

BASIC ASSESSMENT 3 - PROJECT 5

FOR THE SOLAR PARK INTEGRATION PROJECT:

**PROPOSED CONSTRUCTION OF 5 X 132 kV
POWER LINES FOR THE DōE SOLAR PARK AND
2 X 132 kV LINES TO THE GORDONIA
SUBSTATION, UPINGTON, NORTHERN CAPE.**

**DRAFT - Site-specific Environmental Management
Programme for the construction of 2 x 132 kV Lines
from the Upington/Solar Park to the Gordonia
Substation, Upington**

Proponent:

Eskom Holdings SOC Limited
Megawatt Park
Maxwell Drive, Sunninghill

DEA Ref No: 12/12/20/2610

NEAS Ref No: DEA/EIA/0000767/2011

September 2016

Project: 12726

ENVIRONMENTAL MANAGEMENT PROGRAMME



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GLOSSARY OF TERMINOLOGY

Contractor	means the main contractor as engaged by the Eskom for the construction of the subject infrastructure, including all Sub-contractors and service provides appointed by the main contractor of his own volition for the execution of parts of the Works. “ <i>Contractor</i> ” also includes any other contractor engaged by Eskom directly in connection with any part of the construction, which is not a nominated sub-contractor to the main contractor.
Environment¹	(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 Control Officer	means a person who is responsible for the monitoring of the implementation of the requirements of an EMPr on behalf of the applicant.
Environmental Officer	means a person who is responsible for the implementation of the requirements of an EMPr on behalf of the contractor.
Environmental Impact Assessment (EIA)	means a study of the environmental consequences of a proposed course of action.
Environmental impact	means an environmental change caused by some human act.

¹ As defined in terms of the National Environmental Management Act No. 107 of 1998 (NEMA).

- Method Statement** means setting out in detail how the management actions contained in an EMPr will be implemented, in order to ensure that the environmental objectives are achieved.
- Public Participation Process** means a process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development.

LIST OF ABBREVIATIONS

C	Contractor
CBA	Critical Biodiversity Area
CSP	Concentrating Solar Power
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DoE	Department of Energy
DWEA	Department of Water and Environmental Affairs
DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EM	Environmental Manager
EMPr	Environmental Management Program (NEMA)
GN	Government Notice
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IEM	Integrated Environmental Management
IUCN	International Union for Conservation of Nature
IWULA	Integrated Water Use Licence Application
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management Biodiversity Act
NEM:WA	National Environmental Management Waste Act
NFA	National Forestry Act
NFEPA	National Freshwater Ecosystem Priority Area
NWA	National Water Act
PES	Present Ecological Status
PM	Project Manager
R	Regulation
S&EIR	Scoping and Environmental Impact Reporting Process
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SHEQO	Safety, Health, Environment and Quality Officer
ToR	Terms of Reference

PART A: INTRODUCTION

1. PURPOSE OF THIS EMPR

This EMPr was approved through an EA in terms of the EIA regulations 2010 (DEA Ref No: 12/12/20/2610 signed 27/03/2014) and as such the addition of site-specific information as per the requirements of the Environmental Authorisation to this EMPr is provided in terms of these regulations for approval by the DEA.

The preparation of an Environmental Management Programme (EMPr) is recognised as a tool in Integrated Environmental Management (IEM) to mitigate or minimise negative impacts and enhances positive impacts on site. Typically an EMPr document is aligned to the project life cycle addressing each project phase i.e. the Construction, Operation and Decommissioning phases.

An EMPr, in the context of the EIA Regulations (2010), is a tool that takes a project from a high level consideration of issues down to a detailed workable action plan that can be implemented in a cohesive and controlled manner. An EMPr is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction phase of a project are prevented and that the positive benefits of the projects are enhanced”. Impacts range from those incurred during start up (site clearing, erection of the construction camp), and to those incurred during operation. Specifically, the objectives of this EMPr can be articulated as follows:

- To give effect to the construction related requirements;
- To give effect to the environmental commitments to the various role players;
- To ensure that these requirements / commitments are expressed in a manner that is accessible to all parties and is binding upon those responsible for project implementation;
- To ensure that sufficient resources are allocated to the project budget in order to give effect to the environmental requirements / commitments, and to ensure that the scale of EMPr-related interventions is consistent with the significance of identified impacts;
- To provide a coherent and pragmatic framework for the implementation of the requirements, ranging from the roles and responsibilities of the key project participants to the auditing and reporting of compliance;
- To facilitate appropriate and proactive response to unforeseen events or changes in project implementation that were not considered in the EIA process; and
- To ensure that the construction phase of the project does not result in undue or reasonably avoidable adverse environmental impacts, and that any potential environmental benefits are enhanced.
- This report constitutes the draft EMPr for the construction and operation of the Solar Park Integration Project. This draft EMPr has been compiled according to the findings of the environmental impact assessment, and is included as an appendix to the EIA for consultation purpose. The draft EMPr will accompany the EIA which will

submitted to the authorities for consideration. The Final EMPr will be published as a standalone document for ease of use.

2. BACKGROUND INFORMATION

Whilst Eskom's reliance on coal fired power stations has allowed for the generation of some of the cheapest electricity in the world at ~R10/W, it has resulted in South Africa being the largest producer of greenhouse gases in Africa, and one of the Top 20 greenhouse gas producing countries in the world.

South Africa being committed to reducing Carbon emissions, is a signatory to the UN Framework Convention on Climate Change and the Kyoto Protocol, and is in the process of implementing strategies aimed at reducing the countries carbon emissions. Furthermore, Eskom is committed to supporting the government's renewable energy efforts and aims to deliver 2 400 GWh towards the Department of Minerals and Energy's (DME's) renewable energy target by 2013². Eskom has committed to reducing coal's current ~90% share of its primary energy mix to 78 % by the year 2012 and to 70 % by the year 2025³ through various projects.

Demonstration projects and research, undertaken by Eskom, have shown that both solar and wind energy show great potential in South Africa. As a result (and in view of reducing their carbon footprint) Eskom is looking to increase the renewable energy component of its supply mix to at least 1 600 MW by 2025.

The power supply crisis has also accelerated the need to diversify Eskom's energy mix and its move towards alternative energy sources such as nuclear power and natural gas, as well as various forms of renewable energy.

Until now solar power has been one of the least utilised renewable energy technologies. Solar power provides less than 1 % of the world's energy, according to the global financial services firm UBS⁴. However, it appears that the potential of solar energy is growing, with UBS calculating 50 % year-on-year growth in the sector⁴. And figures released in 2011, by the Earth Policy Institute, show solar electricity generation is now the fastest-growing electricity source⁴. The main deterrent to the use of solar power has been its cost, estimated at about R 22,00/Watt⁴.

² Eskom (November 2008): Renewable Sources of Primary Energy Revision 2. Eskom Fact Sheet: RW0001.

³ <http://www.safrika.info/business/economy/infrastructure/energy.htm>

⁴ <http://www.enr.com/energy/commentary/33779>

The Upington area has been identified as one of the highest solar radiation locations in the world, providing the best opportunities for using the sun to generate electricity. In an effort to utilise renewable energy resources to meet the growing demand for electricity, the South African Government is in the process of establishing the feasibility of a R 150 billion Solar Park

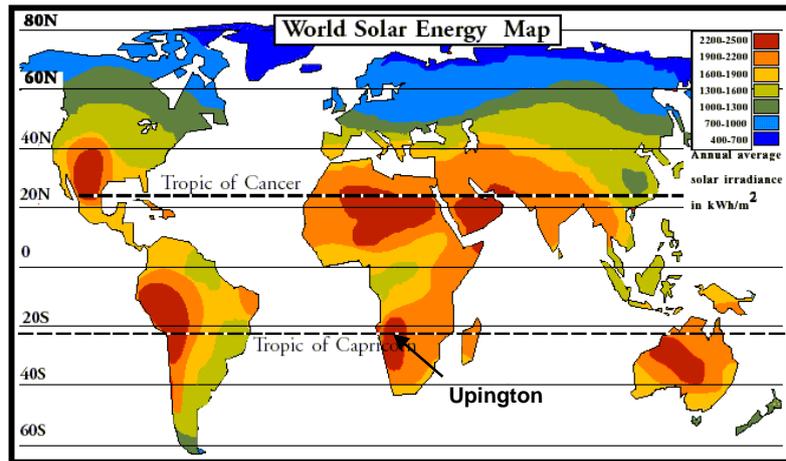


Figure 1: Model of solar radiation patterns.

Programme at Klipkraal, ~15 km west of Upington in the Northern Cape. The Solar Park will use the sun's energy to eventually generate 5 000 MW of electricity.

Eskom is planning to construct a 100 MW Concentrating Solar Power (CSP) plant at the Solar Park. This employs an array of mirrors controlled by tracking systems to focus a large area of sunlight into a small beam. The resulting heat is used to generate electricity. CSP also has the backing of the World Bank⁵, which views it as the only zero-emission technology that could potentially rival coal-fired power. Eskom received a positive



Figure 2: CSP in Seville, Andalusia, Spain.

Record of Decision (RoD), approving a 100 MW CSP facility for this project in August 2007, and is currently underway with an amendment application due to changes in technology and footprint. The expansion of the CSP plant footprint will require an Environmental Authorisation (EA), for which a separate study is being undertaken.

The Department of Energy as well as several Independent Power Producers (IPPs) are busy with investigations to construct solar plants at the Solar Park which should source sufficient electricity to make up the 5 000 MW planned for the solar park. No technologies have been selected for these plants as yet.

The electricity generated at the Upington Solar Park (by IPP's and Eskom) will need to be integrated into the National Grid. The purpose of this Solar Park Integration Project is to

⁵ WORLD BANK GEF, 2006. Assessment of the World Bank/GEF Strategy for the Market Development of Concentrating Solar Thermal Power

address the major infrastructural investments that Eskom will need to make in order to tie the Upington Solar Park into the National Grid. The proposed Solar Park Integration Project entails the construction of a substation at the Upington Solar Park, 400 kV transmission lines to the east and south of Upington to feed the electricity into Eskom's National Grid as well as the construction of a number of 132 kV power lines inter-linking the IPP solar plants with the Eskom Grid and distributing the power generated to Upington.

The major infrastructural investments of the Solar Park Integration Project are listed activities in terms of the National Environmental Management Act ([NEMA] No 107 of 1998) and Environmental Impact Assessment (EIA) Regulations (Government Notice Regulation [GNR] 543 to 546, June 2010) and therefore require Environmental Authorisation (EA) from the Department of Environmental Affairs (DEA). In terms of the aforementioned legislation an EIA must be undertaken to obtain an EA. In South Africa provision is made for two types of EIA's; either a Basic Assessment (BA) or a full Scoping and Environmental Impact Reporting (S&EIR) can be undertaken. This is determined by the EIA Regulations (June 2010).

Some of the activities proposed for the Solar Park Integration Project trigger the requirement for a BA, whilst others require a full S&EIR process be undertaken. In some instances it is possible to logically combine activities into a single application. A summary of the proposed activities, how they have been logically combined into joint applications and the corresponding EA process for these combined applications is shown in Table 1 and is represented graphically in Figure 3.

Table 1: Proposed activities according to EA application process.

EA APPLICATION PROCESS	DESCRIPTION OF THE PROPOSED ACTIVITIES
S&EIR No 1	<ul style="list-style-type: none"> • Solar Park substation (400 kV and 132 kV); • 2 x (±) 125 km of 400 kV lines from Solar Park to Aries substation (southwest of Kenhardt) and associated feeder bays; • 1 x (±) 70 km of 400 kV line from Solar Park to Nieuwehoop substation (northeast of Kenhardt) and associated feeder bays; and • Water Use License Application.
S&EIR No 2	<ul style="list-style-type: none"> • 1 x (±) 200 km of 400 kV line from Solar Park to Ferrum substation (Kathu) and associated feeder bays.
BA No 1	<ul style="list-style-type: none"> • 3 x 132 kV lines for the Eskom CSP Site and 2 x 20 MVA Transformers at Solar Park site.
BA No 2	<ul style="list-style-type: none"> • 3 x 132 kV lines for the IPP in Solar Park.
BA No 3	<ul style="list-style-type: none"> • 5 x 132 kV lines for the DoE Solar Park; and • 2 x (±) 25 km of 132 kV lines to Gordonia Substation (Upington).

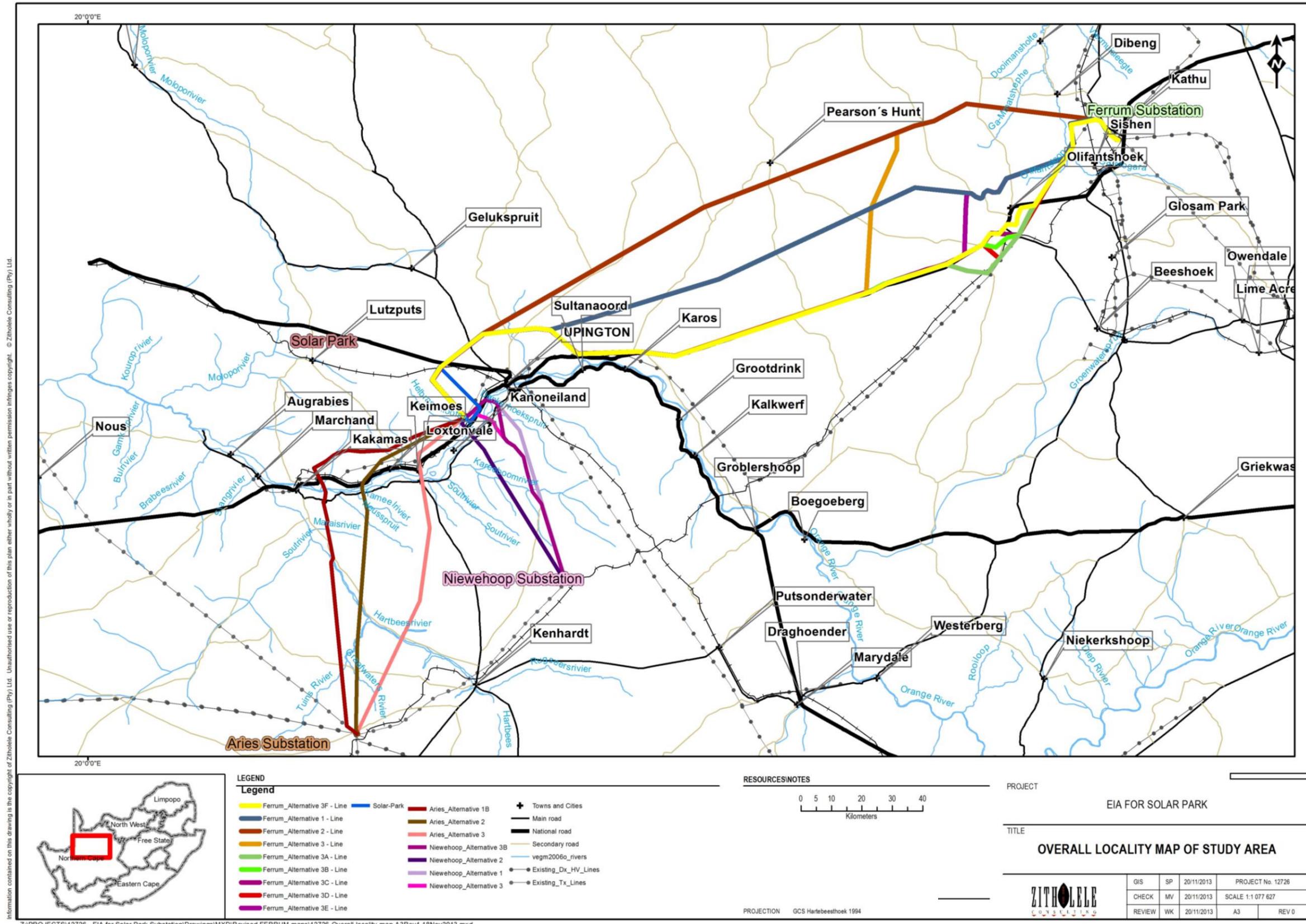


Figure 3: Location of the overall integration project.

3. LEGAL FRAMEWORK

An EMPr is guided by sound environmental management practices and is based on national and international best practices, and relevant legislation, policies and guidelines. All stakeholders should note that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter shall prevail.

All legislation applicable to the development must be strictly enforced, and may including the following:

- The Constitution of the Republic of South Africa Act 108 of 1996, (Chapter 2: Bill of Rights, Section 24: Environmental right, Section 25: Rights in property);
- National Environmental Management Act, 107 of 1998, as amended;
- Environment Conservation Act, 73 of 1989;
- National Environmental Management: Protected Areas Act, 57 of 2003;
- National Environmental Management: Biodiversity Act, 10 of 2004;
- National Forests Act, 43 of 1983;
- The National Water Act, 36 of 1998;
- Hazardous Substances Act, 15 of 1973;
- National Heritage Resources Act, 25 of 1999;
- Conservation of Agricultural Resources Act, 43 of 1983;
- Occupational Health and Safety Act, 85 of 1993;
- National Veld and Forest Fire Act, 101 of 1998;
- Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 36 of 1947;
- National Environmental Management: Waste Management Act, 59 of 2008;
- Mineral and Petroleum Resources Development Act, 28 of 2002;
- Health Act, 63 of 1977;

4. DOCUMENT ROADMAP

This EMPr was approved through an EA in terms of the EIA regulations 2010 and as such the addition of site-specific information to this EMPr is provided in terms of these regulations for approval by the DEA. A roadmap to information in compliance with conditions in the EA and site-specific information area provided in Part B of **Error! Reference source not found..**

Table 2: Document Roadmap

Part B - Compliance with the Environmental Authorisation (DEA Reference: 12/12/20/2610)

Condition 24	A heritage specialist must be commissioned to perform a final walkthrough of the site once the final route alignment and tower positions have been identified. All heritage sensitivities, if any, must be recorded and avoided and a specialist report must be submitted to the Department for approval prior to construction.	Section 19.3.8
Condition 25	An avifaunal specialist must be commissioned to perform a final walkthrough of the site once the final route alignment and tower positions have been identified. The exact pylon/tower coordinates must be geo-referenced and forwarded to this Department. This specialist report must be submitted to the Department for approval prior to construction.	Section 19.3.7 & Appendix C
Condition 26	Anti-collision devices such as bird flappers must be installed where powerlines cross avifaunal corridors, as recommended by the avifaunal specialist. The input of an avifaunal specialist must be obtained for the fitting of anti-collision devices onto specific sections of the line once the exact positions of the towers have been surveyed and pegged.	Section 19.3.7 & Appendix C
Condition 27	A botanist must be appointed to perform a final walkthrough of the alignment to identify sensitive plant species, and assist in identifying the areas that require protection.	Section 19.3.5 & Appendix C
Condition 28	A permit must be obtained from the relevant nature conservation agency for the removal or destruction of indigenous protected and endangered plant and animal species.	Section 19.4

5. ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) DETAILS

In terms of the National Environmental Management Act ([NEMA] No 107 of 1998) and Environmental Impact Assessment (EIA) Regulations (Government Notice Regulation [GNR] 543 to 546, June 2010) the proponent must appoint an Environmental Assessment Practitioner (EAP) to undertake an EIA and / or PPP for listed activities regulated in terms of the aforementioned Act. In this regard, Eskom appointed Zitholele Consulting (Pty) Ltd. (Zitholele) to undertake the PPP and complete the Amendment Application for the proposed project, in accordance with the aforementioned regulations.

Zitholele is an empowerment company formed to provide specialist consulting services primarily to the public sector in the fields of Water Engineering, Integrated Water Resource Management, Environmental and Waste Services, Communication (public participation and awareness creation) and Livelihoods and Economic Development.

Zitholele Consulting has no vested interest in the proposed project and hereby declares its independence as required by the EIA Regulations. The details of the EAP representatives are listed below.

The details of the key individuals representing Zitholele, and acting as the EAP on these projects are given below in **Table 3**.

Table 3: Details of EAP

Project Manager and EAP:	Dr Mathys Vosloo
Company Represented:	Zitholele Consulting (Pty) Ltd
Professional affiliation/registration:	SACNASP Registered - Registration number: 400136/12
Physical address:	Building 1, Maxwell Office Park, Magwa Crescent West, Corner of Allandale Road & Maxwell Drive, Waterfall City, Midrand, 1685
Postal address:	PO Box 6002, Halfway House, 1685
Telephone:	011 207 2060
Fax	086 676 9950
E-mail:	mathysv@zitholele.co.za

Dr. Mathys Vosloo is the EAP for this project and holds a Ph.D. in Zoology. He is a wellqualified and technically proficient environmental and natural scientist with over 12 years in environmental management and consulting experience. He is a registered professional natural scientist (Pr.Sci.Nat.) with the South African Council for Natural Scientific Professionals. His experience ranges from EIA and Strategic Environmental Assessment services to project management and State of the Environment Reporting. Mathys has done numerous projects in the power generation, linear infrastructure and infrastructure development industries.

6. CONTEXT AND OBJECTIVES OF THIS REPORT

This report constitutes the approved Environmental Management Programme (EMPr) report for **BA No 3**, and addresses the following components of the Solar Park Integration Project:

- 5 x 132 kV lines from the proposed Solar Park Substation to the Department of Energy (DoE) Solar Plant located adjacent to Eskom CSP Plant, and for the Solar Park Project; and
- ***2 x (\pm 25 km) 132 kV lines from the proposed Solar Park Substation to the Gordonia Substation (near Upington)***

This Draft EMPr has been drafted according to the findings of the impact assessment, and is included as an appendix to the BA Report (BAR) for consultation purpose. The Final EMPr will be attached to the BAR and submitted to the authorities for approval along with EA evaluation process. The Final EMPr will be published as a standalone document for ease of use.

7. OBJECTIVES OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

Environmental management does not end with obtaining the required EA. Rather there is a need to ensure that the remedial requirements identified during the environmental process

are effectively realised during project implementation, and this is where EMPs have a key role to play.

An EMP, in the context of the EIA Regulations (2010), is a tool that takes a project from a high level consideration of issues down to detailed workable action plan that can be implemented in a cohesive and controlled manner. An EMP is defined as “*an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction phase of a project are prevented and that the positive benefits of the projects are enhanced*”. Impacts range from those incurred during start up (site clearing, erection of the construction camp), and to those incurred during operation. Specifically, the objectives of this EMP can be articulated as follows:

- To give effect to the construction related requirements;
- To give effect to the environmental commitments to the various role players;
- To ensure that these requirements / commitments are expressed in a manner that is accessible to all parties and is binding upon those responsible for project implementation;
- To ensure that sufficient resources are allocated to the project budget in order to give effect to the environmental requirements / commitments, and to ensure that the scale of EMP-related interventions is consistent with the significance of identified impacts;
- To provide a coherent and pragmatic framework for the implementation of the requirements, ranging from the roles and responsibilities of the key project participants to the auditing and reporting of compliance;
- To facilitate appropriate and proactive response to unforeseen events or changes in project implementation that were not considered in the BA process; and
- To ensure that the construction phase of the project does not result in undue or reasonably avoidable adverse environmental impacts, and that any potential environmental benefits are enhanced.

8. STRUCTURE OF THIS DOCUMENT

This document has been divided into four parts, each addressing a different aspect of the Environmental Management Programm (EMP).

- **Part A** provides a brief introduction, details of the person who prepared the EMP and his / her expertise; and overview of the purpose and structure of this document;
- **Part B** sets the context for the EMP by providing an overview of the project, summarising the objectives of the EMP, highlighting the scope of the EMP and briefly emphasising Eskom’s environmental commitments. It provides guidance in terms of the on-site implementation of the EMP, highlighting the organisation

structure and various roles and responsibilities, emphasising the importance of awareness training, summarising the requisite approach to monitoring and auditing and addressing the requirement for review and amendment of the environmental specifications; and

- **Part C** provides an overview of the structure and application of the environmental management plan and highlights the environmental considerations that should inform the construction and operation phases.

PART B: SETTING THE CONTEXT

The motivation for this project is that the electricity generated from the IPPs will need to be integrated into the national grid. The purpose of the five (5) proposed 132kV power lines and the two (2) proposed power lines to Gordonia Substation is to inter-link the DoE with the Eskom Grid and to ensure that the power generated can be distributed.

9. PROJECT LOCATION AND BOUNDARIES

The power lines will be constructed within an approved 500 m development corridor extending from the Eskom CSP to the Solar Park Substation. Although a much smaller servitude width is required for the construction of the power lines a wider corridor is authorised to allow for power line alignment to be adjusted for on-site conditions. The co-ordinates for the approximate start-middle-end points of the development corridor is given below. Co-ordinates for every 250 m along the centreline of the corridor is attached in **Error! Reference source not found..**

	<i>East</i>	<i>South</i>
Starting point of the activity	21°06'33.710" E	28°27'29.625" S
Middle/Additional point of the activity	21°07'39.862" E	28°29'08.711" S
End point of the activity	21°08'10.341" E	28°32'33.166" S

The development corridor is located on the farms:

- Olyvenhouts Drift
- Klipkrall 451

A layout map showing the site boundaries, the development corridor, and other project components is shown in Figure 4.

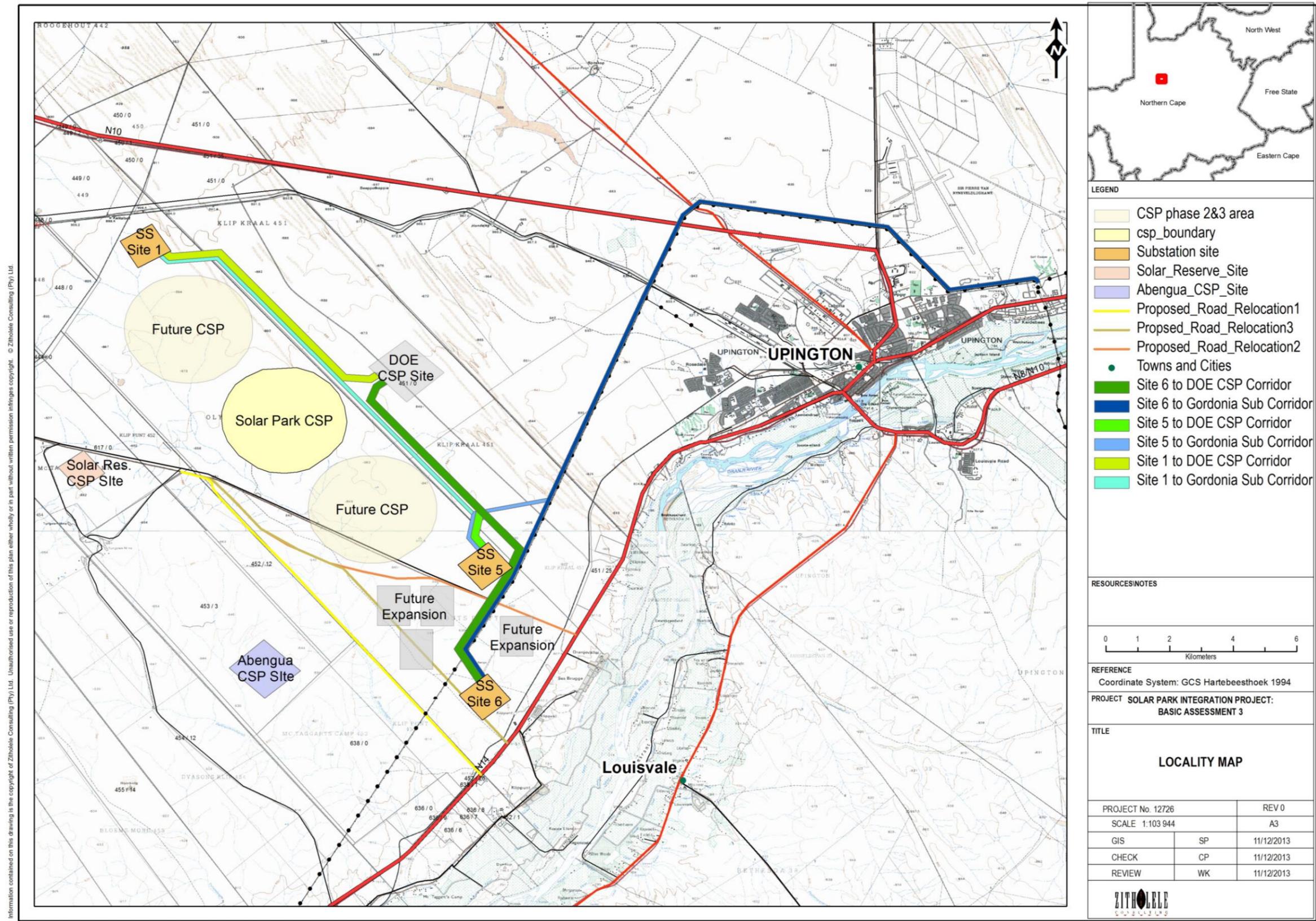


Figure 4: Project location

10. DESCRIPTION OF PROJECT COMPONENTS

Power Line Servitude

Each 132 kV Power Line requires a servitude of 36 m wide. The proposed power lines for this project will be built in parallel alignment. The total servitude width for the seven power lines will thus be 252 m.

132 kV Towers

The proposed power lines will consist of twin turn cables capable of distributing up to 200 MVA at 132 kV, connected by a series of towers (pylons) located approximately 200 m apart, depending on the terrain and soil conditions. The exact tower type to be used will be determined (based on load calculations) during the final design stages of the power line. At this stage, it is proposed that either the Guyed Lattice or Steel Monopole tower type will be used for the proposed power lines. Such a tower is typically 18 m in height and each tower will have a footprint of between 1.21 m² and 16.81 m².

20MVA Transformers

Moreover, transformers are critical components in solar-energy production and distribution. Historically, transformers have “stepped-up” or “stepped-down” energy from non-renewable sources. The construction of the two (2) 20 MVA transformers at the Solar CSP Plant is thus critical in order to distribute the energy generated by the Solar Power Plant.

Access Roads

Existing farm roads will be used to access the servitude for construction purposes. A maintenance road of 5 m wide within the servitude will be retained post construction for maintenance of the power line during the operational phase.

Fencing, Gates and Access Control

The power line servitude will be fenced with a diamond mesh fence approximately 1,8 m high to prevent unauthorised access for reasons of safety and security.

11. CONSTRUCTION ACTIVITIES

The construction phase for the proposed project will include the following activities post-authorisation:

Construction Camp: A construction camp will be sited in area where least disturbance to potentially sensitive environments will be caused. The construction will likely be sited with the construction camp for the Eskom CSP contractors.

Corridor walk-down: To ensure that all site specific sensitivities are avoided a walkdown of the corridor by suitably qualified professionals and specialists will be undertaken. During this process the exact co-ordinates of the proposed towers will be established.

Vegetation clearance: Tall trees and bushes that will affect the safe operation of the power line will be removed during the construction phase. Vegetation around tower positions will be cleared during the construction phase.

Tower footings: Foundations will be laid for the footings of the pylons.

Steelwork structures: The towers will be erected in segments.

Stringing: Once the towers have been erected, cables will be strung between the towers.

The construction phase for the proposed project will take between 12 and 24 months.

12. OPERATIONAL ACTIVITIES

During the **operational and maintenance phase** of the project, Eskom requires access to the servitude for maintenance activities. Maintenance activities are specialised and are, therefore, carried out by Eskom employees.

Prior to commissioning of the power line an Operation Phase EMPr will be compiled and submitted to the DEA for approval.

13. DECOMMISSIONING ACTIVITIES

In terms of the **decommissioning phase**, the following are assumed:

- The physical removal of the power line infrastructure would entail the reversal of the construction process.
- A rehabilitation programme would need to be agreed upon with the landowners (if applicable) before being implemented.
- Materials generated by the decommissioning process will be disposed of according to the Waste Hierarchy i.e. wherever feasible, materials will be reused, then recycled and lastly disposed of. Materials will be disposed of in a suitable manner, in a suitably licensed facility.
- All of the aforementioned decommissioning activities would be subject to a separate Environmental Authorisation process at the appropriate time.

14. SCOPE OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

This EMPr is applicable to the construction phase of the project only. The EMPr must be read in conjunction with the BAR and EA issued for the project.

PART C: ENVIRONMENTAL SPECIFICATIONS

15. INTEGRATION OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME INTO THE CONTRACT

As mentioned in Section 2, this EMPr has been written in a form and language that is consistent with the tender / contract documentation used for engineering contracts i.e. the EMPr takes the form of a set of environmental specifications that can integrate with the civil, mechanical and electrical tender / contract documentation. There are various advantages to this approach:

- The Contractor is made aware of the EMPr at the tender stage;
- The Contractor is able to cost for compliance with the EMPr;
- The EMPr is presented to the Contractor in the language and terminology with which he/she is familiar, and unnecessary duplication and contradiction is eliminated;
- Inclusion of the EMPr within the contract ensures that the EMPr becomes a legally binding document within a well-developed legal framework; and
- The standardised form and structure of the environmental specifications ensures that with time and each new contract, the Contractor becomes increasingly familiar with, and thus more accepting of, the EMPr and implements it with the same diligence as any other set of specifications contained within the contract.

Ultimately, by measuring compliance against an explicit set of environmental controls that are well located within a robust legal framework, the approach has been proven to enhance success in the implementation and enforcement of the EMPr significantly.

16. ORGANISATIONAL STRUCTURE AND RESPONSIBILITY**Functions and Responsibilities for the Construction Phase**

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Project Manager, Site Manager and Environmental Control Officer for the construction phase of this project are as detailed below.

The Project Manager will:

- Ensure that Eskom and the Contractor are aware of all specifications, legal constraints and Eskom standards and procedures pertaining to the project specifically with regards to the environment.

- Ensure that all stipulations within the EMPr are communicated and adhered to by Eskom and its Contractor(s).
- Appoint a suitably qualified (preferably independent) environmental control officer (ECO) for the construction phase of the project. The name and contact details of the ECO must be submitted to the DEA for communication purposes after appointment.
- Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes.
- Be fully conversant with the Environmental Impact Assessment for the project, the conditions of the EA as amended and all relevant environmental legislation.

The Site Manager (Eskom's Representative) will:

- Be fully conversant with the Environmental Impact Assessment.
- Be fully conversant with the conditions of the Environmental Authorisation.
- Be fully conversant with the Environmental Management Programme.
- Be fully conversant with all relevant environmental legislation and Eskom environmental policies and procedures, and ensure compliance with these.
- Have overall responsibility for the implementation of the EMPr.
- Conduct audits to ensure compliance to the EMPr.
- Liaise with the Project Manager or his delegate, the Environmental Control Officer and relevant discipline Engineers on matters concerning the environment.
- Prevent actions that will harm or may cause harm to the environment, and take steps to prevent pollution on the site.
- Confine activities to the demarcated construction site.

The Environmental Control Officer will:

- Be fully conversant with the Environmental Impact Assessment.
- Be fully conversant with the conditions of the Environmental Authorisation.
- Be fully conversant with the Environmental Management Programme.

- Be fully conversant with all relevant environmental legislation and Eskom environmental policies and procedures, and ensure compliance with them.
- The ECO must on a daily basis, monitor project compliance with conditions of the Environmental Authorisation, environmental legislation, the EMPr and, the recommendations for mitigation contained in the final environmental impact assessment report and its appendices.
- Convey the contents of this document to the Contractor site staff and discuss the contents in detail with the Project Manager and Contractor.
- Undertake regular and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EMPr.
- Take appropriate action if the specifications contained in the EMPr are not followed.
- Monitor and verify that environmental impacts are kept to a minimum, as far as possible.
- Review and approve construction methods, with input from the Site Manager, where necessary.
- Ensure that activities on site comply with all relevant environmental legislation.
- In consultation with the Project Manager/Site Manager, order the removal of person(s) and/or equipment in contravention of the specifications of the EMPr.
- Compile progress reports on a regular basis, with input from the Site Manager, for submission to the Project Manager, including a final post-construction audit.
- The ECO shall submit once a month a copy of the monitoring/progress reports to be submitted in terms of the requirements of the construction EMPr within 10 (ten) days after completion of the monitoring/progress report, in writing, to the DEA. Should the reports indicate that there are significant detrimental environmental impacts, the DEA reserves the right to review its decision as indicated in the letter of authorisation.
- Liaise with the Site Manager regarding the monitoring of the site.
- Report to the Project Manager any non-compliance or remedial measures that need to be implemented.
- The ECO must in addition to the requirements contained in the EMPr also maintain the following on site and submit these to the environmental auditor during his/her audit:

- A daily site diary;
- A non-conformance register;
- A public complaints register; and
- A register of audits.

Contractors and Service Providers:

All contractors (including subcontractors and staff) and service providers are ultimately responsible for:

- Complying with the environmental management specifications;
- Submitting an obligatory Methods Statement for approval by the ECO before any work is undertaken;
- Adhering to any instructions issued by the Engineer/Project Manager on the advice of the ECO;
- Submitting a report at each site meeting which will document all incidents that have occurred during the period before the site meeting;
- Ensuring that the list of transgressions issued by the ECO in the site office is available on request;
- Maintaining a public complaints register;
- Arranging that all his employees and those of his subcontractors receive training before the commencement of construction.

Functions and Responsibilities for the Operational Phase

The Eskom Environmental Manager/Advisor will:

- Provide overall assurance to Eskom that environmental issues are appropriately addressed and managed at the various business units (= power stations);
- Develop and implement strategies on various issues such as Environmental management systems, air quality and waste;
- Be responsible for overall consolidation and reporting of environmental performance within Eskom;
- Liaise on a strategic level with Government and other stakeholders on a range of environmental issues;

The Safety, Health, Environment and Quality (SHEQ) Practitioner will:

- Implement an Environmental Management System (EMS) for the power station;
- Manage and report on station's environmental performance;
- Conduct internal environmental audits and co-ordinate external environmental audits;
- Liaise with statutory bodies such as DWEA on environmental performance and other issues;
- Conduct environmental training and awareness of the Power Station employees;
- Compile site-specific environmental policies and procedures;
- Advise the Power Station top management on environmental issues;
- Liaise with interested and affected parties on environmental issues of common concern.

17. SPECIFICATION STRUCTURE AND APPLICATION

These specifications are not exclusive and could, within reason, be expanded on or amended at any time during the contract by the Environmental Control Officer (ECO).

Method statements

Environmental practitioners are not specialists with regard to construction techniques. Therefore, so as not to hinder construction activities by stipulating elaborate, costly and/ or ineffective mitigation measures, the environmental specification is underpinned by a series of Method Statements, within which the Contractor is required to outline how they propose to mitigate any identified environmental risks. For example, if the specification states that "cement contaminated water shall not be allowed to contaminate the soil or adjacent watercourse", the Method Statement compiled by the Contractor would be required to outline how he or she intends to achieve this requirement.

In terms of the environmental specifications for the proposed 132 kv power lines, the Contractors must submit various written Method Statements to the Engineer and ECO as requested in the Specification.

For the purposes of the environmental specifications, a Method Statement is defined as *"a written submission by the Contractor to the Engineer in response to the Specification or a request by the Engineer, setting out the materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the*

Engineer when requesting the Method Statement, in such detail that the Engineer is enabled to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications”.

The Method Statement must cover applicable details with regard to:

- Retrofit (Construction) procedures,
- Materials and equipment to be used,
- Getting the equipment to and from site,
- How the equipment/ material will be moved while on site (including crane operation),
- How and where material will be stored,
- Removal of construction related waste,
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur,
- Timing and location of activities,
- Removal of fauna and flora;
- Removal of bees on site;
- Removal of snakes on site;
- Compliance/ non-compliance with the Specifications, and
- Any other information deemed necessary by the Engineer.

The environmental specifications set very stringent requirements in terms of the provision of Method Statements and the commencement of the activities they cover:

- Any Method Statement required by the Engineer/ECO or the specification must be produced within the timeframes specified by the Engineer or the specification (typically two weeks);
- The Contractor may not commence the activity covered by the Method Statement until it has been approved, except in the case of emergency activities and then only with the consent of the Engineer;
- The Engineer may require changes to a Method Statement if the proposal does not comply with the specification or if the proposed methodology carries an unreasonable risk of excessive damage to the environment;
- Approved Method Statements must be readily available on the site and must be communicated to all relevant personnel;

- The Contractor is required to carry out the activities covered by the Method Statement in accordance with the proposed approach; and
- Approval of the Method Statement does not absolve the Contractor from their obligations or responsibilities in terms of the Contract.

Site documentation and record keeping

The following documents must be kept on site:

- Access negotiations and physical access plans;
- Site instructions;
- Pre-construction audit report;
- Complaints register;
- Records of all remediation / rehabilitation activities;
- Copy of this EMPr;
- Copy of the Environmental Authorisation;
- Monthly compliance report;
- Environmental training records;
- Emergency response procedures.

The monthly compliance report should include:

- Complaints received from affected parties and details of the actions taken;
- Environmental incidents, spills of hazardous substances, etc.
- Environmental damage which requires rehabilitation;
- Damages of private property such as buildings or crops.

Environmental Awareness Training

Training is required for all personnel involved in the proposed project. This includes all employees working on the site including temporary laborers, contractors and subcontractors.

Training should cover:

- The importance of the EMPr;
- Specific details of the EMPr;
- Employees role in compliance with the EMPr;

- Environmental effects associated with the activities;
- Training targeted at specific personnel for example operators of heavy machinery;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures;
- Emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities;
- Environmental legal requirements and obligations;
- Details regarding floral/faunal species of special concern and protected species, and the procedures to be followed should these be encountered;
- The impacts and consequences of poaching of animals or removal of indigenous vegetation;
- The importance of not littering;
- The importance of using supplied toilet facilities;
- The need to use water sparingly;
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible.
- Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should such be encountered.

Training should be conducted by a suitably qualified person and if necessary in more than one language to ensure it is understood by all workers.

Copies of the environmental training must be available on site in languages appropriate to the work force.

Records of training session including attendance, nature of training and date of training should be kept to ensure all staff members have received the necessary training

In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices

throughout its duration. Environmental awareness and training is an important aspect of the implementation of the EMPr.

Environmental awareness could be fostered in the following manner:

- Induction course for all workers on site, before commencing work on site.
- Refresher courses as and when required.
- Daily toolbox talks at the start of each day with all workers coming on site, where workers might be alerted to particular environmental concerns associated with their tasks for that day or the area/habitat in which they are working.
- Courses must be given by suitably qualified personnel and in a language and medium understood by workers/employees.

Provisions for addressing non-conformance

Ultimately, the key to construction phase is ensuring that the requirements of the EMPr are adequately and appropriately implemented on site. Accordingly, monitoring performance and addressing non-compliance are key attributes of any environmental interventions. Part D addresses the actual process for identifying and addressing non-compliance, whilst this section provides an overview of the provision made for this in the environmental specification.

Broadly, the mechanisms for addressing non-compliance that are provided for in the environmental specifications and associated contract documentation can be divided into the following categories:

- Controlling performance via the certification of payments;
- Requiring the Contractor to “*make good*”, at their own cost, any unjustifiable environmental degradation;
- Implementing a system of penalties to dissuade environmentally risky behaviours; and
- Removing environmentally non-compliant staff/ plant from site, or suspending part or all of the activities on site.

Environmental considerations in adjudication of tender

In terms of this EMPr, Eskom has an obligation to ensure compliance by various parties with a suite of environmental requirements related to the construction phase. To ensure that these obligations continue to be fulfilling during the actual construction processes, it requires the Eskom team to ensure that the appointed Contractors possess the requisite

environmental management experience and expertise. Accordingly, it would be prudent for the Eskom team to ensure that environmental considerations form part of the contractual process undertaken during the appointment of contractors and consultants. Key considerations in this regard would be as follows:

- To request on appointment that the Contractor provide his environmental policy and indicate how this will influence the way the construction process is approached and managed on site. At the tender stage the Contractor would merely be asked to provide the overarching environmental policy for the Company or Joint Venture;
- To request as part of the tender process a list of the Contractor's previous experience in terms of the onsite implementation and management of environmental requirements;
- To request as part of the tender process an indication of the proposed organisational structure for the Contract, and specifically for the Contractor to indicate which staff would be acting in the capacity of Environmental Officer (EO) and which senior staff member would have overall responsibility for ensuring compliance by the Contractor with the specified environmental requirements; and
- To confirm, upon receipt of the Tender, that the Contractor has made sufficient allowance in his Tender Price for meeting the various environmental requirements.

During the tender adjudication process for each Contract, each Contractor should be scored in terms of the aforementioned considerations and allocated an environmental competency score. This score should form a key consideration in the final decision-making regarding the award of the various contracts.

18. ENVIRONMENTAL GUIDELINES, STANDARDS AND PERMITS

Legal Requirements and Considerations

- Environmental authorisation is granted only in terms of the National Environmental Management Act, the EIA regulations of 2010, and section 22 of the Environment Conservation Act, Act No. 73 of 1989, and does not exempt the holder thereof from compliance with any other legislation.
- One week's written notice must be given to the DEA before commencement of construction activities. Such notice shall make clear reference to the site location details and environmental authorisation reference number.
- The applicant must notify the DEA in writing, within 24 hours if any condition of this authorisation cannot or is not adhered to. The notification must be supplemented with reasons for non-compliance.
- Any changes to, or deviations from, the project description set out in the authorisation must be approved, in writing, by the DEA before such changes or deviations may be effected. In assessing whether to grant such approval or not, the DEA may request

such information as it deems necessary to evaluate the significance and impacts of such changes or deviations.

- Any complaint from the public during construction must be attended to as soon as possible to the satisfaction of the parties concerned. A complaints register must be kept up to date and shall be produced upon request.
- DEA officials shall be given access to the properties earmarked for construction activities for the purpose of assessing and /or monitoring compliance with the conditions contained in the environmental authorisation at all reasonable times.
- All outdoor advertising associated with this activity, whether on or off the property concerned, must comply with the South African Manual for Outdoor Advertising Control (SAMOAC).
- The applicant shall ensure that all the recommendations and mitigation measures as proposed in the Amended Final Basic Assessment Report and its appendixes, where applicable.
- All documents to be submitted to the DEA as referred to in the authorisation, must be submitted to the Director: Environmental Impact Evaluation at the DEA.
- A copy of the EA shall be available on site during construction and all staff, contractors and sub-contractors shall be familiar with or be made aware of the contents of the authorisation.
- Compliance/non-compliance records must be kept and shall be made available on request from the authorities within five days of receipt of the request.

Applicable legislation

The following is a summary of the applicable environmental legislation relevant and to be adhered to during the establishment of the new CSP Plant and associated infrastructure.

APPLICABLE LEGISLATION
National Legislation
Constitution of South Africa (Act No. 108 of 1996)
Environment Conservation Act (Act No. 73 of 1989)
National Environmental Management Act (Act No. 107 of 1998)
National Heritage Resources Act (Act No. 25 f 1989)
Hazardous Substances Act (Act No. 15 of 1973)
Occupational Health and Safety Act (Act No. 85 of 1993)
National Road Traffic Act (Act No. 93 of 1996)
Atmospheric Pollution Prevention Act (Act No. 45 of 1965)
National Water Act (Act No. 36 of 1998)
Conservation of Agricultural Resources Act (Act No. 43 of 1983)
National Veld and Forest Fire Act (Act No. 101 of 1998)
Health Act (Act No. 63 of 1977)
National Environmental Management: Air Quality Act (Act No. 39 of 2004)
National Environmental Management: Biodiversity Act (Act No. 10 of 2004)

National Environmental Management: Waste Act (Act No. 59 of 2008)
National Forest Act (Act No. 84 of 1998)
Northern Cape Nature Conservation Act (Act No. 9 of 2009)
Agricultural Pests Act (Act No. 36 of 1983)
Water Services Act (Act No. 108 of 1997)
Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)
National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
Fencing Act (Act No. 31 of 1963)
National Building Regulations and Building Standards Act (Act No. 103 of 1977)
Disaster Management Act (Act No. 57 of 2002)
Provincial Legislation
Cape Nature and Environmental Conservation Ordinance (Ordinance No. 19 of 1974)

Environmental Guidelines and Standards

All applicable environmental standards contained within the environmental legislation will be adhered to. At the time of compiling this EMP, the following environmental guidelines and standards were identified as being applicable.

Control of Alien Vegetation

In terms of Government Notice R1048, the following regulations are applicable with regards to the control of invasive alien vegetation and declared weeds:

- It is illegal to have declared weed species or invasive alien vegetation on one's property.
- The landowner must immediately take steps to eradicate them by using the methods prescribed in the regulations, namely:
 - uprooting and burning, or
 - the application of a suitable chemical weed-killer (herbicide), or
 - any other method of permanent eradication.
- One may not uproot or remove such plants and dump or discard them elsewhere to re-grow or allow their seeds to be spread or blown onto other properties.
- If the landowner does not comply with requirements above, a person may be found guilty of a criminal offence.

Waste Disposal

- All waste (general and hazardous) generated during construction may only be disposed of at appropriately licensed waste disposal sites (in terms of Section 20 of the Environment Conservation Act, No 73 of 1989 and NEMWA, No 59 of 2008).

- Cognisance must also be taken of the relevant provincial legislation in this regard. It will be noted that all controlling authority regulations pertaining to litter in terms of the Environment Conservation Act (sections 19, 19A and 24A) have been delegated to the provinces.

Noise Control Regulations

The National Noise Control Regulations (NCR) of the Environment Conservation Act (No 73 of 1989), Government Notice No. R55 of 14 January 1994, apply for this project. In terms of these Regulations, noise measurement and assessment is undertaken in compliance with the South African National Standard SANS 10103 for “The measurement and rating of environmental noise with respect to annoyance and to speech communication” in order to determine the suitability of an environment with respect to possible annoyance (i.e. whether complaints could be expected). Section 8.4 of the Standard states that it is highly probable that the noise under investigation is annoying or otherwise intrusive to a community, or a group of persons, if the rating level (L_r) of the measured ambient noise (including the noise under investigation) exceeds that of the measured residual noise (in the absence of the noise under investigation), or if the residual noise cannot be measured, exceeds the typical rating level for ambient noise in different districts as set out in Table 2 of the SANS Standard. Typical noise rating levels for ambient noise in districts are shown in Table 2.

Table 4: Typical noise rating levels for ambient noise in districts

Type of District	Equivalent Continuous Rating Level for Noise ($L_{Req,T}$) (dBA)					
	Outdoors			Indoors with open windows		
	Day-night ($L_{R,dn}$)	Daytime ($L_{Req,d}$)	Night-time ($L_{Req,n}$)	Day-night ($L_{R,dn}$)	Daytime ($L_{Req,d}$)	Night-time ($L_{Req,n}$)
RESIDENTIAL DISTRICTS						
a) Rural districts	45	45	35	35	35	25
b) Suburban districts (little road traffic)	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
NON RESIDENTIAL DISTRICTS						
d) Urban districts (some workshops, business premises and main roads)	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50

18.1. ENVIRONMENTAL PERMITTING REQUIREMENTS

Environmental permits, which will be required to be obtained for construction and operation, are discussed briefly below. These will be required to be obtained before construction commences.

Protected Plants

In terms of the National Forest Act (No 84 of 1998), as amended, and GN 716 of 7 September 2012 (for protected tree species), and the Northern Cape Nature Conservation Act (Act 9 of 2009), the removal, relocation or pruning of any protected plants will require a permit.

Some protected indigenous plants in general are controlled under the relevant Provincial Acts dealing with nature conservation, most notably the Northern Cape Nature Conservation Act (Act 9 of 2009).

Protected species that may occur within the corridor include *Nerine laticoma*, *Harpagophyllum procumbens*, a *Lachenalia* sp., and *Hoodia gordonii*. Images of these species are presented below in Table 5 to facilitate identification of these species by the ECO, project and site manager, and all site staff. Application for a permit or licence from the Northern Cape Department of Environment and Nature Conservation (NC DENC) and National Department of Agriculture, Forestry and Fisheries (DAFF) will be required to relocate or remove any of the protected species identified within the CSP site footprint. For obtaining the permit application forms for removal of protected plant species within the power line servitude contact the Permit Section of Nature Conservation at the provincial Department of Environment and Nature Conservation (DENC) in Kimberley for more information. It should be noted that no protected plant may be removed or disturbed without a license from DAFF and a permit from Nature Conservation (depending on the species involved).

Table 5: Protected species that may occur within the study site



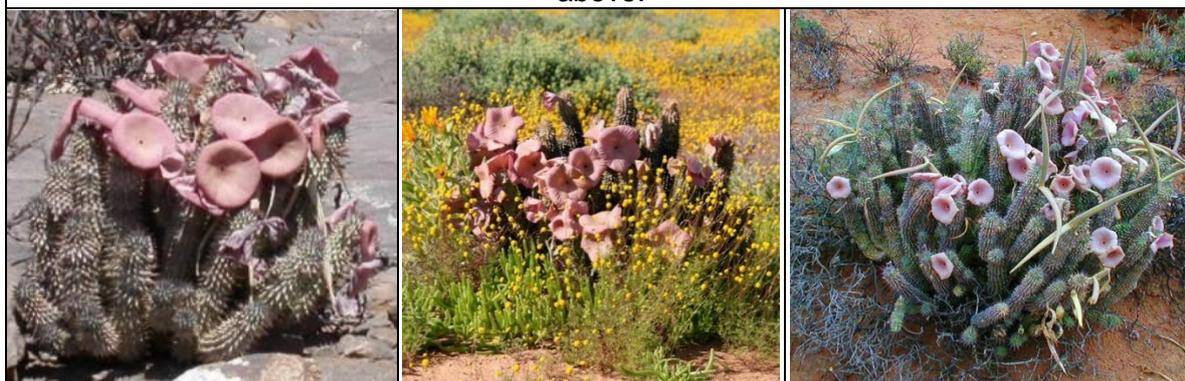


Harpagophyllum procumbens



Lachenalia sp

All *Lachenalia* spp are protected in terms of the Nature and Environmental Conservation Ordinance (No. 19 of 1974). Some examples of the Northern Cape species are included above.



Hoodia gordonii

During the public participation process followed representatives of the South African San Council, Griqua National Council and National Khoisan Council indicated that they would like to be involved during the site preparation phase of the project in order to harvest any plants on site for medicinal purposes. Where protected plant species of medicinal value is identified prior to commencement of construction on the CSP site representatives of the South African San Council, Griqua National Council and National Khoisan Council must be contacted to

provide an opportunity to collect and remove (with the appropriate permits for medicinal use) plant species such as *Harpagophyum procumbens*. Contact details of representatives of these councils are provided in Table 6 below.

Table 6: Contact details of representatives of the San, Khoisan and Griqua Councils

Council representative	Telephone	Email
Mr Collin Louw, South African San Council	054 339 0327	wclouw@yahoo.co.uk
Chief Stanley Peterson, Griqua National Council	079 382 7441	royalchiefgriekwa@yahoo.com
Mr William Peterson, National Khoisan Council		royalchiefgriekwa@yahoo

Threatened or protected tree species that do occur within the study site are listed below.

***Acacia erioloba* aka Camel Thorn, Kameeldoring / Mogohlo (NS) / Mogôthô (T)**

The area around Kathu is especially rich in these trees and they occur sporadically throughout the study area. These trees can become quite large and range from a 2m spiny shrub to a 16m robust tree as shown below. Due to the potential height of these trees it is anticipated that they might require removal or pruning prior to construction of the power lines.

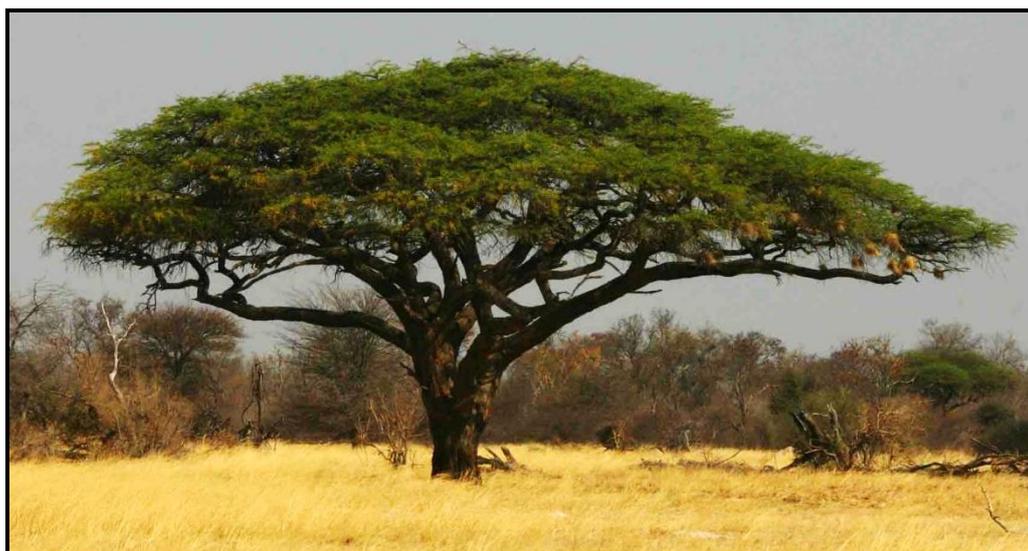


Figure 5: *Acacia erioloba*

***Acacia haematoxylon* aka Grey Camel Thorn, Vaalkameeldoring (A) / Mokholo (T)**

This species can vary from a shrub to medium-sized tree, 1.5 – 6m tall with an irregular crown. These trees are characteristic of the semi-desert and desert areas in South Africa. They occur on deep sandy soils and dunes as a shrub and larger specimens are found along drainage lines.



Figure 6: *Acacia haematoxylon* (foreground) and *A. erioloba* (background)

***Boscia albitrunca* aka *Shepherd's tree*, *Witgat* (A) / *Mohlôpi* (NS) / *Motlhôpi* (T) / *Muvhombwe* (V) / *Umgqomogqomo* (X) / *Umvithi* (Z)**

The Shepard's tree is the one tree in the Kalahari that does not shed its leaves, and hence provides a shady spot for animals and humans (hence the name). This small evergreen tree is characterised by an umbrella-shaped much branched crown and smooth white to grey bark. It is widespread throughout the study area covering almost all habitats (Figure 8).



Figure 7: *Boscia albitrunca* Shepard's Tree

***Euclea pseudobenus* aka *Ebony tree, Ebbeboom* (A)**

The Ebony tree is a shrub to medium sized tree with slender drooping branches that is commonly found along watercourses and depressions in semi-desert and desert areas (Figure 8). The heartwood is pitch black (hence the common name) and used for construction and fuelwood. This tree can be found along the watercourses, especially the Orange and Hartbees River floodplains.

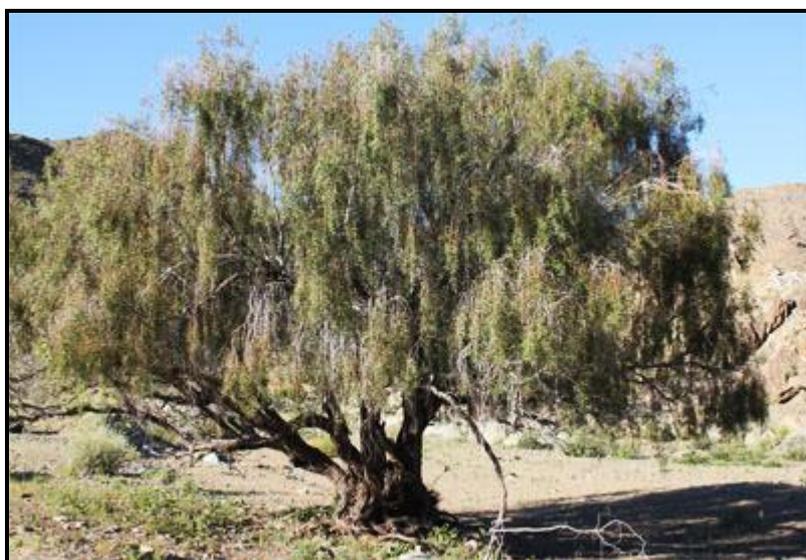


Figure 8: *Euclea pseudobenus* Ebony Tree

***Olea europaea* subsp. *africana* aka *Wild Olive, Olienhout* (A), *Mohlware* (NS, SS), *umNquma* (Z, X, S), *Mutlhware* (V), *Motlhware* (T)**

The Wild olive is a small to medium-sized evergreen tree with a dense rounded crown and green foliage occurring in a wide variety of habitats as shown below. In the case of the study area a few individuals were identified in the floodplains of the Orange River.



Figure 9: *Olea europaea* Wild Olive

In terms of the National Environmental Management: Biodiversity Act (NEM: BA, Act 10 of 2004) and the IUCN website the study area could also contain the following endangered species:

- **Aloe pillansii** (Bastard Quiver Tree)
 - Status: Critically Endangered
- **Aloe ramosissima** (Maiden's Quiver Tree)
 - Status: Vulnerable
- **Mystromys albicaudatus** (White-tailed Mouse)
 - Status: Endangered
- **Pachypodium namaquanum** (Elephant's Trunk)
 - Status: Lower Risk/near threatened
- **Manis temminckii** (Pangolin)
 - Status: Vulnerable
- **Panthera pardus** (Leopard)
 - Status: Vulnerable

The applicant must ensure that the relevant licences are obtained from DAFF prior to the start of construction.

Abstraction of Water

Water for construction and operational activities will be supplied via a pipeline from the //Khara Hais Local Municipality. However, in the event that water is required to be abstracted from the Orange River it will then be necessary to obtain a water use authorisation from DWA in terms of Section 21, 40 and 41 of the National Water Act (No 36 of 1998).

Heritage Sites

No major heritage resources or artefacts were identified along the power line corridor during the environmental impact assessment. If however any heritage artefacts were to be discovered during excavation the procedures outlined in section **Error! Reference source not found.** for the management of heritage resources must be followed and adhered to.

In terms of the National Heritage Resources Act (No 25 of 1999), a permit is required to be obtained for the disturbance, removal or destruction of any national and provincial heritage sites, archaeological and palaeontological sites, burial grounds and graves and public monuments and memorials. Structures older than 60 years are also protected by the National Heritage Resources Act, 1999 (Act No. 25 of 1999).

Borrow pits and fill material requirements

Should fill material be required for any purpose, the use of borrow pits must comply with the provisions of the Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) administered by the Department of Minerals and Energy. No indigenous and/or protected vegetation or part thereof may be removed without the required permits from the relevant Provincial Nature Conservation Departments.

Public Health

Ablution facilities must be approved by the nearest local authority in terms of their by-laws and relevant provincial standard by-laws. These facilities do not fall under provisions of the National Water Services Act (No 108 of 1997). Chemical toilets for temporary purposes must be provided on site and must be emptied at regular intervals.

19. ENVIRONMENTAL MANAGEMENT MEASURES FOR THE PROJECT

The management measures documented in each of the sub-sections below have been compiled using the following information:

- Impact Assessment and mitigation measures documented in the BAR for the proposed 132 kv lines;
- Mitigation and management recommendations provided by the specialist studies.

In addition to the abovementioned information sources, the EMPr will be updated to include the conditions documented in the Environmental Authorisation (EA) to be received upon approval of the Basic Assessment (BA).

19.1. PLANNING PHASE

To mitigate the negative environmental impacts, a number of measures would have to be addressed in the design of the salvage during the planning phase. An inspection must be carried out on the design before commencement of the upgrade in order to ensure that the mitigation measures have been incorporated in the design.

Table 7: Impacts, Management/ Mitigation Measures during the Planning Phase

Planning Phase		
Environmental Consideration	Mitigation Measures	Responsible Party(ies)
Training and Health and Safety	<ul style="list-style-type: none"> Eskom is to appoint an ECO 	Project Manager
	<ul style="list-style-type: none"> Introduce the ECO to the Project Team. 	Project Manager
	<ul style="list-style-type: none"> Training of the Contractor's employees on the EMPr Elucidation of environmental monitoring protocol to the Project Team by the ECO. 	ECO
	<ul style="list-style-type: none"> All correspondence from ECO must be filed and kept on site. 	Project Manager and ECO
	<ul style="list-style-type: none"> Staff responsible for construction should be issued with the appropriate PPE and trained in safe working procedures concerning the various processing action. 	Project Manager
Construction Camp/laydown area	<ul style="list-style-type: none"> In consultation with the ECO, demarcate the suitable site identified for the laydown area. The site office as well as parking areas for construction vehicles should be confined to disturbed areas, away from drainage lines. 	Contractor and the ECO
	<ul style="list-style-type: none"> Chemical toilets must be provided at a ratio of at least one per 15 employees in terms of ablution facilities. Chemical toilets must be serviced and emptied on a regular basis to avoid leaks and spillage. Camp sites must be negotiated with the land owner. No fires or dumping of waste to take place at the camp sites. Landowners must be notified and negotiated with where construction camps may be established on their property. Access procedures to privately owned land must be negotiated with the land owners. No chemical toilet may be within 100 m of a natural water body. 	Project Manager, Contractor
Waste	<ul style="list-style-type: none"> Identify suitable hazardous/general Waste Disposal Sites which will accept waste material to be generated. Provide a plan for the collection, storage and transport of waste a recognized landfill site. All metal off-cuts and metal waste must be recycled. 	Project Manager, Contractor
Social	<ul style="list-style-type: none"> Local suppliers must be used, as far as possible; and Local labour should be employed. Communicate in a cultural sensitive way the next phase of project. Communicate process in language of choice. 	Eskom and Contractor
Designs	<ul style="list-style-type: none"> Ensure that the retrofit is designed to fit inside the existing casing. 	Eskom
Vehicles	<ul style="list-style-type: none"> Ensure that all machinery on site is in a good working order. 	Contractor

19.2. COMPLIANCE WITH EA PRE-CONSTRUCTION WALK-DOWN CONDITIONS

The EA stipulated a number of conditions to which Eskom had to adhere before construction could commence. Pertinent conditions to be adhered to prior to construction include the following:

24. A heritage specialist must be commissioned to perform a final walkthrough of the site once the final route alignment and tower positions have been identified. All heritage sensitivities, if any, must be recorded and avoided and a specialist report must be submitted to the Department for approval prior to construction.
25. An avifaunal specialist must be commissioned to perform a final walkthrough of the site once the final route alignment and tower positions have been identified. The exact pylon/tower coordinates must be geo-referenced and forwarded to this Department. This specialist report must be submitted to the the Department for approval prior to construction.
26. Anti-collision devices such as bird flappers must be installed where powerlines crosses avifaunal corridors, as recommended by the avifaunal specialist. The input of an avifaunal specialist must be obtained for the fitting of anti-collision devices onto specific sections of the line once the exact positions of the towers have been surveyed and pegged
27. A botanist must be appointed to perform a final walkthrough of the alignment to identify sensitive plant species, and assist in identifying the areas that require protection.
28. A permit must be obtained from the relevant nature conservation agency for the removal or destruction of indigenous protected and endangered plant and animal species.

Compliance with conditions 24, 25, 26, and 28 as stipulated in the EA are discussed and demonstrated in the subsequent sections.

19.3. SERVITUDE NEGOTIATIONS

The double circuit 132kV powerline runs parallel to an, and within an existing, powerline servitude with Eskom being the owner of that servitude. The proposed tower infrastructure is provided in **Table 8** below.

Table 8: Proposed tower locations

Tower No.	Ref.	Latitude (DMS)	Longitude (DMS)	Date of Assessment	Land Owner
GOR-UPI 1		21° 17' 37.942" E	28° 25' 50.934" S	18 August 2016	Existing Eskom servitude
GOR-UPI 2		21° 17' 37.408" E	28° 25' 49.399" S		Existing Eskom servitude
GOR-UPI 3		21° 17' 34.318" E	28° 25' 47.398" S		Existing Eskom servitude
GOR-UPI 4		21° 17' 27.910" E	28° 25' 48.281" S		Existing Eskom servitude
GOR-UPI 5		21° 17' 18.795" E	28° 25' 49.535" S		Existing Eskom servitude
GOR-UPI 6		21° 17' 09.708" E	28° 25' 50.786" S		Existing Eskom servitude
GOR-UPI 7		21° 17' 00.840" E	28° 25' 52.007" S		Existing Eskom servitude
GOR-UPI 8		21° 16' 52.256" E	28° 25' 53.188" S		Existing Eskom servitude
GOR-UPI 9		21° 16' 43.896" E	28° 25' 54.338" S		Existing Eskom servitude
GOR-UPI 10		21° 16' 34.253" E	28° 25' 55.665" S		Existing Eskom servitude
GOR-UPI 11		21° 16' 24.795" E	28° 25' 56.966" S		Existing Eskom servitude
GOR-UPI 12		21° 16' 15.907" E	28° 25' 58.188" S		Existing Eskom servitude
GOR-UPI 13		21° 16' 07.711" E	28° 25' 59.315" S		Existing Eskom servitude
GOR-UPI 14		21° 16' 01.849" E	28° 25' 53.346" S		Existing Eskom servitude
GOR-UPI 15		21° 15' 55.383" E	28° 25' 46.760" S		Existing Eskom servitude
GOR-UPI 16		21° 15' 48.532" E	28° 25' 39.783" S		Existing Eskom servitude
GOR-UPI 17		21° 15' 42.513" E	28° 25' 33.654" S		Existing Eskom servitude
GOR-UPI 18		21° 15' 36.236" E	28° 25' 27.261" S		Existing Eskom servitude
GOR-UPI 19		21° 15' 29.765" E	28° 25' 20.669" S		Existing Eskom servitude
GOR-UPI 20		21° 15' 23.273" E	28° 25' 14.056" S		Existing Eskom servitude
GOR-UPI 21		21° 15' 16.974" E	28° 25' 07.640" S		Existing Eskom servitude
GOR-UPI 22		21° 15' 10.721" E	28° 25' 01.270" S		Existing Eskom servitude
GOR-UPI 23		21° 15' 04.485" E	28° 24' 54.917" S		Existing Eskom servitude
GOR-UPI 24		21° 14' 53.847" E	28° 24' 53.474" S		Existing Eskom servitude
GOR-UPI 25		21° 14' 44.555" E	28° 24' 52.213" S		Existing Eskom servitude
GOR-UPI 26		21° 14' 34.682" E	28° 24' 50.873" S		Existing Eskom servitude
GOR-UPI 27		21° 14' 25.042" E	28° 24' 49.565" S		Existing Eskom servitude
GOR-UPI 28		21° 14' 15.242" E	28° 24' 48.235" S		Existing Eskom servitude
GOR-UPI 29		21° 14' 06.133" E	28° 24' 46.998" S		Existing Eskom servitude
GOR-UPI 30		21° 13' 56.531" E	28° 24' 45.694" S		Existing Eskom servitude
GOR-UPI 31		21° 13' 46.683" E	28° 24' 44.357" S		Existing Eskom servitude
GOR-UPI 32		21° 13' 36.429" E	28° 24' 42.964" S		Existing Eskom servitude
GOR-UPI 33		21° 13' 26.184" E	28° 24' 41.572" S		Existing Eskom servitude
GOR-UPI 34		21° 13' 15.869" E	28° 24' 40.171" S		Existing Eskom servitude
GOR-UPI 35		21° 13' 05.694" E	28° 24' 38.788" S		Existing Eskom servitude
GOR-UPI 36		21° 12' 56.047" E	28° 24' 37.477" S		Existing Eskom servitude
GOR-UPI 37		21° 12' 46.101" E	28° 24' 36.125" S		Existing Eskom servitude
GOR-UPI 38		21° 12' 37.352" E	28° 24' 34.935" S		Existing Eskom servitude
GOR-UPI 39		21° 12' 27.177" E	28° 24' 33.552" S		Existing Eskom servitude
GOR-UPI 40		21° 12' 16.750" E	28° 24' 32.134" S		Existing Eskom servitude
GOR-UPI 41		21° 12' 05.908" E	28° 24' 30.659" S		Existing Eskom servitude
GOR-UPI 42		21° 11' 56.004" E	28° 24' 29.312" S		Existing Eskom servitude
GOR-UPI 43		21° 11' 47.874" E	28° 24' 35.913" S		Existing Eskom servitude
GOR-UPI 44		21° 11' 40.327" E	28° 24' 42.040" S		Existing Eskom servitude
GOR-UPI 45		21° 11' 37.489" E	28° 24' 47.914" S		Existing Eskom servitude

Tower No.	Ref.	Latitude (DMS)	Longitude (DMS)	Date of Assessment	Land Owner
GOR-UPI 46		21° 11' 33.443" E	28° 24' 56.288" S		Existing Eskom servitude
GOR-UPI 47		21° 11' 29.176" E	28° 25' 05.118" S		Existing Eskom servitude
GOR-UPI 48		21° 11' 25.337" E	28° 25' 13.063" S		Existing Eskom servitude
GOR-UPI 49		21° 11' 21.023" E	28° 25' 21.989" S		Existing Eskom servitude
GOR-UPI 50		21° 11' 16.710" E	28° 25' 30.915" S	17 August 2016	Existing Eskom servitude
GOR-UPI 51		21° 11' 12.463" E	28° 25' 39.701" S		Existing Eskom servitude
GOR-UPI 52		21° 11' 08.171" E	28° 25' 48.581" S		Existing Eskom servitude
GOR-UPI 53		21° 11' 04.812" E	28° 25' 55.531" S		Existing Eskom servitude
GOR-UPI 54		21° 11' 00.525" E	28° 26' 04.399" S		Existing Eskom servitude
GOR-UPI 55		21° 10' 56.382" E	28° 26' 13.286" S		Existing Eskom servitude
GOR-UPI 56		21° 10' 52.238" E	28° 26' 22.172" S		Existing Eskom servitude
GOR-UPI 57		21° 10' 48.095" E	28° 26' 31.058" S		Existing Eskom servitude
GOR-UPI 58		21° 10' 43.951" E	28° 26' 39.944" S		Existing Eskom servitude
GOR-UPI 59		21° 10' 39.807" E	28° 26' 48.830" S		Existing Eskom servitude
GOR-UPI 60		21° 10' 35.663" E	28° 26' 57.716" S		Existing Eskom servitude
GOR-UPI 61		21° 10' 31.519" E	28° 27' 06.602" S		Existing Eskom servitude
GOR-UPI 62		21° 10' 27.374" E	28° 27' 15.488" S		Existing Eskom servitude
GOR-UPI 63		21° 10' 23.230" E	28° 27' 24.374" S		Existing Eskom servitude
GOR-UPI 64		21° 10' 19.085" E	28° 27' 33.260" S		Existing Eskom servitude
GOR-UPI 65		21° 10' 14.979" E	28° 27' 42.060" S		Existing Eskom servitude
GOR-UPI 66		21° 10' 11.034" E	28° 27' 50.518" S		Existing Eskom servitude
GOR-UPI 67		21° 10' 06.768" E	28° 27' 59.662" S		Existing Eskom servitude
GOR-UPI 68		21° 10' 02.662" E	28° 28' 08.462" S		Existing Eskom servitude
GOR-UPI 69		21° 09' 58.556" E	28° 28' 17.262" S		Existing Eskom servitude
GOR-UPI 70		21° 09' 54.450" E	28° 28' 26.063" S		Existing Eskom servitude
GOR-UPI 71		21° 09' 50.344" E	28° 28' 34.863" S		Existing Eskom servitude
GOR-UPI 72		21° 09' 46.237" E	28° 28' 43.663" S		Existing Eskom servitude
GOR-UPI 73		21° 09' 42.130" E	28° 28' 52.464" S		Existing Eskom servitude
GOR-UPI 74		21° 09' 38.023" E	28° 29' 01.264" S		Existing Eskom servitude
GOR-UPI 75		21° 09' 33.886" E	28° 29' 10.125" S		Existing Eskom servitude
GOR-UPI 76		21° 09' 29.853" E	28° 29' 18.760" S		Existing Eskom servitude
GOR-UPI 77		21° 09' 25.792" E	28° 29' 27.457" S		Existing Eskom servitude
GOR-UPI 78		21° 09' 22.811" E	28° 29' 33.839" S		Existing Eskom servitude
GOR-UPI 79		21° 09' 20.045" E	28° 29' 39.763" S		Existing Eskom servitude
GOR-UPI 80		21° 09' 16.447" E	28° 29' 47.465" S		Existing Eskom servitude
GOR-UPI 81		21° 09' 12.850" E	28° 29' 55.168" S		Existing Eskom servitude
GOR-UPI 82		21° 09' 09.252" E	28° 30' 02.871" S		Existing Eskom servitude
GOR-UPI 83		21° 09' 05.654" E	28° 30' 10.573" S		Existing Eskom servitude
GOR-UPI 84		21° 09' 02.056" E	28° 30' 18.275" S		Existing Eskom servitude
GOR-UPI 85		21° 08' 58.458" E	28° 30' 25.978" S		Existing Eskom servitude
GOR-UPI 86		21° 08' 54.860" E	28° 30' 33.680" S	Existing Eskom servitude	
GOR-UPI 87		21° 08' 51.261" E	28° 30' 41.383" S	Existing Eskom servitude	
GOR-UPI 88		21° 08' 47.663" E	28° 30' 49.085" S	Existing Eskom servitude	
GOR-UPI 89		21° 08' 42.361" E	28° 30' 57.144" S	Existing Eskom servitude	
GOR-UPI 90		21° 08' 37.287" E	28° 31' 04.855" S	Existing Eskom servitude	

Tower No.	Ref.	Latitude (DMS)	Longitude (DMS)	Date of Assessment	Land Owner
GOR-UPI 91		21° 08' 31.856" E	28° 31' 13.108" S		Existing Eskom servitude
GOR-UPI 92		21° 08' 26.405" E	28° 31' 21.393" S		Existing Eskom servitude
GOR-UPI 93		21° 08' 20.889" E	28° 31' 29.775" S		Existing Eskom servitude
GOR-UPI 94		21° 08' 15.347" E	28° 31' 38.196" S		Existing Eskom servitude
GOR-UPI 95		21° 08' 9.811" E	28° 31' 46.608" S		Existing Eskom servitude
GOR-UPI 96		21° 08' 4.266" E	28° 31' 55.034" S		Existing Eskom servitude
GOR-UPI 97		21° 07' 58.736" E	28° 32' 03.434" S		Existing Eskom servitude
GOR-UPI 98		21° 07' 53.781" E	28° 32' 10.963" S		Existing Eskom servitude
GOR-UPI 99		21° 07' 54.350" E	28° 32' 16.761" S		Existing Eskom servitude
GOR-UPI 100		21° 07' 59.326" E	28° 32' 21.986" S		Existing Eskom servitude
GOR-UPI 101		21° 08' 4.303" E	28° 32' 27.212" S		Existing Eskom servitude
GOR-UPI 102		21° 08' 9.280" E	28° 32' 32.437" S		Existing Eskom servitude
GOR-UPI 103		21° 08' 14.257" E	28° 32' 37.662" S		Existing Eskom servitude
GOR-UPI 104		21° 08' 15.143" E	28° 32' 38.593" S		Existing Eskom servitude

19.4. CORRIDOR WALK-DOWN

19.4.1. Introduction

A corridor walk-down was undertaken from 17 to 18 August 2016 from the Gordonia substation to the Upington/Solar Park substation approximately 26km to the West of the Gordonia substation just outside the town of Upington. One hundred and four (104) proposed tower locations were visited along the proposed 31m servitude, which is paralleled and mostly within an existing servitude.

19.4.2. Objectives of the walk-down

The objective of the walk-down was to visit all the proposed tower locations (104 tower positions) in order to:

- Identify any sensitive heritage resources/features that must be avoided or mitigated;
- Identify possible raptor nests within 1 km of the proposed tower location;
- Identify power line spans that must be fitted with bird flight diverters;
- Identify any protected or endangered plant species that must be avoided or relocated;
- Identify relevant relocation permits to remove or relocate protected or endangered plant species;
- Identify tower locations that must be moved to avoid sensitivities and appropriate recommendations; and
- Identify and mitigate any other sensitivity encountered within the tower footprint or servitude.

19.4.3. Walk-down team

The professional team that undertook the walk-down and/or studies are included in Table 9 below.

Table 9: Specialist walk-down team

Team member	Company	Designation / Role
Gernie Agenbag	Zitholele Consulting	Environmental assessment Practitioner
Mathew Ross	Enviross	Aquatic/Wetland Specialist
Aisling Dower	Golder Associates	Biodiversity & Avifaunal Specialist
Marko Hutten	PGS Heritage	Heritage Specialist
Graham Hector	Eskom	Project Surveyor
Thandinkosi Mtsotso	Eskom	Project Line Designer
Collin Mouton	Eskom	Project Clerks of Work
Anthony Japtha	Eskom	Project Coordinator
Sibulele Mdingi	Eskom	Project Environmental Practitioner

19.4.4. Walk-down procedure

The following procedure was followed during the walk-down assessment:

- The teams physically walked, or where terrain permitted was transported along the identified servitude to each tower location;
- Each tower position was inspected and the tower footprint area assessed and photographed;
- Any surrounding features or sensitivities were assessed, recorded and photographed, where possible;
- A team discussion between the specialists, Eskom technical team and EAP was undertaken at each site to discuss sensitivities and recommendation where moving of the tower position was required to avoid sensitivities;

A walk-down report and table with final tower positions and numbers was compiled and the proposed mitigation measures were indicated on a per tower basis.

19.4.5. Biodiversity Walk-down

The biodiversity walkdown findings and recommendations are summarised in section 6 of the Consolidated Walkdown (Appendix B) and presented in the specialist walkdown report (Appendix C).

Findings and recommendations in short are:

Protected Trees

An approximate total of 27 protected trees were recorded in the power line corridor. The species and numbers of protected trees and plants are summarised as follows:

- *Acacia erioloba* (Camel Thorn/Kameeldoring): this species is the most commonly recorded throughout the entire length of the power line corridor. Most trees encountered are small-medium sized specimens, with several larger trees also recorded;
- *Acacia haematoxylon* (Grey Camel Thorn/Vaal kameeldoring); this species was recorded less frequently (Figure 3); occurring between stands GOR-UPI 63 and GOR-UPI 87 where deep red Kalahari sands associated with the dune veld were more prevalent; and
- *Boscia albitrunca* (Shepherds' Tree/Witgat): this species was recorded throughout the entire length of the power line corridor, in both shrub and tree form.

Protected Plants

One protected plant species – devil's claw *Harpagophytum procumbens* – was observed at stand GOR-UPI 80. Numerous specimens of this plant, which is protected according to the Northern Cape Nature Conservation Act (2009), were present in this area. Its protected status means that it is illegal to dig it up without a permit from the relevant department of nature conservation.

One other protected plant species – *Aloe hereroensis* – was recorded at stand GOR-UPI 6. This plant is also protected according to the Northern Cape Nature Conservation Act (2009).

Other Features of interest

Two depressions were recorded at GOR-UPI 91 and approx. 100m meters of GOR-UPI 75. These would briefly hold water after rainfall and should be avoided in the interests of general biodiversity conservation, particularly for fauna for which these pooled water areas represent important water resources on occasion throughout the year.

Recommendations

- A protected tree clearing permit for the above-mentioned activities must be obtained from the Department of Agriculture, Forestry and Fisheries.
- It is recommended that the power line tower at stand GOR-UPI 91 be repositioned to avoid direct impacts to the depression at that location.

19.4.6. Wetland / Aquatic Walk-down

The wetland / aquatic walkdown findings and recommendations are summarised in section 6 of the Consolidated Walkdown (Appendix B) and presented in the specialist walkdown report (Appendix C).

Findings and recommendations in short are:

- The vast majority of the surface water habitat types within the survey area are minor drainage lines that are considered to be storm water drainage conduits rather than surface water ecosystems as surface water retention is typically short-lived and not sufficient to support permanent aquatic organisms.
- There is one tower (GOR-UPI-91) where the impacts imposed by the tower position are thought to be significant enough to recommend a shift in locality to outside of the buffer zones
- Erosion management at the local level should be implemented at applicable tower sites, although it is prudent to ensure erosion impacts do not occur at all construction points
- No fatal flaws to the tower positions were noted during the walk-down survey and there is only one tower position where it has been recommended be shifted in order to negate any negative ecological impacts emanating from the proposed development.
- It should be noted that the overall significance of the impacts that have been identified that may impact the surface water habitat units throughout the proposed development area is considered to be low to very low.

19.4.7. Avifaunal Walk-down

The avifaunal walkdown findings and recommendations are summarised in section 6 of the Consolidated Walkdown (Appendix B) and presented in the specialist walkdown report (Appendix C).

Findings and recommendations in short are:

- Given the suite of species likely to inhabit the study area and fact that the power line will be constructed using the steel mono-pole structure, which incorporates the standard bird perch, the significance of the electrocution risk posed to Red List species is considered negligible. Therefore, no further construction mitigatory requirements are recommended.

- Installation of bird flight diverters/bird flappers along identified spans:
 - GOR-UPI 24 – 38;
 - GOR-UPI 55 – 65; and
 - GOR-UPI 68 – 102.
- GOR-UPI 91 - It is recommended that the pole/tower be moved out of the small wetland/pan observed at this location.
- It is recommended that all construction activities be carried out according to generally accepted environmental best practices. Mitigation requirements detailed in the site specific Botanical CEMPr report must be implemented to ensure minimal impact in potential sensitive areas; and
- Existing roads must be used as far as possible for access during the construction phase of the project.

19.4.8. Heritage Walk-down

The heritage walkdown findings and recommendations are summarised in section 6 of the Consolidated Walkdown Report (Appendix B) and presented in the specialist walkdown report (Appendix C).

Findings and recommendations in short are:

- Stone age site between GOR-UPI 05 - GOR-UPI 06 – Demarcate the site as a no go area.
- Stone age site between GOR-UPI 08 - GOR-UPI 09 – Demarcate the site as a no go area.
- Initiation school approximately 500m North of GOR-UPI 50 - GOR-UPI 49 - The local community should be consulted to indicate the intentions of the proposed development of the power line. The community should be informed about the construction schedule of the proposed power line as it may impact on the privacy and intimate nature of this traditional institution.

19.4.9. Summary of Consolidated Walk-down Recommendations

A summary of all observations made, environmental sensitivities identified and technical constraints confirmed during the specialist walk-down are summarised in **Table 10** below.

Table 10: Walk-down observations, environmental sensitivities, technical constraints and proposed recommendations

Tower Ref. No.	Biodiversity	Wetland / Aquatic	Heritage	Technical Constraints	Proposed recommendations
GOR-UPI 05 - GOR-UPI 06	No sensitivities	No sensitivities	Not within suggested footprint, but demarcate the site as a no go area.	No sensitivities	Tower can remain at identified location.
GOR-UPI 08 - GOR-UPI 09	No sensitivities	No sensitivities	Not within suggested footprint, but demarcate the site as a no go area.	No sensitivities	Tower can remain at identified location.
GOR-UPI 24 – 38	Installation of bird flight diverters are expected to reduce bird collisions and mortality along the mitigated spans.	No sensitivities	No sensitivities	No sensitivities	Towers can remain at identified location.
GOR-UPI 55 – 65					
GOR-UPI 68 – 102					
GOR-UPI 50 - GOR-UPI 49	No sensitivities	No sensitivities	Initiation School - The local community should be consulted to indicate the intentions of the proposed development of the power line. The community should be informed about the construction schedule of the proposed power line as it may impact on the privacy and intimate nature of this traditional institution.	No sensitivities	Tower can remain at identified location.
GOR-UPI 91	It is recommended	Recommended that this	No sensitivities	No sensitivities	Tower to be moved to

Tower Ref. No.	Biodiversity	Wetland / Aquatic	Heritage	Technical Constraints	Proposed recommendations
	that the power line tower at stand GOR-UPI 91 be repositioned to avoid direct impacts to the depression at that location. Presence of pan at this pole/tower location	tower position be moved to outside of the buffer zones			outside of the sensitive area.
GOR-UPI 01 - GOR-UPI 104	<i>Acacia erioloba</i> and <i>Boscia albitrunca</i> are scattered throughout the powerline servitude, with occasional <i>Acacia haematoxylon</i> occurring where duneveld prevails. Some of these will need to be cleared or pruned to facilitate construction and operation of the powerline. A protected tree clearing permit for the above-mentioned activities must be obtained from the Department of Agriculture, Forestry and Fisheries.	No sensitivities	No sensitivities	No sensitivities	Towers can remain at identified location.

19.4.10. Other licence and permits applications

A Water Use Licence Application are currently being compiled and will be submitted to the Department of Water and Sanitation in the last quarter of 2016, prior to commencement of construction.

All protected trees and plant species permit applications in terms of the Department of Agriculture, Forestry and Fisheries (DAFF) and the Northern Cape Department of Environment and Nature Conservation (DENC) will be submitted by Eskom Holdings SOC Limited in the last quarter of 2016, prior to commencement of construction.

19.4.11. Walk-down recommendations and conclusion

All recommendations and mitigations proposed in sections 19.3.5 to 19.3.8 and **Table 10** above must be read in conjunction with the rest of the stipulations and mitigations in the EMPr and be effected by the applicant as part of the EMPr implementation prior, during and post-construction.

19.5. CONSTRUCTION PHASE

Sub-transmission lines are constructed in the following simplified sequence:

- Step 1:** Determination of technically feasible alternatives.
- Step 2:** Basic Assessment input into route selection and obtaining of relevant environmental permits and Authorisations.
- Step 3:** Negotiation of final route with affected landowners.
- Step 4:** Apply for necessary permits and licenses for vegetation clearance
- Step 5:** Survey of the route.
- Step 6:** Selection of best-suited structures and foundations.
- Step 7:** Final design of sub-transmission line and placement of towers.
- Step 8:** Issuing of tenders and award of contract to construction companies.
- Step 9:** Vegetation clearance and construction of access roads (where required).
- Step 10:** Pegging of structures.
- Step 11:** Construction of foundations.
- Step 12:** Assembly and erection of structures.
- Step 13:** Stringing of conductors.
- Step 14:** Rehabilitation of disturbed area and protection of erosion sensitive areas.
- Step 15:** Testing and commissioning.
- Step 16:** Continued maintenance.

Table 11: Impacts, Management/ Mitigation Measures during Construction Phase

Construction Phase		
Environmental Consideration	Mitigation Measures	Responsible Party(ies)
Soil	<ul style="list-style-type: none"> • Salvage and stockpile topsoil (top 30 cm of the soil profile). This soil can be returned to the construction area to encourage vegetation growth; • Topsoil shall not be stored higher than 1.5 m. • Avoid unnecessary removal of vegetation cover; • Use existing access roads as far as possible; • If a new road is constructed, ensure that the Eskom erosion prevention guideline is followed and adhere to the Eskom tower construction specification TRMSCAAC1 Rev 3; • Take land use into consideration when choosing pylon types, it is recommended that smaller footprint pylons be used in cultivated areas; • Avoid placement of pylon footings in clay soils as well as on dunes, towers to be sited in between dunes in the so-called dune-streets; • Avoid the construction of access roads through dunes; • Spread absorbent sand on areas where oil spills are likely to occur, such as the refuelling area in the hard park; • Oil-contaminated soils are to be removed to a contained storage area and bio-remediated or disposed of at a licensed facility; • Use berms to minimise erosion where vegetation is disturbed, including hard parks, plant sites, borrow pit and office areas; • If soils are excavated for the footing placement, ensure that the soil is utilised elsewhere for rehabilitation/road building purposes; and • Ensure that soil is stockpiled in such a way as to prevent erosion from wind/storm water. 	Contractor and ECO.
Air Quality	<ul style="list-style-type: none"> • Vehicles to be properly maintained to avoid unnecessary emissions. • The proposed construction operator should control on-site dust emissions by effective management and mitigation according to the existing procedures for the power lines. • Construction vehicles must travel at low speeds to reduce the effect of dust. • Where necessary spraying of haul roads with water or dust suppressant must be carried out to reduce dust generation. 	Contractor

Construction Phase		
Environmental Consideration	Mitigation Measures	Responsible Party(ies)
Fauna and Flora	<ul style="list-style-type: none"> • A walk through of the selected alignment as well as tower positions should be conducted by a suitable qualified botanist as well as zoologist in order to ascertain for the presence of any threatened, protected, endemic or plant or animal species of special concern within or in close proximity to the construction areas (tower supports) for the presence of any animal burrows (including spiders and scorpions), rocky outcrops, logs, stumps and other debris and relocate any affected animals to appropriate habitat away from the servitude or tower. • Protected trees within the servitude will necessitate that appropriate permits are applied for before these trees are damaged or removed. • General mitigation measures would include the avoidance of any physical damage to natural vegetation on the periphery of the proposed servitude and is of particular importance in all riparian areas and areas of steep slopes. • No construction activity or disturbance to vegetation or habitat is to take place within 50m of a delineated wetland or riparian zone. • No hunting permitted by Eskom employees or contractors. • All construction areas should be demarcated prior to construction to ensure that the footprint of impacts are limited. • All alien invasive species on site should be removed and follow up monitoring and removal programmes should be initiated once construction is completed. • Adhere to the Eskom vegetation management guideline. • The ECO should identify any sensitive species or habitats along the servitude, particularly in relation to large terrestrial species and notify the faunal specialist of these so that he can advise on how best to handle these. • The construction of new access roads should be limited. • All vehicle and pedestrian movement should be restricted to the actual construction site and servitude. • Mark powerlines with PVC spiral tyoe Bird Flight Diverters to reduce mortality rates. • Removal of plants should be restricted to only those trees that pose a risk to the powerline. • Sensitive alluvial vegetation should be avoided and construction restricted within 50m from the edge of an endangered habitat. 	Contractor/ECO

Construction Phase		
Environmental Consideration	Mitigation Measures	Responsible Party(ies)
Social	<ul style="list-style-type: none"> • Roads should be maintained or improved on. • Have a trained first aid person on site. • No squatter camps should be erected near construction camps. • HIV/AIDS awareness training must form part of the induction of staff. • Condoms must be freely available. • Access to construction camps should be security controlled. 	Eskom, Contractor
Aesthetics	<ul style="list-style-type: none"> • Sound housekeeping and waste management measures to be employed. • Location of construction camp to be determined by ECO to minimise visual intrusion. • Construction material to be stored in a neat and safe manner, in designated areas. • Waste should be restricted to storage in specifically designated areas, and removed daily. • Any complaints regarding the appearance of the construction site must be recorded and addressed promptly. • Ensure that all litter and pollution is cleared from the site (including remaining building rubble). 	Contractor;
Noise	<ul style="list-style-type: none"> • All machinery to be maintained and fitted with equipment to reduce noise levels. • Laborers to be provided with hearing protection (PPE). • No loud music allowed from the construction camp or anywhere else within the work footprint. • Construction working hours should be limited to 06:00 to 17:00 from Monday to Saturday with no construction taking place on Sundays. 	Contractor and Eskom
Heritage Resources	<ul style="list-style-type: none"> • Placement of infrastructure should avoid potential sites of high archaeological sensitivity such as pans, rocky ridges and river beds. • Where bedrock is disturbed there should be palaeontological monitoring in order to identify any potential sensitive areas that may be exposed. • Any cultural, archaeological or paleontological sites that are identified during construction should be reported to SAHRA and investigated by a Heritage Resources expert. • On uncovering a possible grave or burial site, it is imperative that construction cease • The grave must be fenced off and SAHRA must be notified immediately. 	Contractor, Eskom and ECO.

Construction Phase		
Environmental Consideration	Mitigation Measures	Responsible Party(ies)
Construction Materials	<ul style="list-style-type: none"> • Construction material must be stored under a roof or inside a suitable container. • The construction material must be mixed in designated areas, on impermeable surfaces. The batching plant must be bonded to prevent storm water entry, and to contain dirty water. • Material must be stored in a safe and neat manner. • Site offices, parking areas for construction vehicles should be confined to disturbed areas. • Mixing of concrete/cement must take place on impermeable surface, or where it is happening on site on a plastic liner. • All concrete spills must immediately be cleaned up. • Oil spill kits must be available on site. 	Contractor and ECO
Occupational Health and Safety	<ul style="list-style-type: none"> • All projects must be conducted in accordance with the Occupational Health and Safety Act (Act 85 of 1993). • The contact details of the Safety Officer/Representative should be provided to the ECO. • Safety induction must be expanded to include environmental risks and mitigation measures. <p>Fire prevention:</p> <ul style="list-style-type: none"> • At least two staff of the site contractor should be trained or be proficient in fire fighting and prevention, and at least one staff should be on site at all times. • Adequate fire fighting equipment should be available on site at all times. • The Contractor must take all the necessary precautions to protect the materials on site and to avoid fires. • No waste material may be burnt. • Designated areas must be provided, where smoking can occur in a controlled environment. • A firebreak will be maintained around the construction camp. • Eskom must establish if a Fire Protection Association (FPA) is established in the project area by contacting the DAFF Fire Advisor in Kimberley at (053) 807 2638. • Eskom will join an established FPA if established. • Provide area with relevant warning signage (e.g. no smoking and open fires, fire extinguisher). 	Contractor

Construction Phase		
Environmental Consideration	Mitigation Measures	Responsible Party(ies)
Waste	<ul style="list-style-type: none"> Littering on site and the surrounding areas is prohibited. Clearly marked litterbins must be provided on site. All bins must be cleaned of litter regularly. All general waste will be removed and disposed of at a registered Waste Disposal Site. The contractor must install and maintain mobile chemical toilets at work sites if existing facilities are not available. Drip trays must be used under all machinery, including generators and vehicles. 	Contractor
Sanitation	<ul style="list-style-type: none"> Under no conditions may the surrounding areas be used for ablution purposes. Sufficient chemical toilets to be provided (if no existing facilities are available). Chemical toilets to be placed at strategic points (with minimal visual impact). Chemical toilets must be professionally serviced and emptied on a regular basis. Chemical toilets must be provided at a ratio of at least 1 toilet per 15 employees on site. 	Contractor
Infrastructure, Vehicles and Plant Equipment	<ul style="list-style-type: none"> The equipment and plant to be used at for the power line construction must be suitable for the application and prevailing site conditions, of adequate rated capacity, in good working condition, and shall be so designed and constructed as to cause minimum environmental pollution. The plant, vehicles and equipment necessary for the operation shall be properly maintained and the vehicles serviced at the required service intervals to ensure road worthiness. All vehicles are inspected on a daily basis for roadworthiness. 	Contractor
Stakeholder Liaison	<ul style="list-style-type: none"> Access to the servitude and construction site must be negotiated with the landowners. Construction camp establishment on privately owned land must be negotiated with the land owner. All gates to privately owned land must be closed and/or locked at all times to minimize the disturbance to the land owner. Land owners should be notified when Eskom staff will be active on their property and when that activity will cease. Any changes to these schedules should be communicated to the land owner. 	

Operational Phase

Once construction of the power lines have been completed, the proposed operation is to be undertaken according to the existing operating procedure and associated procedures for transmission lines by Eskom.

The Responsible Party from Eskom will monitor the activities of the operational team on site to ensure all mitigatory measures are implemented and to prevent any additional impacts from occurring.

An annual Project Compliance Audit should be undertaken, which should focus on the adherence to the procedures.

Table 12: Impacts, Management/ Mitigation Measures during Construction Phase

Element	Management Plan
Hazards and Risks	<ul style="list-style-type: none"> • Regular checks and drills must be conducted to ensure that the risk and hazard control strategies are maintained up to date. • All monitoring will occur according to the risk management and emergency response plan, guidelines and license conditions. • A complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon. • If a report or drill indicates an error/omission in risk and hazard management procedures, then procedures must be altered or updated to ensure effective management. • If an incident occurs, then emergency procedures must be enacted to ensure all impacts are minimized.
Fauna and Flora	<ul style="list-style-type: none"> • The maintenance staff may not harm or kill any fauna during the activities of maintaining the power lines. • Wildlife interaction will be investigated by the Environmental Control Officer. • The active control of all alien invasive species by means of manual removal, ring-barking, chemical control or a combination of these methods. • The development of an avifauna impact monitoring programme. The Northern Cape Department of Environment and Nature Conservation has mentioned their interest in being involved in this process. • Ensure that a registered pest control operator applies or supervises the application of all herbicides. • Ensure that all herbicides are stored in a well-ventilated demarcated storage area. • Ensure that a register of all contents of the storage area is kept and updated on a regular basis. • Ensure that a daily register of all relevant details of herbicide usage is kept, and that such a register is maintained by the relevant Eskom custodian. • Maintenance of rehabilitated areas to ensure sustainability. • Observation by Project Manager on a regular basis. • A complaint register, in which any complaints from the community and landowners must be logged. Complaints must be investigated and, if

Element	Management Plan
	<p>appropriate, acted upon.</p> <ul style="list-style-type: none"> • Regular alien plant inspections (6 – 12 monthly). • An incident reporting system will record and manage follow up of resolution of non-conformances. • In the event of an incident, the Project Manager will write a report regarding the incident, and make recommendations. A follow up site inspection will be conducted by the Environmental Control Officer in order to assess the effectiveness of the recommendations.
Maintenance of rehabilitated areas	<ul style="list-style-type: none"> • Monitoring of plant growth in rehabilitated areas will be conducted on a weekly basis during initial phases and on a monthly basis when plants have become firmly established. • Vegetation must be replanted in areas where vegetation cover has decreased due to dieback, or has failed otherwise to successfully establish. • Noxious weeds, invasive and alien species will be controlled by pulling, cutting or any other means approved by the Site Manager. The use of herbicides will not be allowed unless specified by the Site Manager. Bare patches will be replanted.
Traffic and Transport	<ul style="list-style-type: none"> • All drivers will be in possession of an appropriate valid driver's license. • All maintenance vehicles travelling on public roads will adhere to the specified speed limits. • Speed limits will be adhered to on all roads. • The movement of all vehicles will be controlled such that they remain on designated routes. • No member of Eskom or the Contractor will be permitted to drive a vehicle under the influence of alcohol or narcotic substances. • No deviation from approved access roads or transportation routes will be allowed.
Maintenance of power line servitude	<ul style="list-style-type: none"> • Contractors to strictly adhere to the Eskom Standards and Guidelines. In instances where stipulations in this section (Maintenance of Power Line Servitude) contradict stipulations in the Eskom Standards and Guidelines, these stipulations will prevail. • Complete sterilisation of the servitude area must be avoided at all cost. • Shepherd's trees (<i>Witgat</i> trees) must be left intact in the servitude and not be cut down on edges of the servitude where they have no influence on the power line. • Protected trees should only be pruned if they are higher than 2 m. • Grass cover should be left intact and "mowing" of grasses within the servitude should be avoided at all cost. • Protected trees may only be pruned or removed if a valid permit has been issued for these actions by the Department of Agriculture, Forestry and Fisheries. • The appointed contractor must have a copy of the issued permit in his possession while on site. • The Contractor appointed by Eskom to undertake the maintenance activities shall inform the land owner a week in advance of their intention to access their property via the access road. The Contractor shall make a follow up notification to the landowner 1 day in advance of their intention to access the property. • Access roads shall be monitored by the Contractor and photographic

Element	Management Plan
	<p>evidence of erosion shall be provided to Eskom, which will action the remediation of these impacts immediately.</p> <ul style="list-style-type: none"> • Eskom regional manager, or delegated responsible person, shall undertake servitude audits on a yearly basis to measure the Contractor's performance, to verify impacts reported to Eskom by the Contractor, and to measure rehabilitation success of the remedial actions undertaken during the year. • Agreements between Eskom and a Contractor should clearly specify the maintenance actions and activities required by the contract, specify the need to identify impacts requiring remedial actions during maintenance activities, consequences of not reporting such impacts to Eskom and of failing to conduct the specified maintenance activities. • If the yearly servitude audit identified that a Contractor has failed to identify erosion or other impacts requiring remediation, Eskom may terminate the contract of the Contractor or subject such Contractor to disciplinary action. • Contractor's should be informed and strictly adhere to specific conditions specified and negotiated between Eskom and each particular landowner relating to conduct while on the landowner's property. Eskom shall ensure that this information is effectively communicated to the Contractor and signed off by both Eskom and the Contractor. • The landowner shall sign a release form when the maintenance team leave his property to ensure that there is no unfinished business on his property. Each landowner shall mail, fax or email this release form to the relevant Eskom Project Manager or forfeit any claims he may have in future relating to incidents on the particular period of maintenance. • Eskom shall institute a landowner follow up procedure with landowner's post-maintenance to identify any impacts or incidents that requires remediation or improvement before the next maintenance period. • Eskom shall maintain an updated database of all landowners that is associated with the Solar Park to Ferrum 400 kV power line servitude. • Each Contractor shall ensure that their vehicles have clearly identifiable signage on their vehicles and that each staff member has identification on their person at all times. • Appropriate security measures must be established with regards to access to the power line servitude.

De-commissioning

In order to minimise the extent of rehabilitation activities required during the decommissioning phase, Eskom will ensure that constant effort is applied to rehabilitation activities throughout the construction, operation and maintenance phases of the project.

On decommissioning of the construction site/s, Eskom will:

- Ensure that all sites not already vegetated are vegetated as soon as possible after operation ceases with species appropriate to the area.
- Ensure that all structures and tarred areas are demolished, removed and waste material disposed of at an appropriately licensed waste disposal site or recycled.
- Ensure that all access/service roads not required to be retained by landowners are closed and fully rehabilitated.
- Ensure that all disturbed areas are compacted, sloped and contoured to ensure drainage and runoff and to minimise the risk of erosion.
- Ensure that all rehabilitated areas are monitored for erosion.

20. EMERGENCY NUMBERS

- Police: 10111
- Ambulance 10177
- Netcare 911 082 911
- ER24 084 124
- Emergency 107
- Crimestop 08600 10 111

Appendix A: Co-ordinates at 250 m Increments

Appendix B: Consolidated Walk-down Report

Appendix C: Specialist Walk-down Report

Appendix D: Environmental Authorisation