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**Draft Environmental Impact
Assessment Report**

Proposed 400kV Substation and Power
line for the ACWA Power Khanyisa IPP
Project, eMahlaheni, Mpumalanga
Province

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Document prepared by:

Aurecon South Africa (Pty) Ltd

Nelspruit
10 Nel Street
Nelspruit
1200

T 013 752 7055
F 013 753 2116
E anne-mari.white@aurecongroup.com
W www.aurecongroup.com

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Name	Anne-Mari White	Name	p.p. Barend Smit
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ABBREVIATIONS

ACC	Air Cooled Condenser
AOL	Anglo Operations Limited
AOLTC	Anglo American Thermal Coal
AEL	Air Emissions License
AHP	Analytical Hierarchy Process
AO	Anglo Operations
AQMP	Air Quality Management Plan
BID	Background Information Document
Capex	Capital Expenditure
CARA	Conservation of Agricultural Resources Act (No. 43 of 1983)
CCR	Carbon Capture Ready
CCS	Carbon Capture Storage
CFB	Circulating Fluidised Bed
CO ₂	Carbon Dioxide
CSLF	Carbon Sequestration Leadership Forum
CSP	Concentrated Solar Power
DEA	Department of Environmental Affairs
DEIR	Draft Environmental Impact Report
DMR	Department of Mineral Resources (formerly Department of Minerals and Energy)
DoE	Department of Energy
DSR	Draft Scoping Report
DSM	Demand Side Management
DR	District road
DWS	Department of Water and Sanitation (formerly the Department of Water Affairs and Forestry)
Dx	Distribution (in the electricity sector)
EAP	Environmental Assessment Practitioner
EAPSA	Environmental Assessment Practitioners of South Africa
ECA	Environment Conservation Act (No. 73 of 1989)

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ED	Electrodialysis
EDI	Electrodeionization
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EIR	Environmental Impact Report
EIUG	Energy Intensive User Group
ELM	Emalahleni Local Municipality
EMPr	Environmental Management Programme
EWRP	Emalahleni Water Reclamation Plant
EOI	Expression of Interest
EWT	Endangered Wildlife Trust
FBC	Fluidised bed combustion
FGD	Flue gas desulphurisation
FSR	Final Scoping Report
GA	General Authorisation in terms of the National Water Act (No. 36 of 1998)
GAR	Gross as received
GCS	Groundwater Consulting Services
GGP	Gross Geographic Product
GN	Government Notice
GW	Giga Watt
Gx	Generation (in the electricity sector)
ha	hectare
HIA	Heritage Impact Assessment
HSV	High Speed Voltage
HV	High Voltage
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEA	International Energy Agency
IEP	Integrated Energy Plan
IGCC	Integrated coal gasification combined cycle
IRP	Integrated Resource Plan

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ISEP	Integrated Strategic Electricity Planning
IWULA	Integrated Water Use License Application
JV	Joint Venture
KK	Kleinkopje
km	kilometre
kV	kilovolt
kWh	kilowatt hour
l	litre
LM	Local Municipality
m	metre
m ³	cubic metre
mamsl	metres above mean sea level
MCDA	Multi-criteria Decision Analysis
MDARDLEA	Mpumalanaga Department of Agriculture, Rural Development, Land and Environmental Affairs
MTPPP	Medium Term Power Purchase Programme
MHI	Major Hazardous Installation
MPa	Megapascals
MPRDA	Mineral and Petroleum Resources Development Act (No. 28 of 2002)
MR	Minimum Requirements for Waste Disposal by Landfill (DWAF, 1998b)
mt	million tons
MTS	Major Transmission Substation
MYPD2	Multi-year Price Determination (2)
MW	Megawatt
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:WA	The National Environmental Management: Waste Act (No. 59 of 2008)
NEM:AQA	The National Environmental Management: Air Quality Act (No. 39 of 2004)
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act (No. 25 of 1999)

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NO _x	Oxide of nitrogen
NWA	National Water Act (No 36 of 1998)
NWRS	National Water Resources Strategy
OEM	Original Equipment Manufacturer
OCGT	Open Cycle Gas Turbine
PAIA	Promotion of Access to Information Act (Act 2 of 2000)
PAJA	Promotion of Administrative Justice Act (Act 3 of 2000)
PGDS	Provincial Growth and Development Strategy
PM ₁₀	Particulates with a diameter of 10 µm or more
ppm	parts per million
pf	pulverised fuel
PPP	Public Participation Process
REFIT	Renewable Feed-in Tariff
RfQ	Request for Quotation
ROM	Run-of-mine
RSA	Republic of South Africa
SANBI	South African National Biodiversity Institute
SACE	South African Coal Estates
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard
SAM	Social Accounting Matrix
SIA	Social Impact Assessment
SCR	Selective Catalytic Reduction
SDF	Spatial Development Framework
SO ₂	Sulfur dioxide
SO _x	Oxide of sulfur
SoE	State-owned Enterprise
SSF	Sasol Synthetic Fuels
ToR	Terms of Reference
Tx	Transmission (in the electricity sector)
UCG	Underground Coal Gasification

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UNFCCC	United Nations Framework Convention on Climate Change
USD	United States of America Dollar
VIA	Visual Impact Assessment
WESSA	Wildlife and Environmental Society of South Africa
WMA	Water Management Area
WWTW	Wastewater treatment works
WTW	Water treatment works
ZAR	South African Rand
ZLED	Zero Liquid Effluent Discharge

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GLOSSARY OF TERMS

Airshed	Part of the atmosphere that behaves in a coherent way with respect to the dispersion of emissions. It typically forms an analytical or management unit and is also a geographic boundary for air quality standards
Base load	Electricity generated to meet the continuous need for electricity at any hour of the day or night at all times and during all seasons
Environment	The surroundings (biophysical, social and economic) within which humans exist and that are made up of <ol style="list-style-type: none"> i. the land, water and atmosphere of the earth; ii. micro organisms, plant and animal life; iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing
Environmental Impact Assessment (EIA)	A study of the environmental consequences of a proposed course of action.
Environmental Impact Report (EIR)	A report assessing the potential significant impacts as identified during the scoping phase.
Environmental impact	An environmental change caused by some human act
Peaking or peak load	Peaking refers to the periods between approximately 06:00 and 09:00 in the mornings and 18:00 and 21:00 in the evenings when electricity usage “peaks”
Public Participation Process	A process of involving the public in order to identify needs and address concerns, in order to contribute to more informed decision-making relating to a proposed project, programme or development
Mothballed	Withdrawn from service (used in reference to power stations).
Red Data Book (South African)	An inventory of rare, endangered, threatened or vulnerable species of South African plants and animals
Scoping	A procedure for determining the extent of and approach to an EIA, used to focus the EIA to ensure that only the significant issues and reasonable alternatives are examined in detail
Scoping Report	A report describing the issues identified during the scoping phase
Witbank	Former name of eMalahleni

1. INTRODUCTION

Anglo Operations (Pty) Ltd (AO) applied for an environmental authorisation for the coal-fired Khanyisa Power Station (hereinafter referred to as ACWA Power Khanyisa IPP Project) and associated infrastructure proposed near eMahlaheni in 2011 (see Figure 1.1). AO's goal was to procure its own dedicated supply for a portion of its electricity requirements via the Khanyisa Independent Power Producer (IPP) project. Such supply was aimed at increasing Anglo American's security of supply and limiting the impact of electricity price increases. A key motivator for the project is that electricity generating capacity in South Africa is expected to remain constrained for a number of years. An environmental authorisation (EA) for the 450 MW Khanyisa IPP Project was granted in October 2013.

AO has transferred all duties and responsibilities related to the Khanyisa IPP project to International Company for Water and Power Projects (hereafter referred to as Paverstar Trading 32). Paverstar Trading 32 is an Independent Power Producer (IPP) and will be bidding the ACWA Power Khanyisa IPP Project under the Department of Energy's Coal Baseload Programme. The aim will be for Paverstar to build, own, operate and decommission the power station. The power station will contribute to relieving the national/ Eskom generation capacity shortages. Paverstar Trading 32 proposes to increase the approved capacity from 450 MW to 600 MW and an amendment to the initial environmental authorisation for this increase in capacity has been granted by the Department of Environmental Affairs (DEA) under reference no. 12/12//20/2067AM1 on 28 July 2015.

It should be noted that the proposed substation and power line to evacuate the power from the power station does not form part of the Khanyisa IPP Project, but rather a self-build agreement between Paverstar Trading 32 and Eskom requires that the applicant undertakes the EIA process on behalf of Eskom. After construction, the ownership of the power lines and associated infrastructure will be handed over to Eskom. Although the power line and substation for the ACWA Power Khanyisa IPP project were authorised in the October 2013 authorisation referred to above, the position of the substation and the route of the power line have had to move due to Eskom's decision that the authorised connection is no longer

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feasible. The proposed new position and alignments are outside the area that was assessed for the initial authorisation. Hence, a new scoping and EIR process had to be started to authorise the amended substation and power line.

The regional project locality and conceptual positions of the power line and substation are shown respectively in Figure 1.1 and Figure 1.2 below.

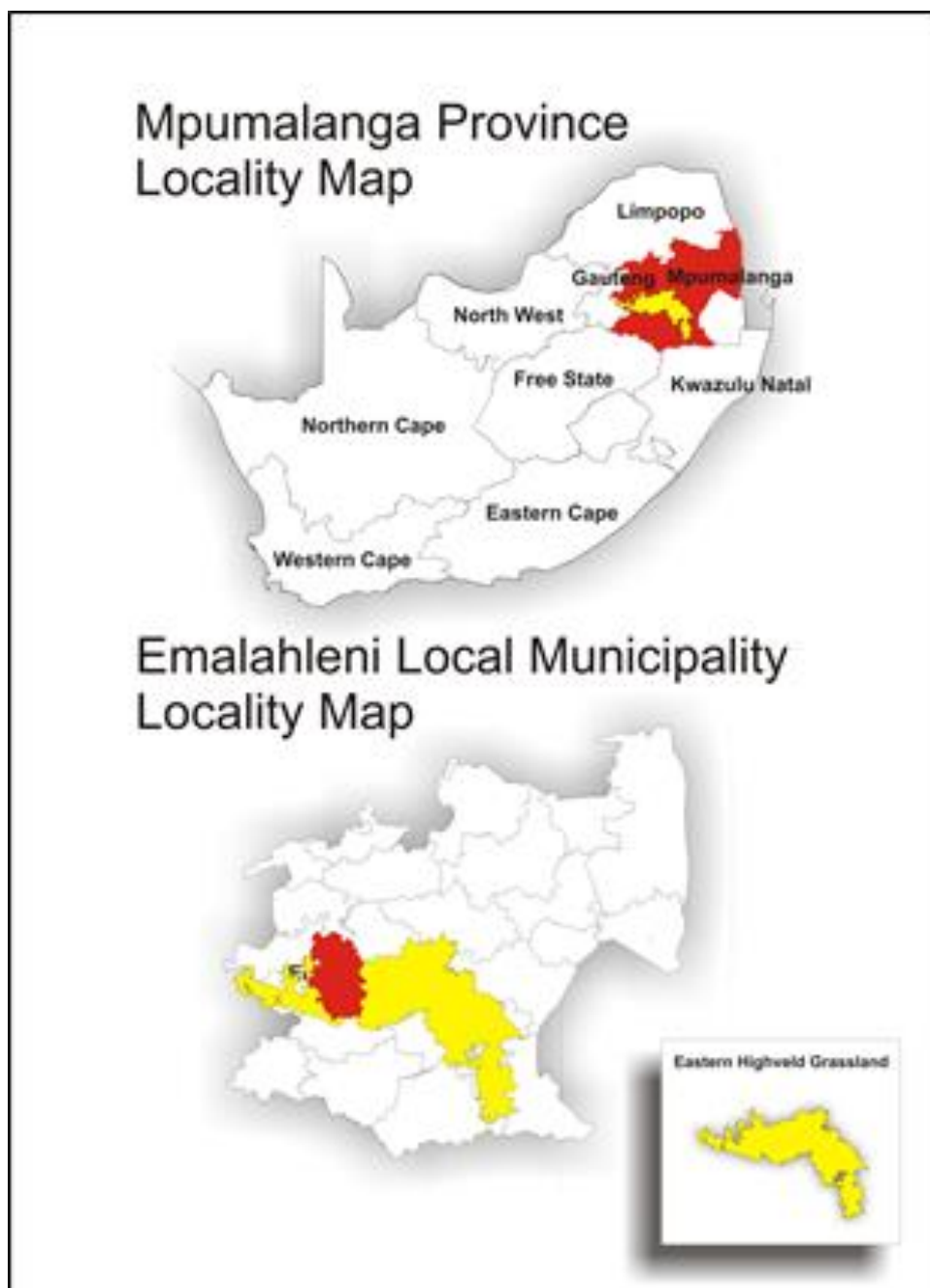


Figure 1.1: Project locality

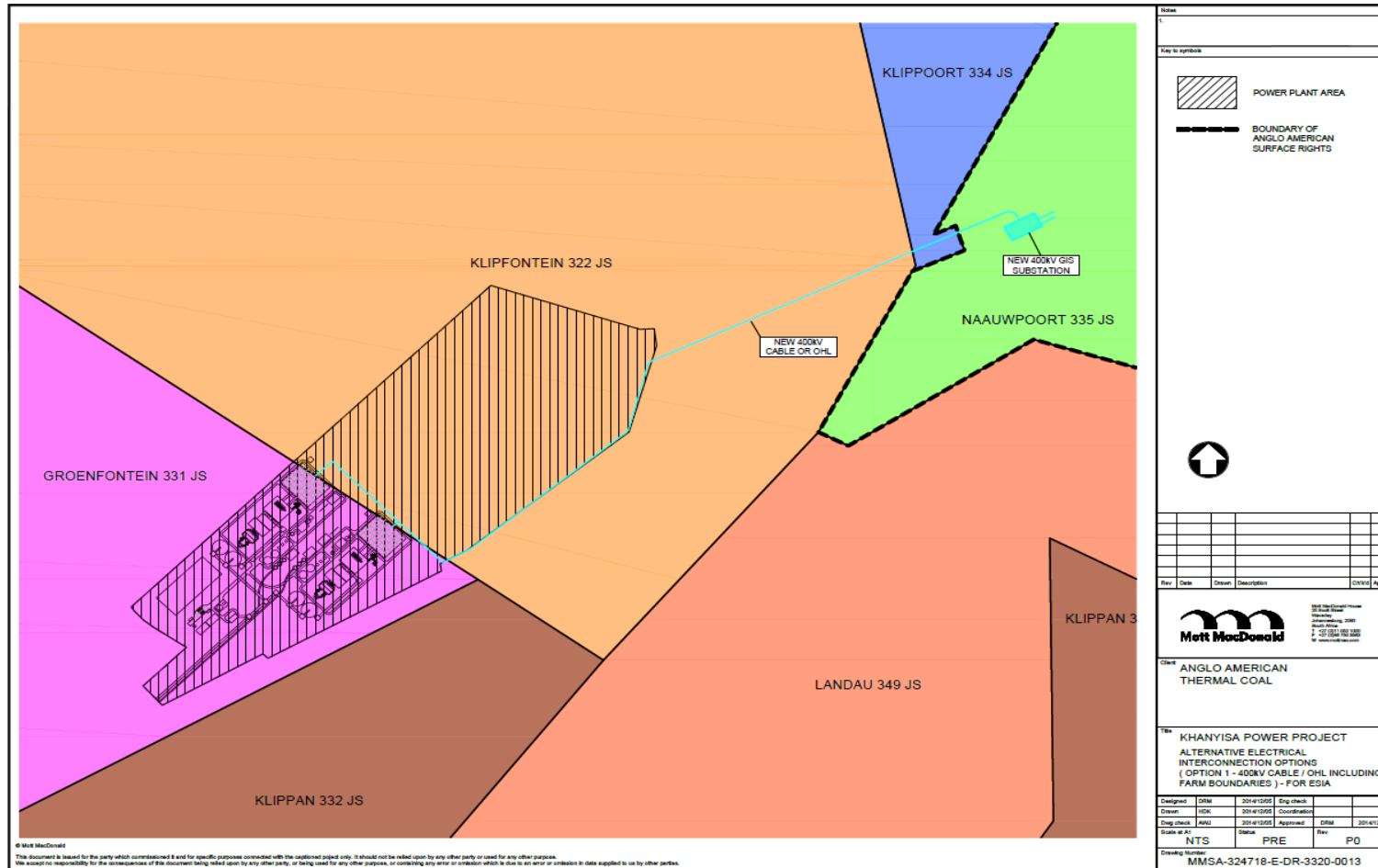


Figure 1.2: Locality map – 400kV Substation and Power line

**Khanyisa IPP Project: Substation & Power Line – Draft EIA
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Paverstar Trading 32 has appointed Aurecon to conduct the Environmental Impact Assessment (EIA) for the relocation of the substation and power line from the proposed ACWA Power Khanyisa IPP Project.

Mr. Barend Smit, who is the Project Director and Unit Manager for the Environmental Unit at Aurecon, has gained over 25 years' experience in the strategic management of environmental aspects relating to the construction of bulk water supply projects such as dams, pipelines and tunnels, but also relating to roads, industrial and residential developments, and recreation and tourism infrastructure. He gained extensive experience in leading, managing and conducting a range of environmental impact assessments, and the preparation and subsequent implementation of project specific environmental management plans. Mr Smit has also managed social impact studies in the course of his work, and has experience in liaison with local communities in project areas. He gained significant experience in the contractual aspects of implementing environmental management plans as part of larger construction projects, and the procurement of specialist services for impact assessments. In addition, he has undertaken landscape designs especially for rehabilitation of rock quarries, borrow pits and spoil dumps in relation to tunnels, dams and roads, in addition to purely aesthetic landscape design. He is experienced in working as part of consortiums or independent projects teams set up for large scale engineering projects. Mr. Smit is registered with the South African Council for the Landscape Architectural Profession (SACLAP) as a Professional Landscap Architect.

Reuben Heydenrych, who will be reviewing the project, has been involved in Environmental Impact Assessment (EIA) processes in South Africa and in various other African countries, as required by relevant national legislation and in terms of international requirements as EIA team leader and team member. These projects have included exemptions, scoping, and full EIAs for projects such as power generation, transmission and distribution, rezoning, filling stations, water and sewage pipelines, roads (national, provincial and municipal), residential developments, game lodges, telecommunications structures, mines, infrastructure in sensitive environments and industrial processes. Reuben obtained a Masters in Philosophy: Environmental Management from the University of Cape Town (UCT), South Africa in 1993 and a Bachelors' Degree in Landscape Architecture from the University of Pretoria, South

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Africa, in 1991. Reuben is registered as a professional landscape architect with the South African Council for the Landscape Architectural Profession (SACLAP).

The EIA process and coordination of the EIA process will be managed by Anne-Mari White, an environmental project leader with Aurecon. She will also provide overall project management (including client liaison, financial management and progress reporting). Anne-Mari is an Environmental Specialist, who started her studies at the University of Northwest and completed her BSc (Environmental Management) degree at the University of South-Africa (UNISA) in 2007. Anne-Mari is also registered with the South African Council for Natural Scientific Professions as a Certificated Natural Scientist (Reg No 300067/15). In addition to her qualification, she has done short courses in soil classifications and wetland delineations (Terrasoil Science), Geographic Information Systems (University of KwaZulu-Natal) as well as Environmental Impact Assessments (University of Northwest).

1.2. Policy, Legal and Administrative Framework

1.2.1. EIA requirements

The National Environmental Management Act (No. 107 of 1998) (NEMA), amongst other things, regulates the procedure and criteria as contemplated in Chapter 5 of NEMA relating to the submission, processing and consideration of, and decision on, applications for environmental authorisations for the commencement of activities in order to avoid detrimental impacts on the environment, or where it cannot be avoided, ensure mitigation and management of impacts to acceptable levels, and to optimise positive environmental impacts, and for matters pertaining thereto.

Paverstar Trading 32 has the responsibility to ensure that the proposed activity and EIA process conform to the principles¹ of NEMA. In developing the EIA process, Aurecon has been cognisant of this need, and accordingly the EIA process has been undertaken in terms of NEMA and the EIA Regulations promulgated in December 2014 (GN R No. 982 to 985 of 2014).

¹ NEMA Principles, Chapter 1, Sections 1-4

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The EIA regulations identify certain activities that require authorisation from the competent environmental authority (in this case DEA) before commencing. Listed activities in Government Notice (GN) No. 984 of 2014 require a Scoping and EIR process whilst those in GN R 983 and 985 of 2014 require a BA (unless they are being assessed under a full EIA process). The activities being applied for in this EIA process are listed in **Table 1**.

Table 1.1: Listed activities in terms of NEMA GN No. 984 of 2014

NO.:	Listed Activity:	Relevant to:
R984 of 2014, Activity 9	The development of facilities or infrastructure for the transmission and distribution of electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex	Construction of the substation and 400kV power line on an area not assessed during the initial EIA process for the power station.
R985 of 2015, Activity 12	The clearance of an area of 300 m ² or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance plan. (c) In Mpumalanga: i. Within any critical endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans;	Construction of the substation and 400kV power line are proposed within a critical biodiversity area as identified in bioregional plans for the Mpumalanga Province.

1.2.2. Other authorisations

Application to the DEA for Environmental Authorisation in terms of NEMA does not absolve the applicant from complying with other legal requirements. In this regard the following national and provincial legislation may apply and is considered in the assessment process:

- Electricity Regulation, 2006 (Act No. 4 of 2006);
- National Water Act, 1998 (Act No. 36 of 1998);
- Road Ordinance 22 of 1957;
- Promotion of Access to Information Act, 2000 (Act No. 2 of 2000);
- National Heritage Resources Act, 1999 (Act No. 25 of 1999);
- National Forests Act, 1998 (Act No. 84 of 1998); and
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

1.2.3. Water Use License requirements

A wetland is located within 500 m of the area proposed for the substation and for this reason a Water Use License Application (WULA) must also be submitted to the Department of Water Affairs and Sanitation (DWS) for approval. According to Section 21 of the National Water Act (Act No. 36, of 1998), the following activities will apply due to the location of the substation within less than 100m of a wetland. It is to be noted that the substation will not impede directly on this wetland, but that regulations under this Act require a WULA if a development occurs in a radius of less than 500m of a watercourse, which is defined to include a wetland:

21 (c): Impeding or diverting the flow of water;

21 (i): Altering the bed, banks, course or characteristics of a watercourse.

1.2.4. International Finance Corporation Performance Standards

The IFC has defined a set of Performance Standards on Social and Environmental Sustainability. The Performance Standards likely to be triggered by the project are listed below and the applicant must also comply with these Performance Standards:

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- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
- Performance Standard 2: Labor and Working Conditions
- Performance Standard 3: Resource Efficiency and Pollution Prevention
- Performance Standard 4: Community Health, Safety, and Security
- Performance Standard 5: Land Acquisition and Involuntary Resettlement
- Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management
- Performance Standard 7: Indigenous Peoples
- Performance Standard 8: Cultural Heritage

1.3. The Project

1.3.1. Need and Desirability

As electricity supply in South Africa has been under immense strain since 2008, load shedding was implemented to stabilise the electricity system when the energy capacity is not sufficient. The Department of Energy has embarked upon various initiatives to alleviate the current electricity supply constraints to secure the provision of electricity into the future. One of these initiatives is the procurement of electricity from Independent Power Producers (IPPs). Hence, an agreement will be signed between Paverstar Trading and the Department of Energy, upon receiving the preferred bidder status, that the electricity generated by the Khanyisa Power Station will be fed back into the national grid. The 400kV substation and transmission lines are essential in order to fulfill this requirement. Eskom reconsidered the connection option after the 2013 environmental authorisation, and advised that the authorised option was no longer feasible. For this reason an application has been made to relocate this substation to an alternative area.

1.3.2. Description of the Project

The project essentially comprises the construction of a 400kV substation and power line connecting the ACWA Power Khanyisa IPP Project to the national grid.

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1.3.3. Project Location

The proposed substation is proposed approximately 2.5km north-east of the approved ACWA Power Khanyisa Power Station on portion 51 of the farm Naauwpoort 335 JS. The 400kV power lines will traverse three properties before it reaches the Khanyisa Power Station south-west of the proposed substation location area. The power line will traverse the following three farms:

- The Remaining Extent (T0JS00000000033400000) of the Farm **Klippoort 334 JS**;
- **Portion 49** (T0JS00000000033500049) and **51** (T0JS00000000033500051) of the Farm **Naauwpoort 335 JS**;
- **Portion 1** (T0JS00000000032200001) and **27** (T0JS00000000032200027) of the Farm **Klipfontein 322 JS**.

Coordinates of the substation:

South-eastern corner:	25° 57' 46.32" S
	29° 14' 48.26" E
North-eastern corner:	25° 57' 42.71" S
	29° 14' 49.95" E
Northern corner:	25° 57' 38.44" S
	29° 14' 48.16" E
Western corner:	25° 57' 41.20" S
	29° 14' 41.51" E

Coordinates of the power line:

Start of linear activity:	25° 57' 38.38" S
	29° 14' 48.89" E
Middle of linear activity:	25° 57' 54.92" S
	29° 14' 11.40" E
End of linear activity:	25° 58' 12.55" S
	29° 13' 37.84" E

2. THE PUBLIC PARTICIPATION PROCESS

The purpose of this chapter is to provide an outline of the public participation process (PPP) to date and the way forward with respect to the EA amendment process.

Engagement and consultation with Interested and Affected Parties (I&APs) forms an integral component of the EA amendment process and enables, *inter alia*, potentially directly affected landowners, neighbouring landowners and communities, authorities and key stakeholders to provide input into the proposed amendment.

I&APs were identified during the EIA phase of the project prior to its authorisation in 2013. The registered I&APs who were involved during the previous EIA process and in currently pending application for amendment of the environmental authorisation have been informed of the environmental application for the substation and power line by means of the following methods:

- Distributing the Background Information Document to all registered I&APs (either by post or email);
- Placing a site notice at the proposed site (see Annexure B); and
- Placing a newspaper advert in the Middelburg Observer and Witbank News on 22 May 2015.

The registered I&AP list is attached as Annexure C.3.

The draft Scoping Report was made available for review to all I&AP's from 15 July 2015. I&APs were given until 14 August 2015 to provide the Aurecon with comments. The only comments received were from the South African Heritage Resources Agency (SAHRA), which requested that a palaeontological study be conducted for the project.

3. CONSIDERATION OF ALTERNATIVES

Site selection is a complicated and multi-faceted issue, which is essential to the success of this application and ultimately to the proper, responsible and sustainable operation of the proposed project.

Substation positions and power line route in this area are complicated due to the fact that much of the area has rights for underground coal mining. The available land is constrained by both undermined areas, where construction is not permitted, and areas earmarked for future mining.

This is the reason, for instance, why a related amendment application was brought to change the authorised route for the access road to Khanyisa IPP Project: although the route had been authorised in 2013, it needed to be changed because coal reserves underneath the proposed route still needs to be mined. This context needs to be understood when the limited number of alternatives for the position of the substation is considered: very few technically feasible alternative positions that are not affected by potential future underground mining are available.

3.1. Site Location Alternatives

Two alternatives were identified and investigated by the applicant for the proposed 400kV substation and power line:

3.1.1. Alternative 1: 132 kV power line to Kleinkopje Substation

Alternative 1 involves a 132kV power line connecting the Khanyisa IPP Project with the existing 132kV Kleinkopje Substation located on the Farm Kleinkopje 115 IS. This substation is located approximately 7km west of the approved Khanyisa IPP Project (**Figure 3.1**).

This alternative was investigated during the prefeasibility phase of the project and it was found that transmitting the electricity to a 132kV Substation and Power line will

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result in unacceptable loss of electricity. For this reason it was found that the 132kV substation and power line will not be further assessed as they are not feasible.

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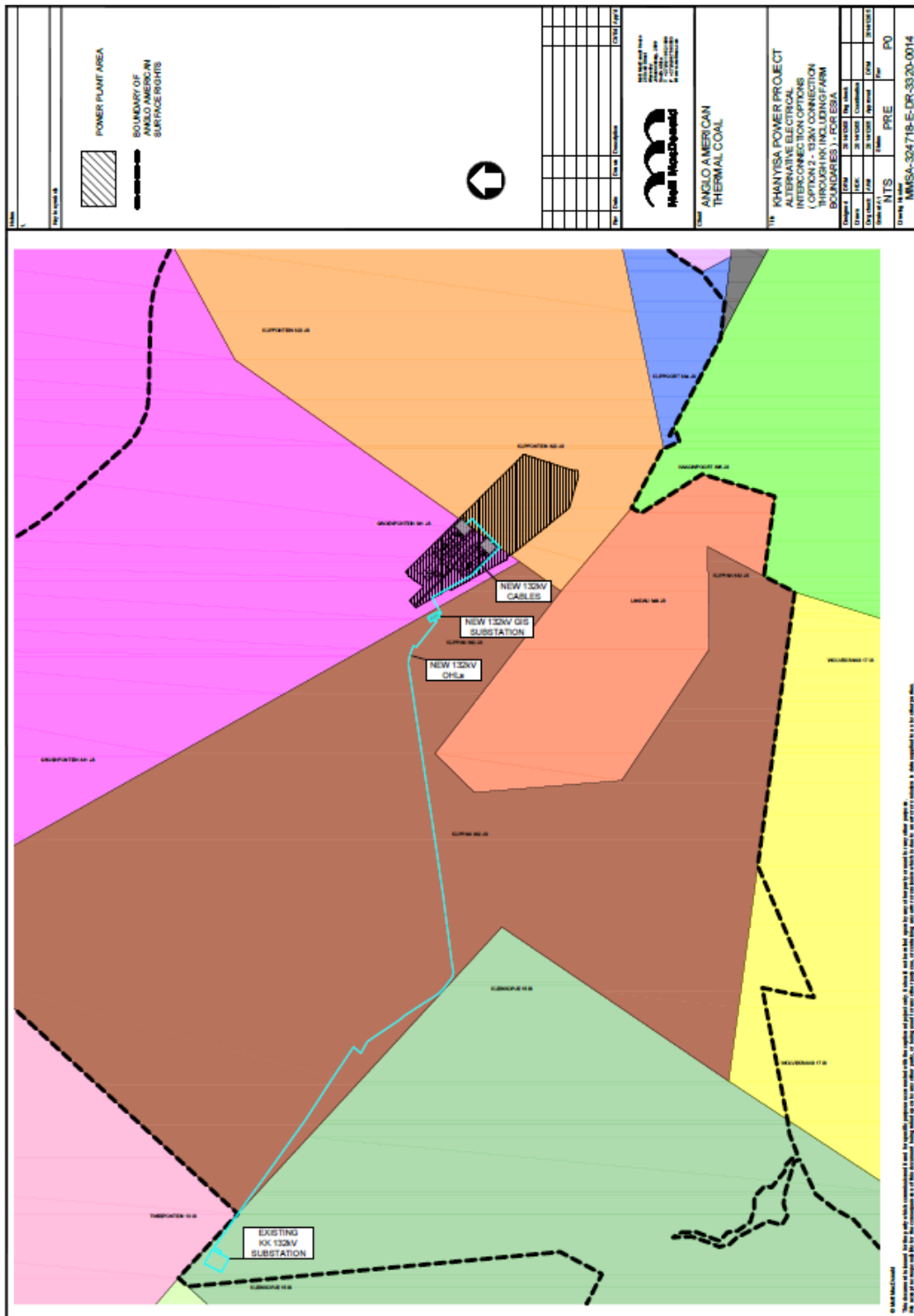


Figure 3.1: Alternative 1 – Kleinkopje substation

3.1.2. Alternative 2: 400 kV power line to Naauwpoort

This alternative involves the establishment of a 400kV substation approximately 2km north-east of the approved Khanyisa IPP Project on portion 51 of the Farm Naauwpoort 335 JS. This substation is proposed to connect to the Khanyisa IPP Project through a 400kV power line. This alternative is illustrated in **Figure 1.2** and is technically preferred, as well as being much shorter than Alternative 1.

3.2. No – Go Alternative

The 'no-go' alternative is the option of not constructing the substation and power line at the proposed location. As described earlier in the report, the substation has already been approved, but the authorised location is no longer feasible for Eskom. Should the relocation not be approved, the ACWA Power Khanyisa IPP Project will not be able to feed electricity into the national grid as per Eskom's requirement, which would defeat the object of constructing the power station. Provided that no fatal flaws relating to the substation and power line are discovered in the course of this Scoping and EIR process, the no-go alternative is not a feasible alternative in this instance.

Considering the highly degraded state of the environment in the proposed project area, due to coal mining over several decades, it is unlikely that an environmental fatal flaw would be discovered to make the no-go alternative the preferred alternative. Furthermore, due to the nature of a power line (pylons with a limited footprint carrying conductors which do not touch the ground), it would cause very limited transformation of the area that it traverses. The only (very limited) transformation would be around the footprints of the pylons. The conductors would not affect terrestrial ecology in any way, although they could have an impact on birds. The greatest source of impact the project could have is from the substation, as this would be the only bit of infrastructure that would completely transform its footprint.

4. DESCRIPTION OF THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The description of the affected environment given below draws on existing knowledge from published data, previous studies, specialist investigations, and site visits to the area. The identification of potential impacts is broad. In cases where there is currently inadequate published information, a specialist assessment has been completed.

4.1. Receiving Environment

4.1.1. Topography

The landscape is characterised by slightly undulating plains, including some low hills and pan depressions. The terrain is dominated by level to gently undulating plains with limited relief at tributaries of the Olifants River. The altitude range is 1,540 – 1,560 mamsl.

4.1.2. Climate

The region has strongly seasonal summer-rainfall, with very dry and cold winters, with mean annual precipitation of 650 – 900mm. During the winter months the average temperatures vary between a minimum of 1⁰C and a maximum of 16⁰C. During the summer months average minimum and maximum temperatures of 13⁰C and 25⁰C respectively can be expected.

4.1.3. Geology and Soils

The regional geology of the study area is dominated by Ecca Group arenite, shale and coal of the Vryheid Formation. The overburden at the adjacent Klipkopje Colliery was found to be mostly sandstone, siltstone and shale. While dolerite intrusions are present just below the surface, there are no outcrops within the study area (Oryx Environmental, 2003).

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The study area falls within Ba4 landtype, which is a plinthic catena in which upland duplex and marginalitic soils are rare. Red, yellow and greyish soils with low to medium base status are dominant.

The current land-use pattern on site is predominantly cultivation (temporary, dryland) and mining (surface-based), with scattered patches of degraded, unimproved grassland, waterbodies, wetlands and plantations. This has resulted in a historic disturbance, albeit minimal, to the soil horizons and structure.

4.1.4. Vegetation

The study area falls within the Grassland Biome and more specifically the Eastern Highveld Grassland vegetation type. In its natural undisturbed state the vegetation is short dense grassland dominated by the usual Highveld grass composition with small, scattered rocky outcrops with wiry, sour grasses and some woody species.

This form of grassland can be found in both Mpumalanga and Gauteng Provinces, located on the plains between Belfast in the east and the eastern side of Johannesburg in the west and extending southwards to Bethal, Ermelo and west of Piet Retief. It occurs at an altitude 1520 – 1780 m, but also as low as 1300 m. Site-specific vegetation communities were identified by ECOREX Consulting Ecologists CC, during various field trips (Refer to Figure 6.1) and are described as follows:

- *Fuirena-Helichrysum* Wetland;
- *Seriphium-Imperata* Secondary Grassland;
- *Themeda-Tristachya* Untransformed Grassland;
- Transformed Grassland; and
- Transformed.

In pristine condition *Aristida*, *Digitaria*, *Eragrostis*, *Themeda* and *Tristachya* grass species dominate. The tree species *Acacia caffra*, *Celtis africana*, *Diospyros lycoides* subsp. *lycoides*, *Parinari capensis*, *Protea caffra* and shrubs / forbs *P. welwitschii* and *Rhus magalismsontanum* are also found.

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Broad vegetation communities were identified using Google Earth™ satellite imagery, and extent of transformation or degradation was assessed in order to determine representivity of vegetation types. The vegetation community boundaries were ground-truthed during fieldwork in order to confirm current position. Potentially occurring plant species of conservation concern were derived from species lists for the quarter-degree grids 2529CC and 2629AA in the SANBI Plants of South Africa database (POSA), and from the PlantDat threatened species database of the MTPA. Likelihood of occurrence of these species was determined through personal field experience of those species and reference to individual accounts in Raimondo et al. (2009). From this background, the species of conservation concern listed in Table 4.1 were identified as potentially being present on the site.

Table 4.1: Plant species of conservation concern potentially occurring in the study area

Species	Red Data Status	Growth Form	Habitat	Likelihood	Reason
<i>Crinum bulbispermum</i>	Declining	Geophyte	Along rivers or streams, wetlands	Moderate	Limited habitat present
<i>Crinum macowanii</i>	Declining	Geophyte	Grassland	High	Much habitat present
<i>Pachycarpus suaveolens</i>	Vulnerable	Herb	Grassland	Unlikely	No habitat present
<i>Ilex mitis var. mitis</i>	Declining	Tree	Riverine forest	Unlikely	No habitat present
<i>Callilepis leptophylla</i>	Declining	Herb	Grassland	Confirmed	
<i>Eucomis autumnalis subsp. clavata</i>	Declining	Geophyte	Grassland, wetlands	Moderate	Limited habitat present
<i>Hypoxis hemerocallidea</i>	Declining	Geophyte	Grassland, wetland edge, open woodland	Moderate	Limited habitat present
<i>Frithia humilis</i>	Vulnerable	Succulent	Flat sandstone sheets with shallow beds of fine sand	Unlikely	No habitat present
<i>Pavetta zeyheri subsp. middelburgensis</i>	Vulnerable	Shrub	Wooded rocky outcrops	Unlikely	No habitat present
<i>Encephalartos lanatus</i>	Vulnerable	Shrub	Rocky hill slopes along major river valleys	Unlikely	No habitat present
<i>Encephalartos middelburgensis</i>	Critically Endangered	Tree	Rocky hill slopes along major river valleys	Unlikely	No habitat present

4.1.5. Mpumalanga Biodiversity Conservation Plan

The Mpumalanga Biodiversity Conservation Plan (MBCP) (Ferrar & Lötter, 2009) is a spatial assessment of the conservation value of land in Mpumalanga and a decision support tool to assist planners and decision makers in sustainable land-use planning. The MBCP is regarded as the foundation for a provincial Biodiversity Conservation Strategy, as required by law. Mpumalanga's biodiversity has been ranked into six categories by the MBCP. The first four categories (protected areas, irreplaceable areas, and highly significant areas, important & necessary areas) are not considered to be available for development via EIA but should be managed as living landscapes, whereas the last two categories (areas of least concern and areas with no natural habitat remaining) are considered available for development via EIA.

Much of the general vicinity of the study areas has been classified as least concern or no natural habitat remaining, because of high levels of habitat transformation and fragmentation. Areas of natural grassland have been classified as “*Important*” and “*Necessary*”, including those grasslands within the study area.

Guidelines for each MBCP category are given to assist planners and decision-makers. The land-use guidelines for *Important* and *Necessary* areas allow for restricted industrial development (which would include power plants) and restricted linear engineering structures, but not surface mining or dumping.

4.1.6. Economic Uses

These soils are excellent for agronomy, and extensive areas are cultivated for maize and other crops. In its natural state it is intensively grazed by cattle and sheep. The actual proposed development site has been transformed and is currently used for both agriculture and mining.

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5. CONSTRUCTION AND OPERATIONAL PHASE IMPACTS

5.1. Method of assessing the significance of the potential environmental impacts

This section outlines the proposed method for assessing the significance of the potential environmental impacts outlined above. As indicated, these include both operational and construction phase impacts as well as the impacts assessed by the specialists.

For each impact, the EXTENT (spatial scale), MAGNITUDE and DURATION (time scale) would be described. These criteria would be used to ascertain the SIGNIFICANCE of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The mitigation described in the EIR would represent the full range of plausible and pragmatic measures but does not necessarily imply that they would be implemented.²

The tables on the following pages show the scale used to assess these variables, and defines each of the rating categories.

Table 5.1: Assessment criteria for the evaluation of impacts

CRITERIA	CATEGORY	DESCRIPTION
Extent or spatial influence of impact	Regional	Beyond a 30 km radius of the candidate site.
	Local	Within a 30 km radius of the candidate site.
	Site specific	On site or within 100 m of the candidate site.
Magnitude of impact (at the indicated spatial scale)	High	Natural and/ or social functions and/ or processes are <i>severely</i> altered
	Medium	Natural and/ or social functions and/ or processes are <i>notably</i> altered

² The applicant will be requested to indicate at the Draft EIR stage which alternative and mitigation measures they are prepared to implement.

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CRITERIA	CATEGORY	DESCRIPTION
	Low	Natural and/ or social functions and/ or processes are <i>slightly</i> altered
	Very Low	Natural and/ or social functions and/ or processes are <i>negligibly</i> altered
	Zero	Natural and/ or social functions and/ or processes remain <i>unaltered</i>

CRITERIA	CATEGORY	DESCRIPTION
Duration of impact	Construction period	Up to 3 years
	Medium Term	Up to 5 years after construction
	Long Term	More than 10 years after construction

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. The means of arriving at the different significance ratings is explained in Error! Reference source not found..

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Table 5.2: Definition of significance ratings

SIGNIFICANCE RATINGS	LEVEL OF CRITERIA REQUIRED
High	<ul style="list-style-type: none"> • High magnitude with a regional extent and long term duration • High magnitude with either a regional extent and medium term duration or a local extent and long term duration • Medium magnitude with a regional extent and long term duration
Medium	<ul style="list-style-type: none"> • High magnitude with a local extent and medium term duration • High magnitude with a regional extent and construction period or a site-specific extent and long term duration • High magnitude with either a local extent and construction period duration or a site specific extent and medium term duration • Medium magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Low magnitude with a regional extent and long term duration
Low	<ul style="list-style-type: none"> • High magnitude with a site-specific extent and construction period duration • Medium magnitude with a site specific extent and construction period duration • Low magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Very low magnitude with a regional extent and long term duration
Very low	<ul style="list-style-type: none"> • Low magnitude with a site-specific extent and construction period duration • Very low magnitude with any combination of extent and duration except regional and long term
Neutral	<ul style="list-style-type: none"> • Zero magnitude with any combination of extent and duration

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Once the significance of an impact has been determined, the PROBABILITY and CONFIDENCE of this impact would be determined using the rating systems outlined in Error! Reference source not found. and Error! Reference source not found. respectively. It is important to note that the significance of an impact should always be considered in concert with the probability of that impact occurring. Lastly, the REVERSIBILITY of the impact is estimated using the rating system outlined in Error! Reference source not found..

Table 5.3: Definition of probability ratings

PROBABILITY RATINGS	CRITERIA
Definite	Estimated greater than 95 % chance of the impact occurring.
Probable	Estimated 5 to 95 % chance of the impact occurring.
Unlikely	Estimated less than 5 % chance of the impact occurring.

Table 5.4: Definition of confidence ratings

CONFIDENCE RATINGS	CRITERIA
Certain	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact.
Sure	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.
Unsure	Limited useful information on and understanding of the environmental factors potentially influencing this impact.

Table 5.5: Definition of reversibility ratings

REVERSIBILITY RATINGS	CRITERIA
Irreversible	The activity will lead to an impact that is in all practical terms permanent.

Reversible	The impact is reversible within 2 years after the cause of the impact is removed.
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5.2. Assessment of construction phase impacts

The construction phase of the substation and power line are likely to result in a number of negative impacts on the biophysical and the social environment. These could potentially include:

5.2.1. Biophysical Impacts

The negative impacts associated with the biophysical environment includes:

- Ecological Impact;
- Sedimentation and erosion of the wetland adjacent to the substation;
- Potential pollution of water resource;
- Potential spillage of hazardous substances;
- Increased risk of fire;
- Dust impacts; and

The construction impacts and cumulative impacts on the biophysical and socio-economic environment have been assessed, and are described below. A framework EMPr has been compiled and attached to the Draft EIR to provide mitigation and ascribe responsibilities for the construction phase impacts.

5.2.1.1. Disturbance of Flora and Fauna

Description of the Environment

The vegetation type present on site can be classified as the Mesic Highveld Grasslands. This vegetation type is made up of highly productive sourveld grasslands characterised by long-lived grasses that favour re-sprouting. These grasslands are adapted to a climate characterised by high summer rainfall (700 – 1200mm per annum), combined with warm summer temperatures and cool to cold winters with a moderate incidence of frost.

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It is clear from Google Earth™ images for the period from 2001 to 2015 that land-use and changes in the vicinity of the substation project footprint over the last 14 years, have been associated with agricultural activity and surface mining. These activities support the classification of the immediate area around the substation project footprint by MTPA (2014) as predominantly Moderately to Heavily Modified. The footprint of the Khanyisa Substation is characterised by Transformed Forestry (Black Wattle, *Acacia mearnsii*) (9.15ha for the total footprint) along its northern border adjacent to the tarred road, Secondary Grassland (5.51ha) in the footprint itself and a wetland to the south (9.9ha). The footprint of the powerline is significantly transformed by anthropogenic activity and is represented by degraded secondary grassland (18.45h), an area transformed by mining activity (5.38ha) and transformed forestry (Black Wattle, *Acacia mearnsii* and Saligna Gum, *Eucalyptus grandis*) (a total of 9.15ha). Given the above and the classification of the substation project footprint by MTPA (2014) predominantly as Moderately Modified (old lands) (67.66ha), Other Natural Areas (total area in the region of 434.842ha) and CBA Optimal (a total area in the region of 965.467ha), the footprint, from the point of view of Present Ecological Status (PES) may be described as being Moderately Modified, where a loss and change in habitats, biota and ecosystems has occurred. According to the MTPA database for conservation important biota, 14 species of conservation-important plants may potentially occur on the site, but given the Moderate to Highly modified status of the terrestrial ecosystems along the proposed power line, the probability of occurrence can be described as improbable (less than 10%). There is a possibility that the Common Pineapple Lily (*Eucomis autumnalis*) may be found in the CBA Optimal section of the water pipeline footprint and *Callilepis leptophylla* in the Other Natural Areas section. It is also possible that the River Lily (*Crinum macowanii*) and Orange River Lily (*Crinum bulbispermum*) may be found in the CBA Optimal section of the footprint. However, the ecological site investigations have not found any of these species in these locations.

The ecological sensitivity varies along the substation project footprint, from Medium-Low for the wetland adjacent and to the south of the substation area, Medium for the substation area itself and Very low to Medium along the linear footprint for the 400kV powerline in a westerly direction from the substation. Hence, depending on the position along the footprint for the substation project, ecological functioning varies from Moderately to Seriously and Irreversibly Modified.

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Impact Assessment

The construction of the substation and power line may have the following ecological impacts:

- Further deterioration of the degraded secondary grasslands and CBA Optimal along the substation footprint and loss of conservation important species;
- Further deterioration of the seepage wetland area;
- Loss of habitat for conservation-important fauna (mammals, birds, reptiles, amphibians);
- Disruption to the life-history cycle of conservation important fauna; and
- Disruption to fauna due to construction activities.

Most of the area along the power line route, as indicated above, is already degraded due to agricultural and anthropogenic activities. The impact in this area is therefore of low significance before the implementation of any mitigation measures.

As the ecological sensitivity is medium on the area where the substation is proposed, the significance of the ecological impact near the identified wetland area can be regarded as medium after the implementation of mitigation measures.

Taking the entire project area into account, the ecological significance has been given a medium rating before mitigation and low after mitigation.

Ref		No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE	
Nr.	Potential impact	Site					
Construction Phase							
1	Ecological Impact	Proposed	No mitigation	medium	Site specific	Short Term	Medium
		Proposed	Mitigation	Low	Site Specific	Short Term	Low
		No-go alternative	No mitigation	Zero	Site Specific	Short Term	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Short Term	Neutral

Mitigation Measures

- It is recommended that the Black Wattle trees along the northern border of the footprint be removed.
- An ecological walk though must be undertaken during the summer to identify any plants of conservation importance to be replanted.
- An alien plant control programme must be implemented.

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Cumulative Impact

The grassland is already degraded and further construction activities will cause a further deterioration of the grassland along the substation and power line.

5.2.1.2. Sedimentation and erosion of the wetland

Description of the Environment

The sediment loads of any drainage depressions and wetlands or pans may increase due to the excavations on the site, and other construction-related activities. This would be exacerbated during the wet season and during intense rainfall events. A wetland is located 250m east of the proposed site for the substation. The construction of the substation and power line could cause erosion and sedimentation of the wetland. A wetland assessment (see Annexure D4) was conducted to delineate the wetland area and propose mitigation measures to minimise the impact on the wetland.

Impact Assessment

The power line does not affect any of the wetland areas identified as the power line is located outside the 32m buffer area. The majority of the area proposed for the substation is also located outside of the 32m buffer area and therefore the significance of the impact is regarded as low before mitigation and very low after mitigation.

Ref	Potential impact	Site	No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
2	Sedimentation and Erosion	Proposed	No mitigation	Medium	Local	Construction	Low
		Proposed	Mitigation	Low	Local	Construction	Very low
		No-go alternative	No Mitigation	Zero	Local	Construction	Neutral
		No-go alternative	Mitigation	Zero	Local	Construction	Neutral

Mitigation Measures

- The construction of the 400kV substation must take place outside of the 32m wetland buffer area.
- The construction phase must limit the loss of loose sediment into the wetland areas.
- All vehicles and personnel must be kept out of the wetland area.

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- Any disturbed area must be rehabilitated immediately after the construction of the 400kV substation.

Cumulative Impact

The dam and wetland area above the dam have been affected by sediment load washed into the wetland from adjacent opencast mining rehabilitation. The construction work in close proximity to the wetland area could add to the sediment load that is already evident within the wetland area.

5.2.1.3. Potential pollution of water resource

Description of the Environment

The proposed substation falls within 250m of the seepage wetland and for this reason construction activities might have an impact on the wetland if these activities aren't appropriately mitigated.

The wetland assessment (Annexure D4) indicated that the 9.9ha seepage wetland has been affected by a dam, dirt roads, mining rehabilitation, furrows, overgrazing, firebreaks and agricultural activities. The shallow dam creates a permanent wetland zone covered by Bullrush (*Typha capensis*). The dam and wetland area above the dam have been affected by sediment load washed into the wetland from adjacent opencast mining rehabilitation. The same rehabilitation has covered some of the seepage wetland area and immediate catchment area of the wetland. Furrows have been dug into the wetland above and below the dam, draining the wetland areas. Firebreaks have been ploughed through the seasonal and temporary wetland areas surrounding the wetland. Dirt roads have been built through the wetland area. The wetland area is heavily grazed and some areas are used for hay bailing. The catchment of the wetland has been transformed in some areas by opencast mining and subsequent rehabilitation.

Impact Assessment

Although the wetland was found to be of very low ecological importance and sensitivity due to anthropogenic activities, wetlands still play an important role in flood attenuation as they store water and release water during dry periods. The possibility of water pollution is increased with construction activities taking place in close proximity to the wetland and for this reason the

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impact is of medium significance before the implementation of any mitigation measures and low after mitigation.

Ref			No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
Nr.	Potential impact	Site					
3	Potential pollution of water resource	Proposed	No mitigation	High	Local	Construction	Medium
		Proposed	Mitigation	Medium	Local	Construction	Low
		No-go alternative	No mitigation	Zero	Local	Construction	Neutral
		No-go alternative	Mitigation	Zero	Local	Construction	Neutral

Mitigation Measures

All hazardous substances and material must be located as far as possible from the wetland area.

Cumulative Impact

No cumulative impact

5.2.1.4. Potential spillage of hazardous substances

Description of the Environment

Various hazardous substances are likely to be used and stored on any construction site. These substances include amongst other things, diesel, curing compounds, shutter oil and cement. Utilisation of such substances in close proximity to the aquatic environment such as wetlands or pans is of greater concern than when used in a terrestrial environment.

Impact Assessment

Construction activities and vehicles on site could potentially cause hazardous substances to spill and for this reason the significance of this impact is seen as medium before the implantation of any mitigation and low after mitigation.

Ref			No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
Nr.	Potential impact	Site					
4	Spillage of hazardous substances	Proposed	No mitigation	Medium	Local	Medium Term	Medium
		Proposed	Mitigation	Low	Local	Medium Term	Low
		No-go alternative	No mitigation	Zero	Local	Medium Term	Neutral
		No-go alternative	Mitigation	Zero	Local	Medium Term	Neutral

Mitigation Measures

Use of hazardous substances at a construction site is controlled by various pieces of legislation. However, the management and protection of the environment would be achieved

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through the implementation of an EMPr, which would, inter alia, specify the storage details of hazardous compounds and the emergency procedures to follow in the event of a spillage.

Cumulative Impact

No cumulative impact

5.2.1.5. Increased Risk of Fire

Temperatures in the Witbank can rise to 35°C or more in summer. Furthermore, the natural vegetation is prone to fires started by lightning strikes, mostly in summer.

Impact Assessment

Construction activities may increase the risk of fire in the area in both the wet summer months and the dry winter months. The outbreak of fire at the construction site could have serious safety, economic and ecological implications and for this reason the impact is of medium significance before the implementation of any mitigation measures.

Ref Nr.	Potential impact	Site	No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
5	Risk of fire	Proposed	No mitigation	Medium	Site Specific	Construction	Medium
		Proposed	Mitigation	Low	Site Specific	Construction	Low
		No-go alternative	No mitigation	Zero	Site Specific	Construction	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Construction	Neutral

Mitigation Measures

The risk of fire would be managed through the EMPr, which includes procedures for preventing fires and dealing with emergency situation such as fires.

Cumulative Impact

No cumulative impact.

5.2.1.6. Dust Impacts

Description of Environment

The construction site may operate on a 24-hour basis at times and earthworks would be undertaken. These activities would exacerbate dust, especially in the dry winter months.

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Impact Assessment

There are no residential areas located near the construction site and for this reason the impact has a low significance even before the implementation of mitigation measures.

Ref	Potential impact	Site	No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
6	Dust pollution	Proposed	No mitigation	Medium	Local	Construction	Low
		Proposed	Mitigation	Low	Local	Construction	very low
		No-go alternative	No mitigation	Zero	Regional	Construction	Neutral
		No-go alternative	Mitigation	Zero	Regional	Construction	Neutral

Mitigation Measures

- The construction site must be watered to control possible dust fallout or an appropriate alternative method must be used.

Cumulative Impact

The area can be very dusty during the dry months due to nearby mining operations and construction during this period will aggravate the amount of dust in the eMalahleni area.

5.2.2. Social Impacts

The negative impacts associated with the social environment include:

- Security risks;
- Heritage and palaeontological Impact;
- Health issues;
- Noise pollution;
- Light pollution;
- Visual impact;
- Increase in traffic volumes

5.2.2.1. Security risks

Description of the Environment

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As mentioned above, during the construction phase a large number of people is likely to be employed, with the numbers rising and falling throughout the construction period, dependent on the activities taking place at the time. While the contractor would want to source construction labour locally, it is inevitable that there will be an influx of people to the area.

Impact Assessment

The increase of people to the area, as well as the periods where some construction workers are unemployed, could lead to an increase in crime and social friction in surrounding areas like eMalahleni, Ogies, Phola, Ga-Nala, Thubelihle, Rietspruit, Van Dyksdrift, Wilge and the surrounding areas. The impact is of medium significance.

Ref		No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE	
7	Security risks	Proposed	No mitigation	Medium	Site specific	Construction	Medium
		Proposed	Mitigation	Low	Site specific	Construction	Low
		No-go alternative	No mitigation	Zero	Site specific	Construction	Neutral
		No-go alternative	Mitigation	Zero	Site specific	Construction	Neutral

Mitigation Measures

Employ local labour as far as possible.

Cumulative Impact

The unemployment rate in the area is already very high and unemployment leads to crime. There will be an influx of workers seeking employment, therefore adding to the unemployment and crime rate.

5.2.2.2. Heritage and Palaeontological Impact

During the site investigation for the heritage impact assessment (See Annexure D1), no buildings or artefacts with cultural or historical value were identified.

A palaeontological study was also conducted and it was found that the area where the 400kV power line is proposed, is underlain by Vaalian aged sandstone, shale conglomerate and volcanic rocks of the Loskop Formation and Permian aged sandstone and interbedded shale, with very well developed coal beds of the Vryheid Formation, Ecca Group, Karoo Supergroup. Trace fossils are present in the siltstone layers. Iron enriched plant remains were observed in

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the sandstones. These plant remains are small and sparse. They are thus not deemed to have a high palaeontological significance. The potential for finding well-defined plant fossils still remains high, and the sections of the study area where sandstone and shale of the Vryheid Formation might be uncovered have thus been allocated a Moderate Sensitivity for palaeontology. The areas underlain by rocks of the Loskop Formation are allocated a Low Palaeontological sensitivity.

Impact Assessment

No structures of historical or social value were identified during the site investigation and therefore no structure of historical or cultural value will be affected by the construction of the substation and power line.

The potential for finding well-defined plant fossils still remains high, and the sections of the study area where sandstone and shale of the Vryheid Formation might be uncovered have thus been allocated a Moderate Sensitivity for palaeontology. The areas underlain by rocks of the Loskop Formation are allocated a Low Palaeontological sensitivity.

The significance of the heritage as well as palaeontological impact has been rated as low.

Ref Nr.	Potential impact	Site	No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
8	Heritage and Palaentological Impact	Proposed	No mitigation	Low	Site Specific	Long Term	Low
		Proposed	Mitigation	Low	Site Specific	Long Term	very low
		No-go alternative	No mitigation	Zero	Site Specific	Long Term	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Long Term	Neutral

Mitigation Measures

The bulk of archaeological remains are normally located beneath the soil surface. It is therefore possible that some significant materials were not located during the site survey and will only be revealed when the soil is disturbed. Should any material that could be of cultural or historical significance or skeletal remains be exposed during digging or excavating, SAHRA must be notified and all construction activities must be stopped and a heritage/archaeological specialist should be called in to determine proper mitigation measures.

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The ECO of the project must be informed of the possibility of finding well-defined plant and trace fossils in exposures of rocks of the Vryheid Formation. If fossils are observed they must be recorded and the palaeontologist must be informed of the finds.

Cumulative Impact

No cumulative impact.

5.2.2.3. Health Issues

Description of the Environment

The migration of construction workers into the eMalahleni region could result in an increase in the prevalence of diseases in the area, including HIV/AIDS and tuberculosis. Construction activities also pose safety risks to all construction workers and to a lesser extent to the public.

Impact Assessment

Health risks could be increased by an influx of sex workers to the area, fed by a large number of construction workers who are away from their families. Medical facilities in the area may not be equipped to deal with the increased requirement for healthcare as a result of the construction activities.

Construction activities also increase the safety risk and therefore the significance of the impact has been rated as medium before the implementation of any mitigation measures.

Ref	Potential impact	Site	No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
9	Health and Safety	Proposed	No mitigation	Medium	Site specific	Construction	Medium
		Proposed	Mitigation	Low	Site specific	Construction	Low
		No-go alternative	No mitigation	Zero	Site specific	Construction	Neutral
		No-go alternative	Mitigation	Zero	Site specific	Construction	Neutral

Mitigation Measures

- All unattended open excavations must be adequately demarcated.
- All construction personnel must wear appropriate protection gear and adhere to the client's rules and regulations and those of other affected landowners, such as Anglo American.

Cumulative Impact

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No cumulative impact.

5.2.2.4. Noise Pollution

Description of the Environment

The construction site may operate 24-hours a day for a portion of the construction period. An increase in noise pollution would be expected from the operation of heavy machinery during the construction period, as well as due to the increased traffic.

Impact Assessment

The severity of this impact is low due to the low numbers of people living in close proximity to area where the substation and power line is proposed. For this reason the impact is regarded to be of low significance before any mitigation measures are implemented.

Ref	Potential impact	Site	No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
10	Noise pollution	Proposed	No mitigation	Low	Local	Construction	Low
		Proposed	Mitigation	Very Low	Local	Construction	Very Low
		No-go alternative	No mitigation	Zero	Site Specific	Construction	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Construction	Neutral

Mitigation

- The contractor must use appropriate and effective silencing devices for operating tools.
- Stationary equipment must be hosed in acoustic covers, screens or sheds to minimise the noise near noise sensitive areas;
- No music is allowed on the construction site.

Cumulative Impact

No cumulative impact.

5.2.2.5. Light Pollution

Description of the Environment

Large floodlights are likely to be installed at the construction site to enable construction activities to continue 24 hours per day, when required.

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Impact Assessment

There are no residential areas located adjacent to the area where the power line and substation are proposed. Therefore, the significance of the impact of light pollution is low without mitigation.

Ref			No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
11	Light Pollution	Proposed	No mitigation	Low	Site Specific	Construction	Low
		Proposed	Mitigation	Very Low	Site Specific	Construction	very low
		No-go alternative	No mitigation	Zero	Site Specific	Construction	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Construction	Neutral

Mitigation Measures

- All lights must be directed inwards and downwards to the construction area. No light must be directed to the adjacent road, as this could lead to blinding oncoming drivers.

Cumulative Impact

No cumulative impact.

5.2.2.6. Visual Impact

Description of the Environment

During construction, the construction site might become very untidy with construction material and waste at the site. This could have a negative impact on the motorists travelling on road D2257.

Impact Assessment

The surrounding area is not visually attractive and no residents are found in close proximity to the site. Therefore, the impact is of low significance before mitigation as the construction site will be seen by motorists travelling on the D2257 road.

Ref			No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
12	Visual Impact	Proposed	No mitigation	Low	Site Specific	Construction	Low
		Proposed	Mitigation	Very Low	Site Specific	Construction	very low
		No-go alternative	No mitigation	Zero	Site Specific	Construction	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Construction	Neutral

Mitigation Measures

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- Rubble and litter must be removed regularly and disposed of at a registered landfill site.
- Cluster construction activities on site.
- Cordon off construction site with shade cloth if necessary.

Cumulative Impacts

No cumulative impacts.

5.2.2.7. Increase in traffic volumes

Description of the environment

Construction vehicles are likely to make use of the existing roads, including the N12, R547, R544, and smaller arterial roads surrounding the proposed site, to transport equipment and material to the construction area. Furthermore, the construction site is likely to operate on a 24-hour basis at times. Construction-related traffic could negatively affect traffic flow in the vicinity and the integrity of the affected roads. Furthermore, this may exacerbate the risk of vehicle accidents.

Impact Assessment

Construction vehicles may cause some traffic flow disruptions during the construction period. However, these disruptions will be for a relatively short period and for this reason the impact is of low significance.

Ref Nr.	Potential impact	Site	No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
13	Increase in traffic volumes	Proposed	No mitigation	Medium	Local	Short Term	Low
		No-go alternative	Mitigation	Low	Local	Short Term	very low
		Proposed	No mitigation	Zero	Local	Short Term	Neutral
		No-go alternative	Mitigation	Zero	Local	Short Term	Neutral

Mitigation

Construction vehicles should avoid peak traffic flow periods.

Cumulative Impact

The traffic flow during the construction of the substation and powerline will not be affected significantly. However, the construction of the substation and powerline will happen in parallel

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to the construction of the ACWA Power Khanyisa IPP Project. This cumulative impact is of medium significance and construction vehicles must try to avoid peak traffic flow periods at all times.

5.2.2.8. Job Opportunities

Description of the Environment

The construction of the substation and power line could cause an influx of people looking for job opportunities as there will be an increase in job opportunities.

Impact Assessment

The construction of the substation and power line can have positive impacts as it will provide direct and indirect employment opportunities. However, these job opportunities are temporary and after the construction period, some people might find themselves once again unemployed. But taking all everything into consideration, the social impact will have a positive low significance before optimisation and a positive medium significance after optimisation.

Ref		No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE	
14	Job opportunities	Proposed	No mitigation	Low	Regional	Construction	Low
		No-go alternative	Mitigation	Medium	Regional	Construction	Medium (+)
		Proposed	No mitigation	Zero	Regional	Construction	Neutral
		No-go alternative	Mitigation	Zero	Regional	Construction	Neutral

Mitigation

- Only construction personnel should be allowed at the construction site.
- Construction workers are not allowed to enter any unauthorised properties.
- Use local labour as far as possible.

Most of the social impacts will be positive and employment opportunities will be created and therefore no other mitigation measures are proposed.

Cumulative Impact

There are numerous unemployed people in the surrounding project area and there will also be an influx of people seeking job opportunities. After the construction period, this will have a cumulative effect with regards to the number of unemployed people within the area.

5.3. Assessment of operational phase impacts

The operational phase impacts and cumulative impacts on the biophysical and socio-economic environment have been assessed, and are described below.

5.3.1. Biophysical Impacts

The impact identified during the operational phase of the project that will have an impact on the biophysical environment include:

- Impact on avifauna

5.3.1.1. Impact on Avifauna

Description of the Environment

During the site investigation, 50 species of birds were identified for the area, of which 12 were not on the expected list. None of the six conservation-important species of birds were identified on site during the survey.

Given that the 400kV powerline will be above ground, due consideration must be given to the effect of support towers and transmission lines on bird flight through the immediate area. Collisions with thin earth wires are a serious consideration, especially for large birds that are not able to avoid such obstructions quickly enough whilst in flight. Electrocutation, on the other hand, occurs when large birds land on or alight from transmission line towers, creating short circuits between live conductors or between live conductors and earth wire (ECOREX 2010). In a further analysis, ECOREX (2010) reported that a further 50 species of birds not listed as of conservation-importance may also be affected negatively by the presence of support towers and transmission lines. Four of these species, namely the Spur-winged Goose (*Plectropterus gambensis*), Egyptian Goose (*Alopochen aegytiacus*), Long-crested Eagle (*Lophaetus occipitalis*) and Black-shouldered Kite (*Elanus caerulus*), were confirmed present in the area of the substation footprint during the survey on 16 May 2015. It must be mentioned that three support towers and transmission lines already exist on the footprint of the substation.

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Impact Assessment

During the site investigation, no bird species of conservation importance could be found within the proposed area. However, the possibility remains for large bird species to collide with earth wires and injure themselves. Unfortunately, not much can be done to minimise the impact that the 400kV power lines may have on some bird species. The impact itself has been minimised by the fact that no species of conservation importance were found during the site investigation. Therefore, the impact is of medium significance.

Ref	Potential impact	Site	No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
1	Impact on Avifauna	Proposed	No mitigation	Medium	Regional	Long Term	Medium
		Proposed	Mitigation	Medium	Regional	Long Term	Medium
		No-go alternative	No mitigation	Zero	Regional	Long Term	Neutral
		No-go alternative	Mitigation	Zero	Regional	Long Term	Neutral

Mitigation Measures

Nothing can be done about the overhead power lines. This impact can only be mitigated if the power lines were to be laid underground. However, this is not an option for the applicant.

Cumulative Impact

There are already three support towers and transmission lines on or adjacent to the proposed area and the 400kV power line will add to the obstruction for bird flight. The impact is therefore of medium significance.

5.3.2. Social Impacts

The impact identified during the operational phase of the project that will have an impact on the social environment include:

- Visual Impact

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5.3.2.1. Visual Impact

Description of the Environment

Overhead power lines will be very visible from the adjacent tar road. The 400kV power line structure is large compared to other power line structures in this area. Therefore, the construction of the substation and power line will have a definite visual impact.

Impact Assessment

The environment surrounding the proposed substation and power lines is characterised by mining and electricity generation. Therefore, the visual quality of the area is already low and this reduces the significance of the impact. The impact can therefore be regarded as medium.

Ref Nr.	Potential impact	Site	No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
2	Visual Impact	Proposed	No mitigation	Medium	Site Specific	Long Term	Medium
		Proposed	Mitigation	Medium	Site Specific	Long Term	Medium
		No-go alternative	No mitigation	Zero	Site Specific	Long Term	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Long Term	Neutral

Mitigation Measures

No mitigation can be implemented to reduce the visual impact as the specific structures must be used to accommodate a 400kV power line.

Cumulative Impact

Visually, the proposed substation and power line will add to the impacts of the surrounding mining and electricity generation environment.

5.4. Impact Statement

During the assessment of all biophysical and social impacts it was found that the following impacts would be of medium significance before the implementation of any mitigation measures:

Construction phase

- Ecological Impact;
- Potential pollution of the water resource;
- Potential spillage of hazardous substances;

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- Potential fire risk;
- Security risk; and
- Health and safety.

All of the above mentioned impacts can however be mitigated to be of low significance through the implementation of the EMPr.

Operational phase

- Visual Impact; and
- Impact on avifauna.

The operational impacts can unfortunately not be mitigated as the above ground electricity generation structures will be permanent fixtures. However, due to the aesthetic quality of the surrounding environment, the impact of the additional electricity generation infrastructures will not be significant. The surrounding agricultural and mining environment also impacted the ecological environment negatively and therefore no bird species of conservation concern could be found during the site investigations.

A map indicating the environmental sensitive areas along the area proposed for the 400kV substation and powerline has been attached (please see Annexure A3).

Please see below the summary of the assessment of all the impact that were identified during the scoping and EIA phase of the project.

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Table 5.6: Impact Statement

Ref Nr.	Potential impact	Site	No mitigation/ Mitigation	Magnitude	Extend	Duration	SIGNIFICANCE
Construction Phase							
1	Ecological Impact	Proposed	No mitigation	medium	Site specific	Short Term	Medium
		Proposed	Mitigation	Low	Site Specific	Short Term	Low
		No-go alternative	No mitigation	Zero	Site Specific	Short Term	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Short Term	Neutral
2	Sedimentation and Erosion	Proposed	No mitigation	Medium	Local	Construction	Low
		Proposed	Mitigation	Low	Local	Construction	Very low
		No-go alternative	No Mitigation	Zero	Local	Construction	Neutral
		No-go alternative	Mitigation	Zero	Local	Construction	Neutral
3	Potential pollution of water resource	Proposed	No mitigation	High	Local	Construction	Medium
		Proposed	Mitigation	Medium	Local	Construction	Low
		No-go alternative	No mitigation	Zero	Local	Construction	Neutral
		No-go alternative	Mitigation	Zero	Local	Construction	Neutral
4	Spillage of hazardous substances	Proposed	No mitigation	Medium	Local	Medium Term	Medium
		Proposed	Mitigation	Low	Local	Medium Term	Low
		No-go alternative	No mitigation	Zero	Local	Medium Term	Neutral
		No-go alternative	Mitigation	Zero	Local	Medium Term	Neutral
5	Risk of fire	Proposed	No mitigation	Medium	Site Specific	Construction	Medium
		Proposed	Mitigation	Low	Site Specific	Construction	Low
		No-go alternative	No mitigation	Zero	Site Specific	Construction	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Construction	Neutral
6	Dust pollution	Proposed	No mitigation	Medium	Local	Construction	Low
		Proposed	Mitigation	Low	Local	Construction	very low
		No-go alternative	No mitigation	Zero	Regional	Construction	Neutral
		No-go alternative	Mitigation	Zero	Regional	Construction	Neutral
7	Security risks	Proposed	No mitigation	Medium	Site specific	Construction	Medium
		Proposed	Mitigation	Low	Site specific	Construction	Low
		No-go alternative	No mitigation	Zero	Site specific	Construction	Neutral
		No-go alternative	Mitigation	Zero	Site specific	Construction	Neutral
8	Heritage and Palaentological Impact	Proposed	No mitigation	Low	Site Specific	Long Term	Low
		Proposed	Mitigation	Low	Site Specific	Long Term	very low
		No-go alternative	No mitigation	Zero	Site Specific	Long Term	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Long Term	Neutral
9	Health and Safety	Proposed	No mitigation	Medium	Site specific	Construction	Medium
		Proposed	Mitigation	Low	Site specific	Construction	Low
		No-go alternative	No mitigation	Zero	Site specific	Construction	Neutral
		No-go alternative	Mitigation	Zero	Site specific	Construction	Neutral
10	Noise pollution	Proposed	No mitigation	Low	Local	Construction	Low
		Proposed	Mitigation	Very Low	Local	Construction	Very Low
		No-go alternative	No mitigation	Zero	Site Specific	Construction	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Construction	Neutral
11	Light Pollution	Proposed	No mitigation	Low	Site Specific	Construction	Low
		Proposed	Mitigation	Very Low	Site Specific	Construction	very low
		No-go alternative	No mitigation	Zero	Site Specific	Construction	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Construction	Neutral
12	Visual Impact	Proposed	No mitigation	Low	Site Specific	Construction	Low
		Proposed	Mitigation	Very Low	Site Specific	Construction	very low
		No-go alternative	No mitigation	Zero	Site Specific	Construction	Neutral
		No-go alternative	Mitigation	Zero	Site Specific	Construction	Neutral
13	Increase in traffic volumes	Proposed	No mitigation	Medium	Local	Short Term	Low
		No-go alternative	Mitigation	Low	Local	Short Term	very low
		Proposed	No mitigation	Zero	Local	Short Term	Neutral
		No-go alternative	Mitigation	Zero	Local	Short Term	Neutral
14	Job opportunities	Proposed	No mitigation	Low	Regional	Construction	Low
		No-go alternative	Mitigation	Medium	Regional	Construction	Medium (+)
		Proposed	No mitigation	Zero	Regional	Construction	Neutral
		No-go alternative	Mitigation	Zero	Regional	Construction	Neutral

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Ref			No mitigation/ Mitigation		Magnitude	Extend	Duration	SIGNIFICANCE
Nr.	Potential impact	Site						
Operational phase								
1	Impact on Avifauna	Proposed	No mitigation	Medium	Regional	Long Term	Medium	
		Proposed	Mitigation	Medium	Regional	Long Term	Medium	
		No-go alternative	No mitigation	Zero	Regional	Long Term	Neutral	
		No-go alternative	Mitigation	Zero	Regional	Long Term	Neutral	
2	Visual Impact	Proposed	No mitigation	Medium	Site Specific	Long Term	Medium	
		Proposed	Mitigation	Medium	Site Specific	Long Term	Medium	
		No-go alternative	No mitigation	Zero	Site Specific	Long Term	Neutral	
		No-go alternative	Mitigation	Zero	Site Specific	Long Term	Neutral	

6. CONCLUSIONS AND WAY FORWARD

6.1. Level of confidence of assessment

With reference to the information available at this stage of the project planning cycle, the confidence in the environmental assessment undertaken is regarded as acceptable for decision making. Aurecon hereby confirms that all information provided in the report is correct and that all I&AP's and stakeholders were informed and given the opportunity to comment during the process. All recommendations made by the specialists have been included in the Draft Environmental Management Programme.

It is acknowledged that the project details will evolve during the detailed design and construction phases. However, these are unlikely to change the overall environmental acceptability of the proposed project. Furthermore, any significant deviation from what was assessed in this EIA should be subject to further assessment and may require an amendment to the Environmental Authorisation, after due process has been met.

6.2. Opinion of the EAP

The impacts associated with the proposed 400kV substation and power line would result in local impacts (both biophysical and some social) that would negatively affect the area. The significance of these impacts; **without mitigation**; range from being of **medium to low** significance. However, with the implementation of the suite of recommended mitigation measures, the significance of most of the negative impacts would be minimized and would be of **low significance**.

Associated with the proposed project is the positive social impact being of **medium** significance due to the temporary nature of employment opportunities. Unemployed

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individuals in the area would benefit from the provision of temporary employment opportunities during the construction phase.

If authorised, the implementation of all mitigation measures listed in Chapters 5 as well as the Draft Environmental Management Programme, should be included as a condition of approval. On this basis it is the opinion of the EAP that this application should be approved

6.3. The way forward

The next stage of the Scoping and EIA process involves the compilation of the Final Environmental Impact Report (EIR).

Once the comment period of 30 days for the review of the Draft Environmental Impact Assessment (EIA) Report has ended, all comments received will be incorporated into the Final EIR and be submitted to the Department of Environmental Affairs for consideration.

7. REFERENCES

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