehicles and workers is to be restricted from areas outside of the boundaries of the demarcated construction areas. • Sensitive vegetation should be avoided outside of the demarcated construction sites. • Construction areas must be inspected for any occurrence of erosion. Appropriate remedial action (rehabilitation) must be taken should any areas be	Significance	1		2		2		2	
				Spatial	1		1		1		1	
				Temporal	3	**VERY LOW**	3	**LOW**	3	**LOW**	3	**LOW**
				Probability	3		5		5		5	

			identified. • The construction staff should be educated about the value of wildlife and environmental sensitivity. • Construction personnel should be informed of the Animal Protection Act (Act 71 of 1962) and encouraged not to harm wildlife. • Workers on site should be prevented from hunting or harassing any fauna on site								
	Air Quality	**NEGATIVE IMPACT** • Fugitive dust emissions may result from soil exposure • Fumes from construction vehicles	• Traffic control measures aimed at reducing the entrainment of material by restricting traffic volumes and reducing vehicle speeds • Measures aimed at binding the surface material or enhancing moisture retention, such as wet suppression and chemical stabilization. • Monitor the existing network of dustfall gauges during the construction period. • A spraying programmeshould be instituted on the construction sites and unpaved roads used for construction vehicles. Such a spraying programmeis best managed by taking cognisance of rainfall and evaporation rates prevalent at the time.	Significance Spatial Temporal Probability	2 2 2 5	**LOW**	2 2 2 4	**LOW**	3 2 2 5	**MOD**	1 2 1 3	**LOW**
	Heritage	**NEGATIVE IMPACT** • Heritage features could be damaged or removed during construction activities	• Report and evaluate any graves or archaeological features and artefacts if found during site preparation work. • Should a grave or any other historically significant feature be identified in the construction footprint, the feature may not be removed and a heritage specialist and the SAHRA APM Unit (Mr Phillip Hine, tel: 021 462 4502) must be contacted immediately. • If a newly discovered heritage resource is found within the construction footprint and it is found to be archaeologically / palaeontologically significant then a phase 2 operation might be necessary at the cost of the developer. • Adjust the development layout and demarcate grave sites with at least a 50 meter buffer. • In the event that the graves cannot be excluded from the development footprint, a grave relocation process as described in the Heritage report needs to be implemented. • Destruction permits required for Heritage sites AR5 and AR19. • Evaluation of Heritage sites FR1 and FR2 for possible	Significance Spatial Temporal Probability	**NO IMPACT**	4 1 5 4	**MOD**	4 1 5 4	**MOD**	4 1 5 2	**LOW**

			historical middens, and if present, phase 2 excavations need to be undertaken to collect material.								
	Soils and Land Capability	**NEGATIVE IMPACT** • Insufficient control measures during the construction phase may result in erosion, compaction and sterilisation of soil resources • Reduction in land capability. • Poor soil improvement measures may result in a lack of vegetation establishment. • Loss of agricultural land • Oil spills from heavy vehicles may result in soil pollution	• Ensure that all machinery on site is in a good working order • Limit all activities to the proposed construction footprint • Ensure that adequate storm water control measures are in place to prevent erosion • Oil-contaminated soils are to be removed to a contained storage area and bio-remediated or disposed of at a licensed facility • Ensure that soil is stockpiled in such a way as to prevent erosion from storm water. • Compaction of soils should be limited as far as possible as to reduce runoff and erosion.	Significance	3	**MOD**	3	**LOW**	3	**MOD**	3	**LOW**
				Spatial	1		1		1		1	
				Temporal	4		3		4		3	
				Probability	5		4		5		4	
	Wetlands, Surface Water and Aquatic Ecology	**NEGATIVE IMPACT** • Eroded materials may result in sedimentation of nearby	• Implement erosion control measures when removing vegetation • If generators are used they should be placed in a bunded area where possible • Provide containment and settlement facilities for hazardous materials like fuel and oil	Significance	4	**MOD**	4	**MOD**	4	**MOD**	3	**LOW**

		watercourses • Loss of sensitive habitat and sensitive species. • Fragmentation and loss of habitats. • Loss of wetland vegetation and destruction of wetland habitat • Increased sediment movement off the site due to erosion on bare soil surfaces and increased sediment load in the valley bottoms; • Soil compaction in areas traversed by heavy machinery; • Deterioration in surface water quality due to spillages and suspended solids transport etc. • Erosion at storm water discharge points; and • Deterioration of water quality due to release of storm water into the wetlands.	• Spill-sorb or similar type product must be used to absorb hydrocarbon spills in the event that such spills should occur • Sediment traps should be put into place and should be maintained. • Plan construction to avoid any impact on the natural drainage of the site. • The distribution of sensitive aquatic ecosystems, as indicated in the Aquatics Ecosystems report should be taken into consideration during mine planning. • Water quality monitoring must be undertaken. • All wetland areas located adjacent to mining areas should be fenced off prior to commencement of vegetation clearing activities on site so as to prevent access to construction machinery and personnel. In addition, all wetland areas should be clearly marked as such to alert construction staff on site. • All stockpiles should be located to fall outside delineated wetland areas. • A construction stormwater management plan should be compiled and implemented. The main focus of such a plan should be to prevent sediment movement off site and into adjacent wetlands. • All construction staff should be educated on the importance and sensitivity of the wetland systems on site. This should form part of the induction process. • No stockpiling of material may take place within the wetland areas and temporary construction camps and infrastructure should also be located away from these areas with a minimum of a 50m buffer between wetlands and construction camps and infrastructure. • Regular cleaning up of the wetland areas should be undertaken to remove litter. • An alien vegetation management plan should be drawn up and implemented. Regular removal of invasive alien species should be undertaken. This should extend right through to the decommissioning and closure phase of the project • The footprint of vegetation clearing should be kept as small as possible. • Vegetation clearing should only be done immediately prior to the commencement of construction activities and should be phased so as to limit the extent of	Spatial	4		4		4		3	
				Temporal	3		2		3		2	
				Probability	4		4		4		3	

			bare soil areas at any one time. • A shallow berm or other sediment barrier should be constructed downslope of the proposed opencast pits to attenuate/slow down sheet flow and create a depositional environment to trap sediments. • All hazardous substances should be stored on impervious surfaces that allow for the containment of spills and leakages (e.g. bunded areas) away from wetland areas. Should spills occur, these should be reported to the ECO. • Where clean storm water is discharged into wetlands, gabions should be constructed to contain erosion. This should be done in consultation with an appropriate wetland and storm water specialist. The gabion structure should also include measures to dissipate energy of flows and to disperse flows over a greater area. • Direct discharge of sediment rich runoff from the construction sites into wetland areas should be avoided. • Concentrated runoff from cleared areas should be avoided. Any preferential flows paths that do develop should be plugged and repaired as soon as possible. • Ensure all clean water is diverted around dirty water areas and opencast pits and reintroduced to the downstream wetlands in a manner approximating pre-development flow characteristics. • Protect discharge points of clean water diversions against erosion and prevent discharge of concentrated, high velocity flows into wetlands.									
	Groundwater Quantity and Quality	**NEGATIVE IMPACT** • Groundwater flow towards the box cuts during the construction • Formation of depression cones • Increase in the Total Dissolved Solids (TDS)	• Any significant inflow of groundwater into the box cuts can be used during the construction phase, or can be pumped to pollution control facilities. • For the prevention of dirty surface water to seep into the aquifer, run-off must be collected in dirty water dams. Berms should be constructed around mining activities in order to divert clean run-off.	Significance	3	**LOW**	3	**LOW**	3	**LOW**	2	**VERY LOW**
				Spatial	1		1		1		1	
				Temporal	2		2		2		2	
				Probability	3		3		3		2	

	Noise	**NEGATIVE IMPACT** • Noise generated during construction	• In order to prevent noise impacts resulting from construction activities, working hours are to be limited to Monday to Saturday between 6h00 to 18h00 wherever possible. • Reducing the number simultaneous activities • Ensuring that all equipment and machinery are well maintained and equipped with silencers • Stakeholders will be notified before construction commences. • Implement an environmental noise monitoring programmefor the construction phase. Noise measurements should be conducted on an ongoing basis at noise sensitive areas and management should be advised of any significant increase in the ambient sound level as operations continue. • The impact that the noise producing activities may have on noise sensitive areas as well as mitigation measures should be communicated to communities that may be affected for the purpose of transparency and good relations • A buffer zone of at least 500m between the the closest mining activities and sensitive receptors.	Significance	2	**LOW**	3	**LOW**	3	**LOW**	3	**LOW**
				Spatial	2		2		3		2	
				Temporal	1		3		3		2	
				Probability	5		3		3		3	
	Geology	No deep excavations are planned for the construction phase.										
	Waste	**NEGATIVE IMPACT** • Litter • Soil pollution • Surface and groundwater pollution • Visual impact	• A waste contractor must be appointed to manage the removal and disposal of solid construction waste during the construction phase. • The Contractor camp shall have the necessary ablution facilities with chemical toilets where such facilities are not available at commencement of construction Toilet facilities supplied by the contractor for the workers shall occur at a minimum ratio of 1 toilet per 30 workers. All temporary / portable toilets shall be secured to the ground to prevent them from toppling due to wind or any other cause. • Eating areas shall be designated and demarcated. Sufficient bins shall be present in the construction area for all waste material.	Significance	**NO IMPACT**		3	**LOW**	3	**LOW**	3	**LOW**
				Spatial				2		2		2	
				Temporal				2		4		2	
				Probability				3		3		3	
	Social	**NEGATIVE IMPACT** • Noise and	• Ensure all machinery is serviced and adequately maintained as per the planned maintenance schedule.	Significance	3	**LOW**	3	**LOW**	3	**MOD**	2	**LOW**

		visual intrusion of construction activities on surrounding farms and properties • Possible migration of job seekers to the area • Unwanted social interactions between local population and construction workers. This will only apply if construction workers are sourced from outside the immediate surroundings	• During the construction phase machines are to be operated Monday to Saturday during daylight hours with the exception of during casting work where work will be carried out through the night. • Make use of local labour, as far as possible. • Ensure skills transfer takes place, as per the relevant Social and Labour Plans.	Spatial	3		3		3		2	
				Temporal	2		2		3		2	
				Probability	2		3		4		3	
		POSITIVE IMPACT • Employment and related wage benefits for construction workers and their associated communities • Limited expenditure into local economy due to expenditure of goods, materials and services • Potential education opportunities afforded to contractors through skill transferral during employment		**POSITIVE IMPACT**								
B - Operational Phase													
Mining of proposed opencast pit areas	**Terrestrial Ecology**	Impacts have already occurred during the construction phase											
	Air Quality	**NEGATIVE IMPACT**	• Traffic control measures aimed at reducing the entrainment of material by restricting traffic volumes	Significance	1	**LOW**	3	**MOD**	3	**MOD**	1	**LOW**
				Spatial	3		3		3		3	
				Temporal	2		2		2		2	

		• Exhaust fumes from vehicles • Fugitive dust from gravel roads	and reducing vehicle speeds • Measures aimed at binding the surface material or enhancing moisture retention, such as wet suppression and chemical stabilization. • Monitor the existing network of dustfall gauges during construction and operational periods. • A spraying programmeshould be instituted on the construction sites and unpaved roads used for construction vehicles. Such a spraying programmeis best managed by taking cognisance of rainfall and evaporation rates prevalent at the time.	Probability	5		4		5		3	
	Soils	**NEGATIVE IMPACT** • Reduction in land capability. • Loss of agricultural land • Oil spills from heavy vehicles may result in soil pollution	• Ensure that all machinery on site is in a good working order • Limit all activities to the proposed opencast footprint • Ensure that adequate storm water control measures are in place to prevent erosion • Oil-contaminated soils are to be removed to a contained storage area and bio-remediated or disposed of at a licensed facility • Ensure that soil is stockpiled in such a way as to prevent erosion from storm water. • Compaction of soils should be limited as far as possible as it would reduce runoff and erosion.	Significance	3	**MOD**	3	**LOW**	3	**MOD**	3	**LOW**
				Spatial	2		2		2		1	
				Temporal	3		3		3		2	
				Probability	5		3		4		3	
	Wetlands, Surface Water and Aquatic Ecology	**NEGATIVE IMPACT** • Destruction of wetlands within footprint of opencast pit areas. • Loss of the functions provided by wetlands. • Fragmentation and loss of wetland habitats • Eroded materials may result in sedimentation of nearby	• Opencast pit areas to avoid 1:100 year floodline and/or a buffer to be implemented around wetland areas as well as along both the Olifants River and Steenkoolspruit. • Implement surface, and aquatic monitoring programs • Obtain the necessary Water Use Licence under Section 21 of the National Water Act. • All wetland areas located adjacent to mining areas should be fenced off prior to commencement of vegetation clearing activities on site so as to prevent access to construction machinery and personnel. In addition, all wetland areas should be clearly marked as such to alert construction staff on site. • All stockpiles should be located to fall outside delineated wetland areas. • A construction stormwater management plan should be compiled and implemented. The main focus of such a plan should be to prevent sediment movement off site and into adjacent wetlands.	Significance	3	**HIGH**	4	**HIGH**	4	**HIGH**	4	**MOD**
				Spatial	4		4		4		2	
				Temporal	3		3		3		3	
				Probability	5		5		5		4	

		watercourses • Loss of sensitive habitat and sensitive species. • Fragmentation and loss of habitats. • Decrease in water quality • Loss of wetland vegetation and destruction of wetland habitat • Increased sediment movement off the site due to erosion on bare soil surfaces and increased sediment load in the valley bottoms; • Soil compaction in areas traversed by heavy machinery; • Deterioration in water quality due to spillages and suspended solids transport etc. • Erosion at storm water discharge points; and • Deterioration	• All construction staff should be educated on the importance and sensitivity of the wetland systems on site. This should form part of the induction process. • No stockpiling of material may take place within the wetland areas and temporary construction camps and infrastructure should also be located away from these areas with a minimum of a 50m buffer between wetlands and construction camps and infrastructure. • Regular cleaning up of the wetland areas should be undertaken to remove litter. • An alien vegetation management plan should be drawn up and implemented. Regular removal of invasive alien species should be undertaken. This should extend right through to the decommissioning and closure phase of the project • The footprint of vegetation clearing should be kept as small as possible. • Vegetation clearing should only be done immediately prior to the commencement of construction activities and should be phased so as to limit the extent of bare soil areas at any one time. • A shallow berm or other sediment barrier should be constructed downslope of the proposed opencast pits to attenuate/slow down sheet flow and create a depositional environment to trap sediments. • All hazardous substances should be stored on impervious surfaces that allow for the containment of spills and leakages (e.g. bunded areas) away from wetland areas. Should spills occur, these should be reported to the ECO. • Where clean storm water is discharged into wetlands, gabions should be constructed to contain erosion. This should be done in consultation with an appropriate wetland and storm water specialist. The gabion structure should also include measures to dissipate energy of flows and to disperse flows over a greater area. • Direct discharge of sediment rich runoff from the construction sites into wetland areas should be avoided. • Concentrated runoff from cleared areas should be avoided. Any preferential flows paths that do develop should be plugged and repaired as soon as possible. • Ensure all clean water is diverted around dirty water areas and opencast pits and reintroduced to the									

		of water quality due to release of storm water into the wetlands. • Increased sediment loads in valley bottoms	downstream wetlands in a manner approximating pre-development flow characteristics. • Protect discharge points of clean water diversions against erosion and prevent discharge of concentrated, high velocity flows into wetlands. • Install low level berms as part of the stormwater management plan around soil and overburden stockpiles to prevent sediment rich runoff entering wetlands directly. Clean runoff should be discharged to the environment via a sediment trap and erosion protected discharge point.									
	Groundwater Balance	**NEGATIVE IMPACT** • Groundwater make accruing from recharge related to rainfall • Natural groundwater influx through the open cast mine walls from the surrounding aquifer.	• No mitigation measures can be implemented to stop the groundwater influx.	Significance Spatial Temporal Probability	**NO IMPACT**	5 3 5 5	**VERY HIGH**	5 3 5 5	**VERY HIGH**	5 3 5 5	**VERY HIGH**
	Groundwater Quantity and Quality	**NEGATIVE IMPACT** • Impact on availability of groundwater in the larger study area. • Impact on quality of groundwater in the larger study area. • Depletion of groundwater resources	• The open cast pits must be at least 100 m away from sensitive surface water features. • In-pit management measures relate to continuous rehabilitation as mining progresses. • Alternative supplies of water to replace existing usage will be negotiated with affected groundwater users • In the event of the external users being compensated for their land, no further mitigation measures are required. • Water accumulating in the active cut and excess seepage from spoils/rehabilitated areas, must be pumped out or used during the operational phase as soon as possible, as to prevent the acidification of large volumes of water. • Berms that divert clean storm water away from surface	Significance Spatial Temporal Probability	**NO IMPACT**	3 3 3 3	**LOW**	3 3 3 3	**LOW**	3 3 3 2	**LOW**

			infrastructure must be constructed. • Overburden stockpiles must have drainage diverting berms constructed up gradient in order to prevent clean drainage water for flowing through. • Groundwater monitoring around the opencast pit areas must be implemented in order to determine the quantity and quality of infiltration.									
	Depletion of stream base flow	**NEGATIVE IMPACT** • Reduction in the groundwater base flow towards nearby streams or rivers	• Mining pits must be situated at least 100 m from sensitive surface water features.	Significance Spatial Temporal Probability	**NO IMPACT**		3 3 4 3	**LOW**	3 3 4 3	**LOW**	3 3 3 3	**LOW**
	Visual	**NEGATIVE IMPACT** • Visibility of the new opencast pits may impact on aesthetics for nearby landowners	• Ongoing rehabilitation of opencast pits as mining progresses. • Shaping of backfilled areas to follow the natural contours as far as possible.	Significance Spatial Temporal Probability	3 2 2 5	**MOD**	4 3 3 3	**MOD**	4 3 3 5	**HIGH**	4 2 2 4	**MOD**
	Geology	Glencore commits to appointing the relevant specialist to undertake a detailed Geotechnical investigation prior to any mining activities taking place at ATCOM East.										
	Noise	**NEGATIVE IMPACT** • Noise	• In order to prevent noise impacts resulting from construction activities, working hours are to be limited to Monday to Saturday between 6h00 to 18h00	Significance Spatial	2 2	**LOW**	3 2	**LOW**	3 3	**LOW**	3 2	**LOW**

		generated during opencast mining activities	wherever possible. • Reducing the number simultaneous activities • Ensuring that all equipment and machinery are well maintained and equipped with silencers • Stakeholders will be notified before construction commences. • Implement an environmental noise monitoring programmefor the construction phase. Noise measurements should be conducted on an ongoing basis at noise sensitive areas and management should be advised of any significant increase in the ambient sound level as operations continue. • The impact that the noise producing activities may have on noise sensitive areas as well as mitigation measures should be communicated to communities that may be affected for the purpose of transparency and good relations • A buffer zone of at least 500m between the the closest mining activities and sensitive receptors at night. • Implement a noise monitoring program.	Temporal Probability	1 5		3 3		3 3		2 3	
	Social	**NEGATIVE IMPACT** • Health and Safety of employees • Noise and visual intrusion of construction activities on surrounding farms and properties • Possible migration of job seekers to the area • Unwanted social interactions between local population and construction workers. This will only apply	• Employees to undergo health and safety induction; • Appropriate PPE is to be worn by employees • Relevant signage must be erected on site; • Ensure all machinery is serviced and adequately maintained. • During the construction phase machines are to be operated Monday to Saturday during daylight hours with the exception of during casting work where work will be carried out through the night. • Make use of local labour, as far as possible. • Ensure skills transfer takes place, as per the relevant Social and Labour Plans.	Significance Spatial Temporal Probability	3 3 2 2	**LOW**	3 3 2 3	**LOW**	3 3 3 4	**MOD**	2 2 2 3	**LOW**

		if construction workers are sourced from outside the immediate surroundings											
		POSITIVE IMPACT • Employment and related wage benefits for workers and their associated communities • Limited expenditure into local economy due to expenditure of goods, materials and services • Potential education opportunities afforded to contractors through skill transferral during employment		**POSITIVE IMPACT**									

8. ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURES - EMPR

Please refer to **Appendix A** for the Environmental Management Program Report.

9. ASSUMPTIONS, UNCERTAINTIES AND KNOWLEDGE GAPS

In accordance with Section 30(m) of R543 of the NEMA EIA Regulations, the knowledge gaps, adequacy of predictive methods, underlying assumptions and uncertainties encountered in compiling the required information have been identified and discussed in this section of the Final BA Report.

At present, several gaps in the information available regarding the proposed project have been identified. The following information will be gathered to supplement out-dated or insufficient information:

- The objectives of this document will only be met if the mitigation measures are successfully and duly implemented;
- Competent and qualified specialists were appointed to undertake the included specialist studies. The mitigation measures proposed by the specialists and their predicated impacts are based on their company predictive methodologies and can therefore only be confirmed during the operational phase.
- Glencore commits to appointing the relevant specialist to undertake a detailed Geotechnical investigation prior to any mining activities taking place at ATCOM East.

10. ENVIRONMENTAL IMPACT STATEMENT AND CONCLUSION

It is apparent that the major concern with regards to mining through the wetland areas at ATCOM East relates to the loss / destruction of the wetlands which are present within the footprint of the proposed opencast pit areas, and also the subsequent complete loss of the functions provided by these wetlands. The anticipated impacts on terrestrial and aquatic ecology as well as sensitive habitat types are also of importance.

Commitment will thus be required to be clearly manage the water from the wetlands on site so as not to impact negatively on water quality within the downstream environment. It is important to note that the wetlands and the riparian zones form part of the water resource and any development that impacts on the wetland or the riparian zones will only be permissible if authorised by a Water Use Licence under Section 21 of the National Water Act and in terms of NEMA.

This assessment illustrates that there are various potential negative and positive impacts that may arise as a result of mining through the wetland areas at ATCOM East Section which will have an effect on the following environmental components:

- Air quality;
- Terrestrial ecology;
- Aquatic ecology;
- Groundwater resources;
- Surface water resources;
- Wetlands;
- Social environment;
- Soils and land capability; and
- Visual aesthetics.

The proposed project will occur on an existing brownfields site which was previously disturbed. This will localise all impacts and minimise the footprint of the mine during their operations.

Should this project go ahead it will supply a significant number of jobs as well as good quality coal which will support the economy.

In conclusion, several mitigation measures have been proposed to minimise the anticipated environmental impacts together with an environmental monitoring programmeto monitor the effectiveness of these mitigation measures.

As is noted from the above section, the project will impact on a range of environmental components. The positive impacts of the project as well as the benefits of the project must be weighed up against the losses and negative impacts.

11. RECOMMENDATIONS

It is recommended that the proposed project being applied for, be approved by the MDEDET with the condition that all prescribed mitigation measures included in this report be implemented and adhered to at all times. Furthermore it is also suggested that where relevant the MDEDET stipulate any additional mitigation measures that they consider necessary as a condition in the Environmental Authorisation.

Additionally, this report should be utilised as supporting documentation to the Water Use Licence application to be considered for approval by the DWS.

Construction may not commence until Environmental Authorisation is received. Water use related activities as listed in the NWA may not be commenced until a Water Use Licence has been issued.

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APPENDIX A

EMPR

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APPENDIX B

SPECIALIST STUDIES

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APPENDIX C

PUBLIC PARTICIPATION

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OTHER

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