

Final EMPr

**FINAL EMPR FOR THE 132 KV
TRANSMISSION LINES FOR THE
200MW PHOTOVOLTAIC ENERGY
FACILITY FOR SIBANYE SOLAR PV
(PTY) LTD, GAUTENG.**

Sibanye Solar PV (Pty) Ltd

Submission date: 2023/02/09

1001612: Environmental Management Plan for 132 kV Transmission Lines
Revision: 0

Document control record

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Document Control						
Project name		Final EMPr for the 132 kV Transmission Lines for the 200MW Photovoltaic Energy Facility for Sibanye Solar PV (Pty) Ltd, Gauteng.				
DFFE Ref number		Environmental Management Plan for 132 kV Transmission Lines	Project number		1001612	
Client		Sibanye Stillwater				
Client contact		Jevon Martin	Client reference		TBC	
Rev	Date	Revision details/status	Author	Reviewer	Verifier (if required)	Approver
0	2023/01/23	Draft version of Final EMPr for review	F Gresse. Updated: ZP Xakayi	R Heydenrych	Jevon Martin	R Heydenrych
Current revision		0				

Approval			
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Abbreviations

AIP	Alien and Invasive Plant
BA	Basic Assessment (as provided for in NEMA (Act 107 of 1998) and EIA Regulations [2014]).
CA	Competent Authority
DEA	Department of Environmental Affairs
DFFE	Department of Fisheries, Forestry and Environment (previous name of the DEA)
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GDARD	Gauteng Department of Agriculture and Rural Development
GDARDE	Gauteng Department of Agriculture, Rural Development and Environment
GN	Government Notice
I&AP	Interested and Affected Party
kV	Kilovolt
MW	Megawatt

NEMA	National Environmental Management Act (Act No. 107 of 1998)
POD	Point of Distribution
PPP	Public Participation Process
PV	Photovoltaic
RDL	Red Data Listed
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SPV	Special Purpose Vehicle

Table 1: Requirements of an Environmental Management Programme (EMPr) as detailed in Appendix 4 of the NEMA EIA Regulations 2014 (as amended).

Requirement	Reference
Details of the EAP who prepared the EMPr and the expertise of the EAP, including a CV.	Appendix A
A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.	Section 1 and Section 2
A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers.	Appendix D
A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including: (i) Planning and design (ii) Pre-construction activities (iii) Construction activities (iv) rehabilitation of the environment after construction and where applicable post closure (v) where relevant, operation activities	Section 4 to Section 7
A description of proposed impact management actions, identifying the manner in which the impact management outcomes will be achieved, and must, where applicable, include actions to: (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation (ii) comply with any prescribed environmental management standards or practices (iii) comply with any applicable provisions of the Act regarding closure, where applicable (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable	Section 4 to Section 7
The method of monitoring the implementation of the impact management actions.	Section 3.6 and Section 4 to Section 7
The frequency of monitoring the implementation of the impact management actions.	Section 3.6 and Section 4 to Section 7
An indication of the persons who will be responsible for the implementation of the impact management actions.	Section 3 and Section 4 to Section 7

Requirement	Reference
The time periods within which the impact management actions must be implemented.	Section 4 to Section 7
The mechanism for monitoring compliance with the impact management actions.	Section 3 and Section 4 to Section 7
A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations.	Section 3
An environmental awareness plan describing the manner in which: (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment	Section 3.5.1.
Any specific information that may be required by the competent authority.	Section 1.2.1

1 Introduction

The proposed 132 kiloVolt (kV) overhead transmission lines for the 200 Megawatt (MW) photovoltaic (PV) energy facility for Sibanye Solar PV (Pty) Ltd (henceforth referred to as Sibanye) (the Applicant), situated close to Sibanye Gold's Driefontein and Kloof mining operations near Westonaria, Gauteng, were granted an Environmental Authorisation (EA) by then Department of Environment Affairs (now known as the Department of Forestry, Fisheries and the Environment (DFFE)) on 10 January 2017 (ref no. 14/12/16/3/3/1/1606). The EA is included in Appendix B of this document.

Since 2017, the Competent Authority (CA) has changed from the DFFE¹ to the Gauteng Department of Agriculture, Rural Development and Environment (GDARDE); however, this Environmental Management Programme (EMPr) will be assessed and reviewed by the DFFE as it is compiled to satisfy a requirement under the initial EA (14/12/16/3/3/1/1606) issued by the DFFE.

This EA would have expired on 09 January 2022, but the Gauteng Department of Agriculture and Rural Development (GDARD) (now known as the Gauteng Department of Agriculture, Rural Development and Environment (GDARDE)) granted an extension of its validity by non-substantive amendments under Part 1 (Regulations 29 and 30) of Chapter 5 of the Environmental Impact Assessment (EIA) Regulations (Government Notice no. 982 of 2014) with reference number Gaut 006/21-22/E0088. This amendment is provided in Appendix C of this document. Additionally, the holder of the authorisation was amended to reflect the details of the Special Purpose Vehicle (SPV) company Sibanye Solar PV (Pty) Ltd that will construct the transmission lines and ancillary infrastructure.

Condition 16 of the EA requires the Applicant to amend the EMPr that was compiled as part of the Basic Assessment process to include updated layout plans and to address the conditions contained in the EA. This Final EMPr responds to this requirement.

1.1 Purpose of the EMPr

In addition to complying with the conditions of the EA as described above, this EMPr provides for environmental management throughout the various lifecycle stages of the proposed development. The following stages are included:

- ▶ Planning and design;
- ▶ Pre-construction and construction;
- ▶ Operation; and
- ▶ Decommissioning.

Furthermore, this EMPr aims for alignment and optimisation of environmental management processes with conditions contained within the EA, thereby ensuring that identified environmental considerations are considered during all stages of development.

1.2 Legal requirements

The layout plan included in this EMPr has taken the conditions of the EA, further specialist assessments of the authorised alignment, the Basic Assessment Report and its associated EMPr into account and will be provided to the EPC contractor as basis for detailed designs.

Should changes to the layout plan be required, the CA shall be informed by submitting the revised layout with a detailed motivation together with an updated EMPr.

¹ Known as the Department of Environmental Affairs (DEA) in 2017 when these EAs were issued

1.2.1 Conditions of the EA

Condition 16 of the EA (Appendix A) states that the EMPr, which was compiled as part of the Basic Assessment process at that time, was **not** approved and must be amended to include the final layout plan and other documentation that was not available at the time of it being issued. An updated layout plan is included in Appendix D.

This layout and site sensitivities must be provided to the EPC contractor to finalise their detailed design.

The additional requirements of the EA are tabulated below, with references to where these have been addressed within this EMPr.

Table 2: EA conditions and document references

EA Condition related to EMPr	Reference within this EMPr
All recommendations and mitigation measures recorded in the BAR and specialist studies	The specialist recommendations and proposed mitigation measures have been included in Section 4 to Section 7 of the EMPr.
The requirements and conditions of this EA	Throughout the EMPr. EA attached in Appendix B.
The final site layout map	Appendix D.
The holder of the EA shall ensure that the final EMPr (with all mitigations and monitoring measures) is submitted to this Department for approval after the pre-construction walkdown assessment and micro-siting have taken place.	Noted
A permit must be obtained from the relevant nature conservation agency for the removal or destruction of any indigenous protected and endangered plant and animal species if required.	Noted
No exotic plants may be used for rehabilitation purposes. Only indigenous plants occurring within a ten (10) kilometre radius of the development site must be utilised.	Noted
This final EMPr, once approved, must be implemented and strictly enforced during all phases of the project.	Noted

1.2.2 General Requirements for EMPrs

The content of EMPrs must meet the requirements in Section 24N (2) and (3) of NEMA and Appendix 4 of the NEMA EIA Regulations 2014 (as amended). Appendix 4 specifies the required contents of an EMPr.

The EMPr must address the potential environmental impacts of the proposed activity on the environment throughout the project life cycle, including an assessment of the effectiveness of monitoring and management arrangements after implementation.

Section 24N (2) and (3) of the NEMA, which lists the requirements of an EMPr, are given below.

24N.(2) *the environmental management programme must contain-*

- (a) *information on any proposed management, mitigation, protection or remedial measures that will be undertaken to address the environmental impacts that have been identified in a report contemplated in subsection 24(1A), including environmental impacts or objectives in respect of –*
 - (i) *planning and design;*
 - (ii) *pre-construction and construction activities;*
 - (iii) *the operation or undertaking of the activity in question;*
 - (iv) *the rehabilitation of the environment; and*
 - (v) *closure, where relevant.*
- (b) *details of –*
 - (i) *the person who prepared the environmental management programme; and*
 - (ii) *the expertise of that person to prepare an environmental management programme*
- (c) *a detailed description of the aspects of the activity that are covered by the draft environmental management plan;*
- (d) *information identifying the persons who will be responsible for the implementation of the measures contemplated in paragraph (a);*
- (e) *information in respect of the mechanisms proposed for monitoring compliance with the environmental management programme and for reporting on the compliance.*
- (f) *as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of any listed activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and*
- (g) *a description of the manner in which it intends to-*
 - (i) *modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;*
 - (ii) *remedy the cause of pollution or degradation and mitigation of pollutants; and*
 - (iii) *comply with any prescribed environmental management standards or practices.*
- (3)** *the environmental management programme must, where appropriate-*
 - (a) *set out time periods within which the measures contemplated in the environmental management programme must be implemented;*
 - (b) *contain measures regulating responsibilities for any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of prospecting or mining operations or related mining activities which may occur inside and outside the boundaries of the prospecting area or mining area in question; and*
 - (c) *develop an environmental awareness plan describing the manner in which-*
 - (i) *the applicant intends to inform his or her employees of any environmental risk which may result from their work; and*
 - (ii) *risks must be dealt with in order to avoid pollution or the degradation of the environment.*

An EMPr should be seen as a live document that allows for improvements and adjustments throughout the life cycle of the project as new information is made available, unforeseen situations arise or new conditions warrant adaptation.

1.2.3 Other EMPs for this project

There is an additional generic EMP for transmission lines. The reason for this is that the NEMA (through Government Notice no. 435 of 2019) specifies generic EMPs for transmission lines.

1.2.4 Structure of the EMP

This EMP has been structured for implementation by the project. The sections have been structured as follows:

Section 1: Introductory information

Section 2: Project description

Section 3: Roles and responsibilities

Section 4: Summary of impacts and mitigation measures

Section 5: Construction phase mitigation measures

Section 6: Operational phase mitigation measures

Section 7: Decommissioning mitigation measures

1.3 Details of the Environmental Assessment Practitioner

Section 33 of EIA Regulations and Section 24N (2) and (3) of the NEMA requires that an EMP must include the details of the person(s) who prepared the EMP, and the expertise of that person to prepare an EMP. Zutari has selected a team of highly experienced specialists and multi-disciplinary practitioners to execute this project in a professional and unbiased manner. A synopsis of the qualifications and experience of Zutari's Environmental Assessment team this project is provided hereunder. Full CVs are available in Appendix B.

The Lead Environmental Assessment Practitioner (EAP), **Mr Reuben Heydenrych**, is a manager and a registered environmental assessment practitioner (EAP) at Zutari. He has 28 years' experience in managing the environmental impacts of various small and large-scale infrastructural and environmental projects. He is employed as an Environmental Practitioner at Zutari's Tshwane office. He has been involved in EIA processes in South Africa and in various other African countries, as required by relevant national legislation and in terms of international requirements as EIA team leader and team member. These projects have included exemptions, scoping, and full EIAs for projects such as rezoning, filling stations, water and sewage pipelines, roads (national, provincial and municipal), residential developments, game lodges, telecommunications structures, mines, infrastructure in sensitive environments and industrial processes. Reuben also has experience in environmental advisory services and strategic environmental management, including strategic environmental assessments, environmental scans, environmental feasibility studies and environmental management frameworks (EMFs); EMPs for the construction and operational phases of infrastructure developments and environmental auditing, including due diligence assessments, ISO 14001 systems development and auditing, legal compliance, and waste management audits.

He obtained a Master's in Philosophy: Environmental Management from the University of Cape Town, South Africa in 1993 and a Bachelors' Degree in Landscape Architecture from the University of Pretoria, South Africa, in 1991. Reuben is registered as an Environmental Assessment Practitioner (Registration no. 2021-3897) with the Environmental Assessment Practitioners Association of South Africa (EAPASA)).

The assistant Junior Environmental Consultant, Mrs. Zinzi Portia Xakayi, has two years of environmental science-related experience and has a Bachelor of Science degree in Geography and Environmental Sciences with an Honours degree in Geography and Environmental Sciences. She has experience in the compilation of environmental impact assessment reports (EIAs), basic assessment

reports (BARs) and environmental screening reports for the erection of Telecommunication Masts. She has also assisted in undertaking public participation processes prior to the erection of telecommunication masts.

Zinzi has previous working experience in geo-informatics and geographic information systems (GIS). She has two years of experience working with GIS, which she has gained whilst working on projects for the private sector. Zinzi has specialised in spatial analysis, data processing and mapping while her technical responsibilities include inter alia the evaluation of data, digitising, editing, and converting spatial data and non-spatial data from various formats and manipulating data in Esri ArcMap, GeoMedia and QGIS.

2 PROJECT DESCRIPTION

Sibanye obtained authorisation to develop a number of 132 kilovolt (kV) overhead transmission lines inside three 200 m wide authorised corridors between its proposed solar PV plant and its mines near Westonaria, in the Gauteng Province (Figure 2).

The proposed transmission lines are required to evacuate the electricity generated at the proposed Sibanye Gold 200-Megawatt (MW) Photovoltaic (PV) energy facility² and connect via an on-site substation to the existing Sibanye Gold substations and Points of Distribution (POD) at the Kloof mining operations.

In order to connect the proposed transmission lines to the Points of Distribution (PODs), it may be required to add an additional feeder bay to each of these existing substations. The substations would most likely be expanded by approximately 24 m² outside the existing substation fence line for each substation. The throughput of each substation remains the same. **This EMPr deals only with the transmission line to the Kloof POD** (Figure 1). Should Sibanye want to develop transmission lines to the Libanon or Driefontein PODs at a later stage, similar EMPrs would need to be compiled for these lines.

There are historical mine-related structures (**SIB 018 and SIB 019**), located on the southeast portion of the transmission line. These two sites are of low-moderate significance and would require mitigation. If they cannot be avoided with at least a 20 m buffer, the significant historical structures must be mitigated well in advance of construction.

² The proposed PV Facility has been assessed under a separate Environmental Impact Assessment (EIA) Process (DEA Ref No.: 14/12/16/3/3/2/919).

Table 3: Details of the proposed transmission line

Transmission Corridor	Description	Preferred/ Alternative	POD Connection 1	POD Connection 2
Transmission Corridor 3 (Kloof) Refer to Figure 2	A combination of overhead and underground 132 kV transmission lines connecting the proposed PV facility to the south to the Kloof 1 POD (Kloof Main Shaft), and thereafter to the Kloof 4 POD.	Both alternatives are required but this is the preferred alternative	Connection from the PV facility to the Kloof 1 POD, where the entire transmission line would be overhead cables (indicated by the orange line only).	Connection from Kloof 1 POD to Kloof 4 POD – western alignment (indicated by the lighter blue line).
		Both alternatives are required	Connection from the PV facility to the Kloof 1 POD, where approximately the last 263 m of the transmission line close to the Kloof 1 POD would be underground cables (indicated by the orange and purple lines). <u>* Note:</u> The underground cable would only be used if the space constraints prohibit the use of overhead lines at a detailed design stage.	Connection from Kloof 1 POD to Kloof 4 POD – eastern alignment (indicated by the dark blue line). <u>* Note:</u> a section of this proposed transmission line has already been applied for under an application made with the Department of Mineral Resources ³ for a separate project, namely the Sibanye Gold Limited West Rand Tailings Retreatment Project and associated EIA undertaken by Digby Wells and Associates (South Africa) (Pty) Ltd.

³ Department of Mineral Resources Reference Number: GP 30/5/1/2/2 (66) MR

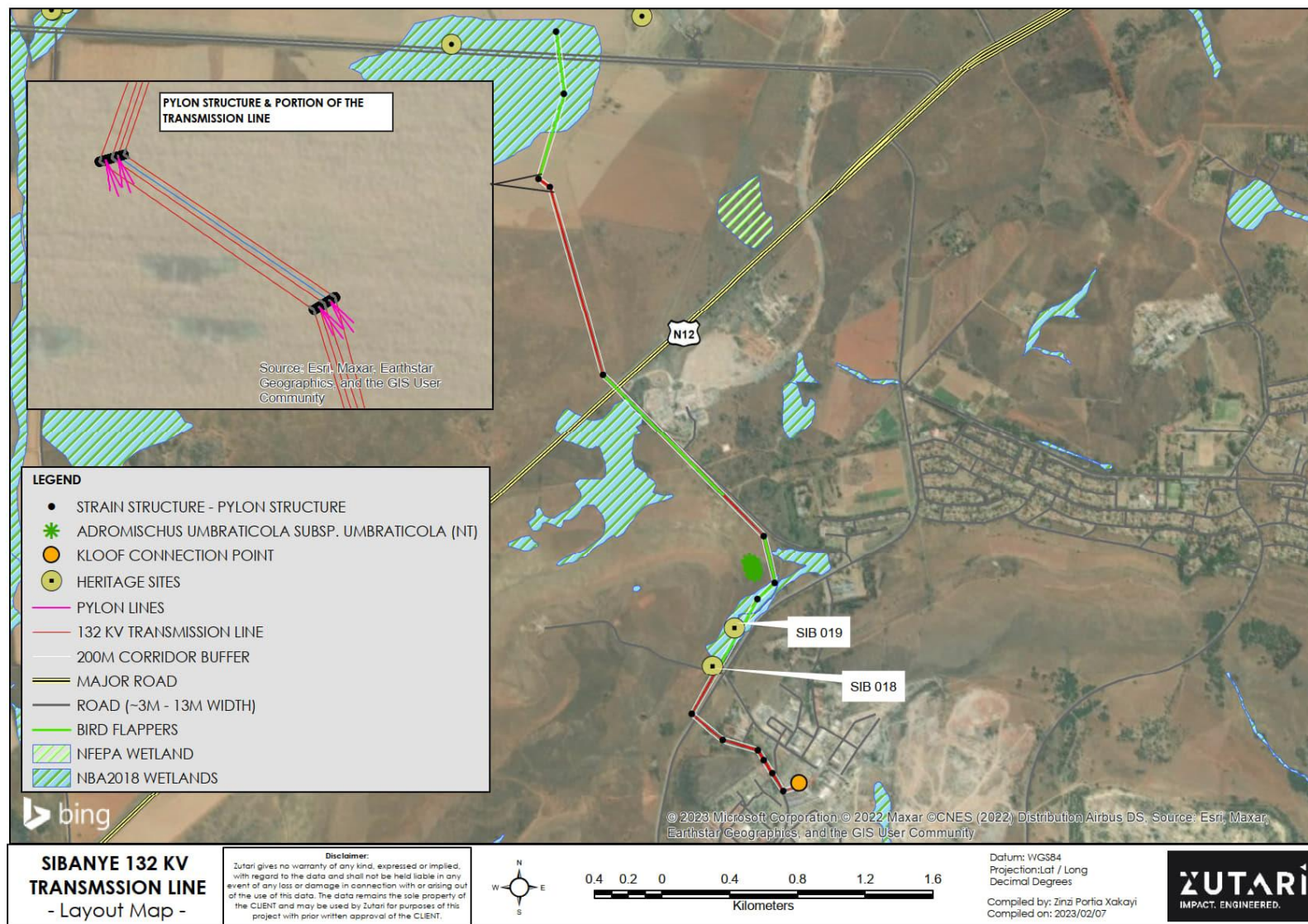


Figure 1: Transmission line to the Kloof POD

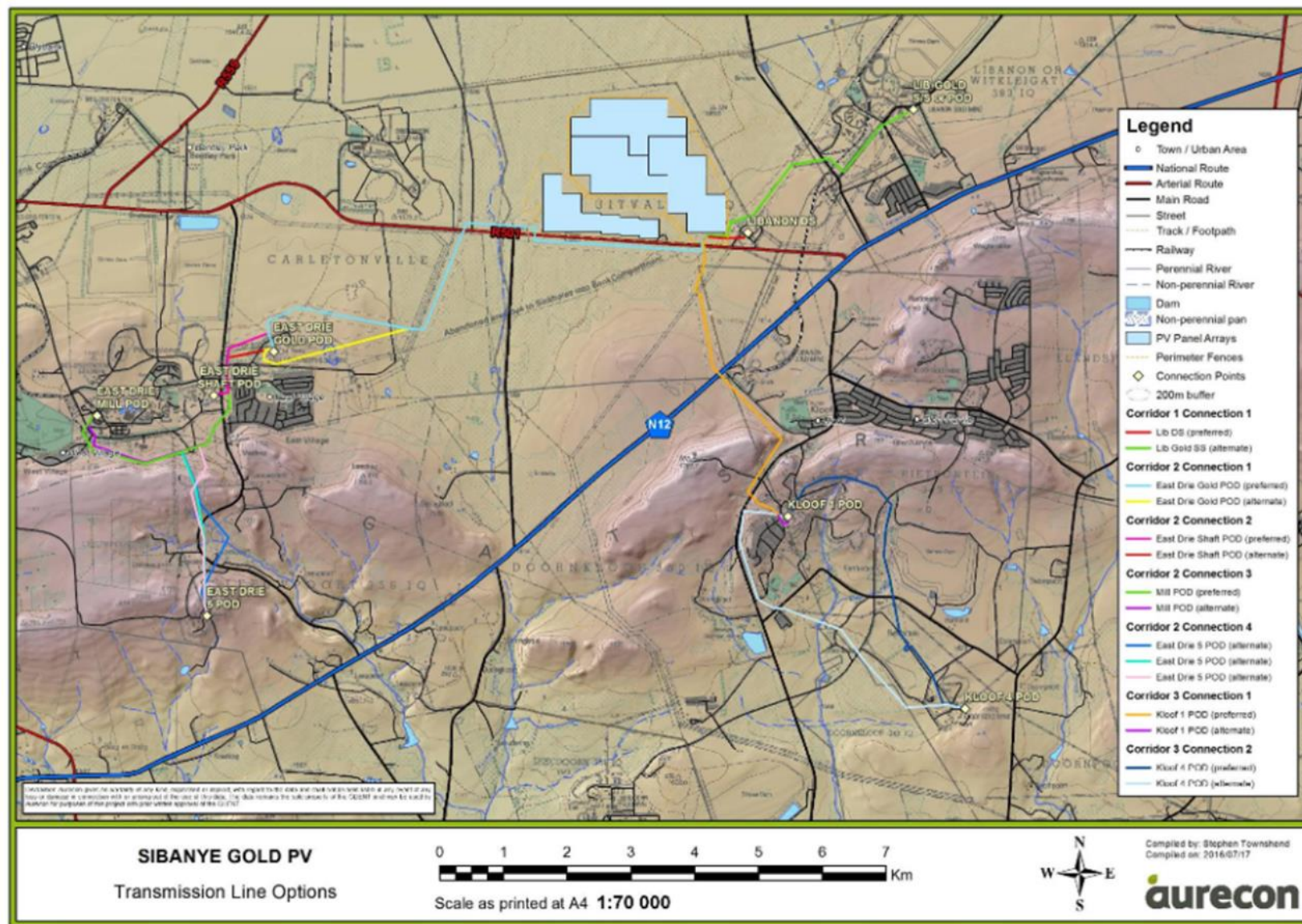


Figure 2: A map combining the alignments of all authorised transmission line corridors

3 Roles and Responsibilities

This chapter provides a description of the roles and responsibilities of the various parties involved with the construction of the proposed development.

3.1 Environmental Control Officer

The Developer shall appoint a suitably qualified, experienced, and independent Environmental Control Officer (ECO) prior to the commencement of activities to monitor the Contractor's compliance in terms of this EMPr and the conditions contained in the EA, as well as address environmental site issues. Details of the appointed ECO must be submitted to the *Director: Compliance Monitoring* of the DFFE as per condition 26.2 of the EA. The ECO shall remain employed for the duration of the construction phase, until rehabilitation is completed, and the entire site is ready for operation.

The ECO shall work in close relation with the Contractor's appointed Environmental Control Officer (CECO). The designation is reserved for a suitably qualified (National Diploma / Degree in Natural Science or an equivalent qualification), independent, environmental manager, with adequate environmental knowledge to understand and implement the EMPr.

The duties of the ECO include but are not limited to:

- Liaison with the Developer, Project Manager and/or Engineer and DFFE;
- Update the EMPr to include relevant conditions of approval contained in the EA (if applicable);
- Conduct environmental induction training with the contractor prior to commencement of work (Section 3.5);
- Undertake ECO site inspections. The frequency of site inspections can be determined between the ECO, SE, Environmental Site Agent (ESA) or any specific conditions of authorisation contained in the EA. It is recommended that the ECO be supported by a full-time ESA during the initial construction period/activities (see section 3.5 below) and that the ECO undertake monthly ECO inspections with the ESA. The ECO must attend/arrange a site meeting with the engineer, contractor and other relevant project team members during his/her site inspection to discuss any environmental matters;
- Compilation of ECO Reports that must be submitted to the project team, DEA, developer and Eskom (or any other authority/body deemed necessary by the project team). The ECO must liaise with the ESA to ensure that action items are carried out;
- Review ESA weekly compliance monitoring reports and include information in monthly ECO Reports;
- Monitoring compliance with the various environmental conditions/requirements contained in the EA and EMPr;
- Assist the ESA in reviewing of the Contractor's method statements;
- Ensuring that the requisite remedial action is implemented in the event of non-compliance;
- Ensuring the proactive and effective implementation and management of environmental protection measures;
- Ensuring that a register of public complaints is maintained by the Contractor and that any and all public comments or issues are appropriately reported and addressed;
- Attend monthly site meetings; and
- Recording and reporting of environmental incidents.

3.2 Developer

Generally, the developer would refer to the holder of the EA who would assume overall responsibility for the administration and implementation of the EA and EMPr.

The developer will be responsible for the following tasks amongst others:

- Ensure that all conditions of approval as contained in the EA are adhered to;
- Ensure that the requirements as set out in this EMPr are adhered to and implemented;
- Ensure all authorisations, permits, consents are in place and any other legal requirements are settled before construction commences;
- Allocate the responsibilities assigned to the ECO to an independent suitably qualified individual prior to the start of construction activities on site; and
- Provide all principal contractors working on the project with a copy of this EMPr as part of tender contract documentation to allow the contractors to cost for its requirements within their respective construction contracts.

3.3 Site Engineer

The Engineer responsible for the design of the PV plant and yard will be a Sibanye appointment. It will be the responsibility of the Engineer to oversee the overall implementation of the project as well as the compliance of the EMP and incorporate any potential environmental aspects mentioned into the design.

3.4 Contractor

As part of being responsible for the construction of the proposed PV plant, the Contractor will also be responsible for the overall implementation of the EMP. The Contractor will nominate a suitably qualified representative on site as his environmental representative, known as the CECO. The contractor must issue site instructions to rectify any environmental non-compliance, based on the CECO's findings. The Sibanye Site Manager can also issue site instructions.

3.5 Contractor's Environmental Control Officer

The CECO will be responsible, on behalf of the contractor, to ensure that the EMP is implemented and complied with on site on a daily basis. The CECO will liaise with the ECO (see above) on all matters relating to the implementation of the EMP. The CECO needs a certain amount of environmental management experience in the field and preferably experience on solar PV plant construction projects.

3.5.1 Environmental Awareness on Site

Prior to construction, all contractor teams involved in work on the project are to be briefed on their obligations towards environmental controls and methodologies in terms of this EMPr. It is recommended that the briefings take the form of an on-site talk and demonstration by the CECO. The education/awareness programme should be aimed at all levels of management and construction workers within the contractor team. All new employees arriving on site shall undergo this training. Environmental induction must be done according to the Contractor's Environmental Management System and must include all aspects of the site specific EMPr.

Toolbox talks are to be used as a tool for continuous training of employees and must be conducted on a weekly basis. Toolbox talks must be conducted in an interactive way to ensure the employees understand the content and purpose of the specific EMPr requirements. Relevant environmental site

matters, incidents and issues shall form part of the Contractor's toolbox talks. The Contractor shall make a note of the environmental subjects discussed.

As construction continues, an effort must be made by the Contractor to assess the training needs of workers on site. Cognisance must be taken of the specific work to be undertaken at the time and, if necessary, additional training on environmental requirements must be conducted to ensure all workers understand the risks involved as well as how to adequately implement mitigation measures.

A signed register documenting all employees' environmental training and awareness programmes must be kept on record for verification purposes.

The Comprehensive Construction Environmental Management Plan (CEMP), attached as Annexure F, provides requirements for controlling construction activities' impacts on the environment. Section 2 of the CEMP further details requirements for environmental awareness and fulfil the EIA Regulation GN No. R. 982 requirement for the inclusion of an environmental awareness plan.

3.5.2 Record Keeping

The CECO is responsible for maintaining all records in relation to the EMPr requirements on site. Such records must be made available to the ECO on request during the monthly audits, as well as at any time as requested by the ECO, auditor or project managers. Recordkeeping must be done in an orderly fashion with the intent of ensuring easy reference.

3.6 Monitoring and auditing framework

The purpose of the monitoring programme is to ensure that mitigation measures identified and described in the EMPr are implemented. Construction activities of the PV plant will be monitored and recorded by the ECO and audited against the EMPr monthly. A report must be submitted at the end of each month prior to the progress meetings where they will form part of the agenda. The ultimate target is to achieve 100% compliance with the EMPr.

Relevant environmental site matters, incidents and issues shall form part of the Contractor's toolbox talks. The Contractor shall make a note of what environmental subjects were discussed.

As per condition 30 of the EA, the developer must also submit the environmental audit reports to the GDARD within 30 days of completion of the construction phase. A final audit report must be submitted to the GDARD within 30 days of the completion of all rehabilitation activities.

The audit reports contemplated in condition 30 of the EA must be compiled in accordance with Appendix 7 of the EIA Regulations, 2014. Records relating to the monitoring and auditing on site must be kept and made available on site should the GDARD wish to conduct an inspection from time to time.

Additionally, a notification must be sent to the GDARD no later than 14 days prior to the commencement of the activity, which includes site preparation.

4 Summary of Impacts and Mitigation Measures

The following table (Table 4) covers the activities and associated environmental impacts that will occur during the development of the proposed 132 kV transmissions lines and ancillary infrastructure.

The table considers the expected impacts during the different phases of the project, as well as the mitigation measures and environmental management procedures required to manage the expected impacts. Table 4 includes the following sections:

- ▶ Pre-construction and construction site environmental management
- ▶ Flora and fauna
- ▶ Heritage and palaeontology
- ▶ Materials and waste
- ▶ Dust
- ▶ General construction activities
- ▶ Rehabilitation

The following components are identified / described:

- ▶ Activity: Component / activity of the project for which the impact has been identified.
- ▶ Aspect: The aspect of the above activity which will be impacted.
- ▶ Impact: The environmental impact identified and to be mitigated.
- ▶ Mitigation measure: Measures identified for implementation in terms of environmental management to reduce, rectify or contain the identified environmental impact. The following aspects of mitigation are discussed:
 - Objective: Desired outcome of mitigation measure; and
 - Mechanism: Method of achieving the objective.
- ▶ Performance indicators: Outcomes that will indicate achievement of objective/s.
- ▶ Responsibility: Party or parties identified for implementation of mitigation measure/s.
- ▶ Resources: Available resources to aid implementation of mitigation.
- ▶ Schedule: Timeframe in which identified impact and mitigation measure is anticipated to occur.
- ▶ Verification: Party or parties identified as responsible for review and assessment of final outcome

Table 4: EMPr for the proposed 132 kV overhead transmission lines development

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
Pre-construction and construction site environmental management								
Engineering Design	All the aspects listed in the EMP	Design incompatible with environment	Objective: - To ensure the design of the transmission lines infrastructure takes the environmental sensitivities into account. Target: - Assimilate requirements of the EMP in design and construction management giving special attention to the impact ratings and suggestions of specialists; and - The "no go"-zones identified by specialists shall be communicated to anyone entering the site, indicated/demarcated as such, and avoided during all phases of the project	Design meets objectives and does not degrade the receiving environment.	Contractor	Planning and design	Contractor/Developer	Once-off
Establishment of the construction camp sites	Construction camp	Damage or loss of existing vegetation and changes to the area's water quality	Objective: - To prevent negative influence to the surrounding surface and groundwater. Target: - Site establishment shall take place in an orderly manner and all amenities shall be installed at Camp sites before the main workforce move onto site; - A method statement is required from the Contractor at appointment stage that includes the layout of the camp, management of ablution facilities and wastewater management; - The planning and design for the construction camp must ensure that there is a minimum impact on the environment; - A site plan of the construction camp must be provided indicating waste areas, storage areas and placement of ablution facilities; - The Contractor camp shall have the necessary ablution facilities with chemical toilets where such facilities are not available at commencement of construction; - The Contractor shall supply a wastewater management system that will comply with legal requirements and be acceptable to Sibanye; - Where Sibanye facilities are available the Contractor may make use of such facilities where it is viable and possible; - The Contractor shall inform all site staff to the use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities; - The Contractor shall supply waste collection bins where such is not available, and all solid waste collected shall be disposed of at a registered waste dump; - A certificate of safe disposal shall be obtained by the Contractor and kept on file; - Where a registered waste site is not available close to the construction site, the Contractor shall provide a method statement about waste management. Under no circumstances may solid waste be burned on site; - The construction camp must be placed on already disturbed land as far as possible;	Construction camp established in compliance with objectives	Contractor, CECO	Pre-construction (site establishment)	ECO	Once-off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			- The construction camp should be fenced off so as to limit the removal of unnecessary vegetation; Fences and security access must be maintained, throughout the project; - All fences removed to facilitate access will be replaced by the contractor once machinery and personnel have been removed from the site to the satisfaction of all the relevant landowners; and - Emergency and contact numbers of the contractors must be available and prominently displayed on a signage board that is clearly visible.					
Establishment of the construction camp site.	Construction camp.	Loss of soil fertility.	Objective - The environmental objective when establishing the contractor's camp is to minimise the footprint of disturbance thereby preventing the degradation and loss of topsoil. Target: - Allowance for one contractor's camp at the site; - The construction camp site shall be strictly within the approved boundaries; - Once the site has been cleared of vegetation, the topsoil should be stripped; - Topsoil must be stored in a demarcated area which protected from wind and rain; - The topsoil stockpiles must not exceed 2m in height; and - The area must be rehabilitated once the construction camp has been decommissioned.	Established construction camp in compliance with objectives and no evidence of environmental degradation.	Contractor, CECO	Pre-construction (site establishment)	ECO	Once off
Closure of the construction camp.	Construction camp.	Potential impacts associated with the closure of the construction camp.	Objective(s): - To limit potential impacts on the environment for the period for which the construction camp is closed. Target: Should the construction camp be closed for a period of more than one week, a report on compliance will be lodged with the Contractor, Site Engineer confirming the following: - No persons allowed other than project employees; - Minimal materials are stored; - All waste disposal bins will be emptied periodically; - Materials are stored in leak-proof, sealable containers or packaging; - The store area is secure and locked; - Fire extinguishers are serviced and accessible; - The area is secure from accidental damage through vehicle collision, etc.; - Emergency and contact numbers of the contractor are available and prominently displayed; - All stores will be secured; - Chemical toilets are empty, kept hygienically clean and secured; and 24-hour security will be on site during this period.	Closure of the construction camp in line with the requirements of the EMP.	Engineer, Contractor and CECO	Closure of camp	Engineer, ECO	Whenever the construction camp is closed for longer than a week.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
Storage of topsoil.	Stripping and stockpiling of topsoil.	Mixing of topsoil and subsoil. Erosion of topsoil. Contamination of topsoil. Dust.	Objective(s): - Topsoil is conserved, maintained and reused. Target : - The topsoil in the specific region is regarded as the top 300 mm (maximum) of the soil profile irrespective of the fertility appearance or physical depth, unless otherwise confirmed by the ECO; - Topsoil is to be stripped up to this depth when it is in as dry a condition as possible in order to prevent compaction; - The topsoil, including the existing grass cover is to be shallowly ripped (only the depth of the topsoil) before removal. This is to ensure that organic plant material, and the natural seed base is included in the stripping process; - Stockpiles shall not be allowed to become contaminated with oil, diesel, petrol, garbage or any other material, which may inhibit the later growth of vegetation; - The contractor shall apply soil conservation measures to the stockpiles to prevent erosion. This could include the use of erosion control fabric or grass seeding; - All grass and other vegetation should be left on the topsoil stockpiles so that they colonize the area after construction; - Photographic record must be kept of the topsoil stockpiles; - Dust and erosion of topsoil from runoff must be minimised through appropriate watering and the avoidance of transporting and placing of topsoil in areas exposed to high wind or excessively rainy conditions; - The contractor shall devise a soil conservation and stockpiling plan, to be approved by the ECO and Engineer, which shall detail: - Stockpile sizes, layout and form; - Means of erosion (wind and water) prevention for stockpiles; - The rehabilitation measures to be taken for the area occupied by the temporary stockpile; - A generic schedule of soil replacement for areas where work has been completed. Soil replacement should preferably run in parallel (where feasible) with the construction process; and - Soil erosion prevention measures for general site use. - Alien vegetation growing on stockpiles must be eradicated; and - Herbicides shall not be used to remove alien vegetation unless approved by the ECO.	Topsoil is kept free of weeds and contaminants and can be used for rehabilitation.	Contractor, CECO	Pre-construction (site establishment)	ECO	Weekly
Construction of site buildings.	Site buildings materials.	Soil pollution and permanent alternation to the natural environment.	Objective(s): - To ensure the material for site buildings are recyclable and to minimise the impacts of the construction of the buildings on the environment. Target: - No permanent structures will be permitted at the contractor's camp; - Temporary structures shall be founded on a platform, either subsoil or screed slab;	On site buildings constructed according to the requirements of the EMP.	Contractor and CECO	Pre-construction (site establishment)	ECO	Once off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			- Buildings should preferably be pre-fabricated or constructed of re-usable / recyclable materials; - All temporary structures must be soundly built and not pose a danger to workers; - Containers are to be used for the storage of materials which have the potential to release pollutants into the environment; and - All structure footprints to be rehabilitated and re-vegetated after construction is complete.					
Fencing of the construction sites that will be affected by the proposed project.	Demarcation of the site.	Unnecessary removal of vegetation. Loss of topsoil. Safety.	Objective(s): - Whilst establishing the site, the footprint of disturbance must be minimised and the extent of soil erosion, loss of vegetation and the potential for the pollution of soils must be prevented. Target: - All excavations posing a risk to both human and animal safety must be demarcated as indicated in the EMP using danger tape with steel droppers or other methods approved by the ECO; - The width of the construction footprint must be agreed upon by the ECO and the Engineer and as far as possible must be kept to a minimum. Should additional space be needed for the temporary storage of material, the ECO must advise on an adequate area away from any sensitive areas; and - No personnel or construction materials will be allowed to move outside the designated / demarcated site during construction activities.	The site is demarcated according to the requirements of this section of the EMP.	Contractor and CECO	Construction sites must be fenced off along the alignment before site clearance.	Engineer, ECO	As construction proceeds along the alignment.
Cooking of food	Cooking facilities	Type and placement of cooking facilities used, and how they will be used.	Objective(s): - To ensure that the cooking facilities used on site do not pose risks to the environment. Target: - The contractor must supply gas and /or electricity cooking facilities for the labourers at the construction camp; - If gas cooking facilities are not available fires (for the purposes of cooking) will be allowed in a demarcated area that has been cleared of any combustible materials; - Firewood, or other suitable fuels, must be supplied by the Contractor; - No vegetative matter may be removed from the area for firewood; and - After use, all cooking fires must be extinguished.	Evidence of presence of gas and / or electricity cooking facilities and / or demarcated area for cooking with fire.	Contractor	Pre-construction (site establishment)	ECO	Once off
Operation of the sanitation system(s).	Sanitation systems.	Unpleasant odours on site. Inadequate number of latrines on site. Position of latrines and shower systems.	Objective(s): - To ensure good sanitation system and management throughout the construction period. Targets: - Adequate chemical toilets must be provided for all staff. Alternatively, existing ablution facilities on site can be utilised if available; - Chemical toilets must be emptied / serviced on a regular basis to prevent them overflowing. Proof of this must be provided to the ECO;	Adequate toilets and showers will be positioned at the right places as per the EMP and ECO. Absence of odours, erosion and build-up of detergents.	Contractor	Pre-construction (site establishment)	ECO	Once off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
		Poor management of wastewater.	- A minimum of one toilet must be provided per 15 persons at each working area within 100m from worker activity, or as required by the Occupational Health & Safety Act; and - Where shower facilities be provided for use by staff the following must be imposed: - Positioning of the showers, specifically the discharge point, must be placed in a way to ensure that erosion and build-up of detergents does not occur; - All discharge from the shower and other washing facilities must pass through a suitable filter to reduce the load of detergents to the environment; and - Use of the shower facilities must be limited to staff or authorised persons only.					
Vehicle parking area. Storage of equipment.	Vehicle parking and parking area(s). Storage of equipment.	Pollution of soils. Disturbance of soils due to parking of vehicles outside of designated areas.	Objective(s): - To ensure vehicles are parked according to the specifications in the EMP and that equipment is handled appropriately. Target: - No storage of vehicles or equipment will be allowed outside of the designated area; and - Drip trays or any form of oil absorbent material must be placed underneath vehicles and equipment when not in use for periods longer than 3 days and / or for those vehicles and plant showing evidence of leaking hydrocarbons.	Drip trays must be provided and placed under vehicles and equipment which are not being utilised on site.	Contractor and CECO	Throughout the construction period.	ECO	Whenever parking, servicing or maintaining vehicles throughout the construction period.
Servicing and washing of vehicles and machinery	Workshop and Equipment Storage Areas	Water contamination, Soil contamination, Noise pollution.	Objective(s): - To ensure that the environment is not polluted by ensuring that service areas and wash bays for vehicles and machinery are made available and utilised. Target: - Where possible and practical, all maintenance of vehicles and equipment shall take place in a workshop area; - During servicing of vehicles or equipment in the approved area, a suitable drip tray shall be used to prevent spills onto the soil, especially where emergency repairs are affected outside the workshop area; - Leaking equipment shall be repaired immediately or be removed from site to facilitate repair; - All potentially hazardous and non-degradable waste, including used ballast or the wastewater effluent from washing the contaminated ballast, shall be collected and removed to a registered waste site; - Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and re-mediated to the satisfaction of the ECO; - A method statement is required from the Contractor showing how to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage;	Evidence of prescribed servicing and washing services.	Contractor, CECO	During construction	ECO	Whenever servicing or maintaining of vehicles or equipment throughout the construction period.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			- The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site; - Should emergency repairs be necessary, drip trays or tarpaulins must be utilised to ensure the collection of the oil. The area for emergency repairs should be identified by the ECO; - Should repair centers not be available in close proximity to the site, the contractor may erect maintenance areas / workshops at designated areas approved by the ECO. - The contractor must ensure that delivery drivers and plant operators are informed of all relevant procedures and restrictions required ensuring compliance with this document; - All vehicles and equipment must be well maintained to ensure that there are no oil or fuel leakages; and - The following shall apply: - All contaminated soil / yard stone shall be removed and be placed in containers for further disposal; - Contaminated material can be taken to one central point where bioremediation can be done; - Smaller spills can be treated on site; - A specialist Contractor shall be used for the bioremediation of contaminated soil where the required remediation material and expertise is not available on site; and - All major spills of hazardous substances constituting a section 30 environmental incident (according to the NEMA) must be reported to the ECO and relevant authorities within 14 days of the incident occurring.					
Personnel conduct	Personnel	Infringement of the EMP requirements by personnel.	Objective(s): - To ensure that personnel are adhering to the EMP requirements. Target: - The Contractor will adhere to all requirements of the Occupational Health and Safety Act (Act 56 of 2004), including the drafting of a suitable Health and Safety Plan which will be implemented during the construction phase; - All personnel to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof; - Tool box talks to include aspects of the EMP; - Labourers associated with the contractor must be easily recognizable (i.e. company issued overalls with company name / logo etc.), and other persons will not be allowed within the construction camp at any time without prior permission from the project manager; - The Contractor shall take all necessary precautions against trespassing on private properties;	Personnel wearing proper safety uniform. Absence of trespassers on site.	Contractor and labourers.	Approved PPE must be issued to all employees prior to construction but must be used for the duration of the construction period.	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			- Warning signs must be placed on and around the site as per the Occupational, Health and Safety requirements; - Adequate first aid services must be provided by the contractor at the contractor's camp; - The contractor will be responsible for his own security arrangements and shall comply with all site security instructions; - Basic firefighting equipment must be available on site; - PPE to be provided and well maintained at contractor's camp; and - All environmental incidents should be reported to ECO, investigated, documented, and kept on file.					
Construction activities	Safety of the Public / surrounding landowners.	Injuries to Public / landowners. Health of Public / landowners.	Objective(s): - To ensure that the Public at large is not injured or affected negatively in any way. Target: - The Contractor shall recognise that the Site is situated close to inhabited and agricultural areas and shall therefore take all reasonable measures to ensure the safety of people in the surrounding communities; - Where the public could be exposed to danger by any of the Works or Site activities, the Contractor shall as appropriately provide suitable flagmen, barriers and / or warning signs in English, Afrikaans and SiSwati (or other language/s appropriate for the site), all to the approval of the Project Manager; - All unattended open excavations shall be adequately demarcated (fencing shall consist of a minimum of three strands of wire and made clearly visible). Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed structures and protective scaffolding.	No injuries or health consequences to neighbouring people. No complaints from neighbouring people.	Contractor and CECO	Throughout the construction period.	ECO	Throughout construction period
Flora and Fauna and Water								
Transmission Lines Infrastructure construction	Floral habitat	Impact on floral habitat	Objective: - Preservation of floral habitat characteristics Target: Essential construction phase mitigation measures: - Avoid disturbance of moderately-high sensitivity habitat units as far as possible. - Demarcate the construction footprint, and ensure that all construction activities remain within this footprint. - Ensure that the proposed development footprint area remain as small as possible. - Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development activities. - Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the project footprint. Recommended construction phase mitigation measures:	Little or no alien species on construction site. No disturbances beyond project footprint.	ECO	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			All soils compacted as a result of construction activities falling outside of the footprint area should be ripped and profiled.					
Transmission Lines Infrastructure operation			Objective: - Preservation of floral habitat characteristics Target: Essential operation phase mitigation measures: - Ensure that operational related activities are kept strictly within the footprint area. - Alien and invasive vegetation control should take place throughout the operational phase of the development.	Floral basal cover recovery on site	Developer	Operation	Developer	Weekly.
Transmission Lines Infrastructure construction	Floral diversity	Impact on floral diversity	Objective: - Floral diversity outside footprint is not damaged unnecessarily. Target: Essential construction mitigation measures: - Ensure that the proposed development footprint area remain as small as possible. - Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development activities. - Prohibit the collection of plant material for firewood or for medicinal purposes. - Species specific and area specific eradication recommendations: - Care should be taken with the choice of herbicide to ensure that no additional impact and loss of indigenous plant species occurs due to the herbicide used; and - Footprint areas should be kept as small as possible when removing alien plant species.	Little or no alien species on construction site. No disturbances beyond project footprint.	ECO, Contractor	Construction	ECO	Throughout construction period
Transmission Lines Infrastructure operation			Objective: - Floral diversity increases or remains as is. Target: Essential operation mitigation measures: - Ensure that operational related activities are kept strictly within the footprint area. - Alien and invasive vegetation control should take place throughout the operational phase of the development.	Floral basal cover recovery on site	Developer	Operational phase	Developer	Weekly.
Transmission Lines Infrastructure construction and site preparation	Species conservation	Loss of floral Species of Conservation Concern (SCC)	Objective: - SCCs are preserved Target: Essential construction mitigation measures: - Prohibit the collection of plant material for medicinal purposes. - Edge effect control such as alien floral control needs to be implemented to ensure no further degradation outside of the proposed footprint area. Recommended construction mitigation measures:	Successful transplantation of SCCs	Contractor, ECO	Pre-construction and construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
Transmission Lines Infrastructure operation			- Should any SCC or other protected plant species be encountered within the subject property in the future, the following should be ensured: - If any threatened species will be disturbed, ensure effective relocation of individuals to suitable offset areas; and - All rescue and relocation plans should be overseen by a suitably qualified specialist.					
			Objective: - SCCs are preserved Target: Essential operational phase mitigation measures: - Ensure that operational related activities are kept strictly within the footprint area. - Restrict vehicles to travelling only on designated roadways to limit the ecological footprint of the proposed development activities. - Prohibit the collection of plant material for medicinal purposes		Developer	Operation	Developer	Whenever site is visited for maintenance purposes.
Transmission Lines Infrastructure construction	Faunal habitat	Decreased faunal habitat area and integrity	Objective: - Faunal habitats are preserved Target: Essential construction phase mitigation measures: - It must be ensured that, as far as possible, all proposed infrastructure is placed outside of sensitive habitat areas. Where this is not possible, suitable mitigation measures, must be implemented. - Keep the construction footprint as small as possible to minimise impact on the surrounding faunal habitat. - Demarcate the construction footprint and ensure that all construction activities remain within this footprint. - Areas of increased ecological importance and sensitivity, including wetland and ridge areas, should be considered during all phases of the development planning and construction - Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the proposed development activities. - Manage edge effects such as alien floral invasion such as alien floral invasion to ensure further loss of faunal habitat does not occur in the surrounding areas. - Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread beyond the development area. - Fires in the vicinity of development area should be prohibited during all development phases. - No trapping or hunting of fauna is to take place. - Recommended construction phase mitigation measures:	No fires on site. No destruction of natural vegetation units outside of footprint.	Contractor, ECO.	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			Fence footprint areas to ensure that all activities are contained within the demarcated areas.					
Transmission Lines Infrastructure operation		Decreased faunal habitat area and integrity	Objective: - Faunal habitats are preserved Target: Essential operational phase mitigation measures: - All disturbed areas must be rehabilitated. - Ensure that operational related activities are kept strictly within the development footprint. - Alien and invasive vegetation control should take place throughout the operational / maintenance phase of the development. - Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the proposed development activities.		Developer	Operation	Developer	Weekly.
Transmission Lines Infrastructure construction	Faunal diversity	Decline in faunal diversity	Objective: - Faunal habitats are preserved Target: Essential construction mitigation measures: - Keep all development infrastructure within designated areas within the study area, whilst minimising the construction as far as possible. - Planning of temporary roads and access routes should take the site sensitivity plan into consideration. As far as possible pre-existing roads are to be used, whilst new roads must avoid any wetland and water systems. Recommended construction mitigation measures: - It is recommended that a speed limit of 40km/h be implemented on all roads running through and accessing the study area, to minimise the risk of vehicle collisions with faunal species.	No faunal deaths reported	Contractor, ECO	Construction	ECO	Throughout construction period
Transmission Lines Infrastructure operation			Objective: - Faunal habitats are preserved Target: Essential operation mitigation measures: - All disturbed areas falling outside the project footprint must be rehabilitated. - Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the proposed development activities. - No dumping or waste disposal is to occur within the study area.		Developer	Operation	Developer	Weekly
Transmission Lines Infrastructure construction	Species conservation	Loss of faunal SCC	Objective: - SCCs are preserved Target: Essential construction mitigation measures: - Disturbance to important avifaunal habitat, such as the ridges and wetlands, must be minimised. - Ensure that as far as possible all development infrastructure is placed outside of sensitive areas.		ECO, Contractor	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
Transmission Lines Infrastructure operation			Objective: - SCCs are preserved Target: Essential operational phase mitigation measures: - Ensure that operational related activities are kept strictly within the development footprint. - Restrict vehicles to travelling only on designated roadways to limit the ecological disturbance footprint of the proposed development activities.		Developer	Operation	Developer	Weekly
Transmission Lines Infrastructure construction	Wetland integrity	Wetland habitat and ecological structure fragmentation	Objective: - Wetlands are protected Target: - Essential mitigation measures for construction phase: - Limit the footprint area of the construction activities to what is absolutely essential in order to minimise environmental damage. Construction vehicles must use existing roads where possible. - During construction all building materials should be kept out of the wetland areas - All waste and remaining building materials should be removed from site on completion of the project; - No vehicles should be allowed to indiscriminately drive through the wetlands. - The duration in which soils are exposed during construction activities should remain as short as possible; - Concurrent rehabilitation is to take place as far as possible and footprint areas should be minimised as far as possible; Recommended mitigation measures for construction phase: - As far as possible, all construction activities should occur in the low flow season, during the drier winter months.	No construction materials are disposed of and no driving occurs in wetland areas. No erosion at site.	ECO, Contractor	Construction	ECO	Throughout construction period
Transmission Lines Infrastructure operation			Objective: - Wetlands are protected Target: Essential mitigation measures for operational phase: - Any area where active erosion is observed must be immediately rehabilitated in such a way as to ensure that the hydrology of the area is re-instated to conditions which are as natural as possible.	No erosion originating at site	Developer	Operation	Developer	Whenever site is visited for maintenance purposes.
Transmission Lines Infrastructure construction	Wetland hydrology	Impacts on Wetland Hydrological Function and Sediment Balance	Objective: - Wetlands are protected Target: Essential mitigation measures for construction phase: - Limit the footprint area of the construction activities to what is absolutely essential in order to minimise environmental damage. Construction vehicles must use existing roads where possible.	No construction materials are disposed of and no driving occurs in wetland areas. No erosion at site.	ECO, Contractor	Construction	ECO	Throughout construction period

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			- During construction all building materials should be kept out of the wetland areas - All waste and remaining building materials should be removed from site on completion of the project; - No vehicles should be allowed to indiscriminately drive through the wetlands. - The duration in which soils are exposed during construction activities should remain as short as possible; - Concurrent rehabilitation is to take place as far as possible and footprint areas should be minimised as far as possible; - Stormwater management systems should include energy dissipation structures to minimize the potential impact or erosion and sedimentation; Recommended mitigation measures for construction phase: - As far as possible, all construction activities should occur in the low flow season, during the drier winter months.					
Transmission Lines Infrastructure operation			Objective: - Wetlands are protected Target: Essential mitigation measures for operational phase: - Any area where active erosion is observed must be immediately rehabilitated in such a way as to ensure that the hydrology of the area is re-instated to conditions which are as natural as possible.	No erosion originating at site	Developer	Operation	Developer	Whenever eroded areas are encountered.
Construction activities (Physical issues and their control).	Terrain.	Scarring of soil surface, disturbance / loss of topsoil.	Objective(s): - Minimise scarring of the soil surface and land features; - Minimise disturbance and loss of topsoil; and - Rehabilitate all disturbed areas. Target: - Topsoil to be stripped to 300 mm where required by ECO; - Topsoil only to be stripped where absolutely necessary; and - The areas within and around the servitude will most likely be disturbed by construction activities and rehabilitation is required to reinstate such areas.	No visible erosion scars once construction is completed. Minimum loss of topsoil at the site. No barren area visible 3 months after construction is completed. All damaged areas successfully rehabilitated.	Contractor and CECO	Pre-construction	ECO	Vegetation will be cleared as construction proceeds.
Transmission Lines Infrastructure closure	Agriculture	Damage to agricultural equipment	Objective: - Agriculture can continue after project is decommissioned Target: - Any pole structures such as fences, sign boards, light poles etc. should be removed with the concrete footing and may not be cut off above surface.	No infrastructure remains on site after closure of facility	Contractor, Developer	Decommissioning	Developer	Once-off
Transmission Lines Infrastructure closure	Soil	Impacts on land arability	Objective: Soil quality is improved after facility closure, or re-instated as close as possible to pre-commencement state. Target:	All waste materials and decommissioned infrastructure are cleared from site. Weeds are absent.			Developer	Once-off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			- The footprint of structures such as foundations (usually partly below surface), roads, parking areas, paved or tarred surfaces should be cleaned properly and waste material should be removed to a suitable disposal facility. - The footprints should be ripped to alleviate compaction. - After demolishing the structures, the footprint may not be left abandoned and unproductive as weeds and aliens will immediately invade the area. - The total footprint can immediately be reintroduced to crop farming or otherwise the soils should be ameliorated and seeded with a grass mixture such as <i>Digitaria eriantha</i>, <i>Cenchrus ciliaris</i> - A mixture of grass seed can be used provided the mixture is carefully selected to ensure the following: - Annual and perennial grasses are chosen; - Pioneer species are included; - All the grasses shall not be edible; - Species chosen will grow in the area without many problems; - Root systems must have a binding effect on the soil; and - The final product should not cause an ecological imbalance in the area.					
Precipitation	Soil; dust	Soil erosion and/or water logged conditions	Objective: - No soil erosion or water logging occurs on site. Target: - The Surface Water Management Plan (SWMP) must be adhered to at all times. - The project area should be covered with grass. - Surfaces/areas covered with road building material should be contained as far as possible. - Any occurrences of soil erosion or waterlogged spots should be remediated immediately. - The amount of roads within the transmission lines and associated infrastructure's footprint should be reduced as far as possible.	Little runoff, water logging and soil erosion. Dust doesn't accumulate on panels. Adherence to the SWMP.	Developer	Construction, Operation	Developer	Whenever site is visited for maintenance purposes.
Heritage and palaeontology								
Transmission Lines Infrastructure construction	Heritage	Destruction of heritage resources	Objective: - Compliance with relevant legislation and recommendations from SAHRA under Section 35, 36 and 38 of NHRA. Target: - Include section on possible heritage finds in induction prior to construction activities take place. - Heritage chance finds are reported and dealt with as advised by the heritage specialist.	No legal directives, legal compliance audit scores (legal register, ECO Monthly Checklist/Report)	Developer, ECO, Heritage specialist	Planning / Pre-Construction	ECO	Monthly
			Objective: Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA.	ECO Monthly Checklist/Report.		Construction	ESA and ECO	Weekly (ESA)/ Monthly (ECO)

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			Target: Implement chance find procedures in cases where possible heritage finds area made.	No heritage finds destroyed.				
Method statement development	Fossil discovery	Destruction of fossils	Objective: - Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA. Target: - Develop finds protocol for palaeontological resources.	Completion and development of mitigation measures	Developer, ECO, Palaeontologist	Pre-construction	ECO	Once-off
Transmission Lines Infrastructure site preparation	Heritage	Destruction of graves	Objective: - Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA. Target: - A 20m precautionary buffer should be placed around the two potential grave sites, unless it has been confirmed via suitable testing that the sites are not graves. Alternately, the graves must be relocated (see below)	Grave 20 m buffer zones are avoided	Developer, ECO, Heritage specialist	Pre-construction	ECO	Once-off
			Objective: - Compliance with relevant legislation and recommendations from SAHRA under the National Health Act (No 61 of 2003) and Section 35 and 38 of NHRA. Target: - If so required by construction activities, graves should be relocated with the necessary permits. - Destruction permits should also be applied for.	Completion of mitigation measures and obtaining relocation and destruction permits	Contractor, Developer, Heritage specialist	Construction	ECO	Once-off
		Destruction of heritage resources	Objective: - Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA. Target: - A 20 m buffer should be established around historical structures identified on site.	Historical structure 20 m buffer zones are avoided	Contractor, Developer, Heritage specialist	Pre-construction	ECO	Once-off
			Objective: - Compliance with relevant legislation and recommendations from SAHRA under Section 35 and 38 of NHRA. Target: - If so required by construction activities: - The sites are to be documented through mapping and excavations to determine its layout and history. - Further archival research into the existence of the possible past presence of a school is to be conducted. - A mitigation permit should be applied for and issued by SAHRA under section 34 and 35 of the NHRA, as/if required - Upon completion of the abovementioned documentation, the applicant can apply for a destruction permit	Historical structure destruction permit obtained.	Contractor, Developer, Heritage specialist	Pre-construction & during construction	ECO	Once-off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementatio n Responsibility	Time Schedule	Verification Responsibility	Frequency
Project decommissioning	Visual	Impact on visual receptors	Objective: - Removal of visual disturbance. Target: - Remove all transmission lines and ancillary infrastructure from site after project lifetime.	No complaints of glint and glare from motorists.	Contractor, Developer	Decommissioning	Developer	Once-off
Transmission Lines Infrastructure construction			Objective: - Minimisation of visual disturbance. Target: - The colour of the roof-scape and exterior walls of buildings should be charcoal, and the colour of the exterior walls should be dark stone or dark grey or, where dark colours might affect the building temperature, natural/neutral tones should be used instead. - Perimeter fencing should be grey and visually permeable.	Dark grey or neutral/muted colours present on plant's ancillary infrastructure.	Contractor, Developer	Construction	Developer	Once-off
Transmission Lines Infrastructure operation		Impact on landscape character	Objective: - Improvement of landscape character after construction. Target: - Grasses and low shrubs should be planted, if natural vegetation has not returned by the end of the first wet season	Proliferation of endemic vegetation.	Contractor, Developer, ECO	Operation	ECO	Once-off
		Disturbance / confusion of nocturnal fauna	Objective: - Little night-time lighting. Target: - Limit mounting lights and specifying foot lights and bollard level lighting - Use minimum lumen or wattage in fixtures - Place down lights and shielded fixtures - Place motion detectors on security lighting.	Limited night-time lighting beyond site perimeter	Contractor, Developer, ECO	Construction , operation	Developer	Once-off
Materials and waste								
Transportation of material	Material transport	Traffic congestion. Dust during transportation. Excessive noise.	Objective(s) - To ensure that whilst material is transported, it cannot be of negative influence to the surrounding environment. Target: - Existing access roads must be utilised as far as possible, with only the minimum new access roads being constructed where absolutely necessary; - Access to privately owned land will be arranged with the various landowners; - Adequate and appropriate traffic warning signage must be erected where applicable, along transport routes and access roads; - The Contractor shall take preventative measures e.g. screening, muffling, timing, pre-notification of affected parties to minimise complaints regarding noise and vibration nuisance from sources; - Fine materials (such as sand) must be covered during transportation; - Appropriate response plans must be prepared by Contractors to ensure the fastest possible reaction to spills or accidents;	Mufflers and silencers fitted to construction vehicles and equipment. Covering of material during transportation. Emergency reaction plan (for spills / accidents) always readily available on site.	Contractor and CECO	Prior to construction start	ECO	Throughout construction period or as required by the ECO.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			- Deliveries must be scheduled for off-peak hour traffic times; - All trucks and vehicles removing spoil from the site must have load areas and must be covered by a tarpaulin (plastic / synthetic sheets (covers) to prevent rocks and spoil falling onto the road surfaces; - Vehicle speeds on site should not exceed 30 km / hr. on gravel roads; - All drivers and operators are to have licences for driving and moving of plant on site; and - All road vehicles should be roadworthy.					
Storage of hazardous material	Hazardous material storage areas	Contamination of soil by hazardous material	Objective(s): - To ensure adequate protection of soil and soil remediation measures in case of spills. Target: - Hazardous materials, such as paint, cement, fuels, bitumen, oil, herbicides, battery acid or detergents, must be stored in sealed, lockable containers when not in use; - A register shall be kept on all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately; - No decantation into unmarked containers or containers with no or incorrect labelling; - To avoid fire risks, no decanted fuel will be left unattended in the sun; - When handling hazardous materials, manufacturer's specifications must be complied with. The 16 point Material Safety Data Sheet should be available on site; - Reasonable care must be taken to prevent spills of any hazardous material when in use; - All spills (minor and major) must be cleaned and remediated to the satisfaction of the ECO and CECO within 24 hours of occurrence; - The contractor must ensure that there is a supply of absorbent material (e.g. Drizit) and clean-up materials readily available to absorb, break down and, where possible, encapsulate minor hazardous material spillages; - No hazardous material may be stacked higher than 2 m; - All products are to be stored with compatibility in mind; - Storage areas shall display the required safety signs depicting "No smoking", "No naked flames" and "Danger". Containers shall be clearly marked to indicate contents as well as safety requirements; - Any other hazardous substances stored in bulk will require bunding; and - The contractor shall supply a method statement to the contractor for approval for the storage of hazardous materials prior to site preparation works.	Storage of hazardous materials in sealed and lockable containers. No evidence of spills on site. Absorbent and clean-up material readily available on site.	Contractor and CECO.	Construction period	ECO	For the duration of the construction period dependent on the presence of hazardous material on site.
Storage of fuel	Storage areas	Contamination of soil by fuel.	Objective(s):	Established fuel storage areas in	Contractor and CECO	Pre-construction	ECO	Once off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
		Inadequate remediation measures for spills.	- To ensure that there is optimum environmental protection (especially soil) from fuel spills. Target: - Fuel must be stored in above ground storage tanks or sealed containers, contained within a bunded area with sump drainage; - All bunds must be designed to contain at least 110% of the tank or drum storage capacity (this shall apply to above ground storage, and include fuels, welding equipment and oxy-acetylene cutting equipment); and - No drainage from fuel storage areas shall be permitted.	compliance with the objectives of the EMP.		(site establishment)		
Use of cement	Cement	Contamination of soil and surrounding environment by cement. Decrease in ambient air quality.	Objective(s): - To ensure that the environment is protected from cement that will be used on site. Target: - Cement must be delivered in sound and properly secured bags or in approved bulk containers; - Cement in bags must be stored in containers to be provided at the construction camp and should only be opened when needed; - The storage facility and surrounding area must be swept and cleaned regularly as necessary to ensure that cement products do not pollute the surrounding environment; - Empty cement bags are to be collected in hessian, material or plastic bags which, once full, can be disposed of at a registered landfill site; - Cement bags are not to be burnt on site; and - No concrete batching is to occur on bare soil, but rather on lined specially constructed bunded areas.	Cement delivery, storage and use will be in line with the EMP requirements.	Contractor and CECO	Construction period	ECO	As long as cement is in use on site.
Storage, removal and disposal of construction waste	Construction waste	Land pollution. Compaction of soil by rubble. Decreased aesthetic integrity of the site.	Objective(s): - To ensure that waste is correctly stored and disposed of, decreasing the visual and environmental impact during the construction and post construction period; - To keep the site neat and clean; - Disposal of rubble and refuse in an appropriate manner; - Minimise litigation; and - Minimise landowner complaints. Targets: - No material shall be left on site that could be harmful to humans and animals; - Broken, damaged and unused nuts, bolts and washers shall be picked up and removed from site for future use or recycling; - Surplus concrete may not be dumped indiscriminately on site, but shall be removed from site when nearing completion of the different stages of work; - Concrete trucks shall not be washed on site unless adequate washing and concrete collection facilities are introduced to site;	Construction waste stored, collected and disposed of as per the requirements of this EMP.	Contractor and CECO	Waste bins / skips must be available prior to construction. Removal of waste throughout the construction period.	ECO	The ECO will determine the frequency of waste removed from site.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			- Bins and containers must be made available by the contractor for the storage of construction waste; - All construction waste shall be stored in waste skips located strategically on site. A licensed waste contractor shall collect these skips for removal to a licensed landfill site. No construction waste may be stored on site for longer than 30 days; - The Contractor will be responsible to remove and transport all construction waste material off site to a registered waste disposal facility (proof of this, as well as a copy of the site's Registration Permit, must be provided by the Contractor to the ECO); - Where domestic waste is collected by the relevant municipality itself, a collection receipt will be suitable proof of safe disposal; - No burning of waste will be permitted on site.					
Storage, removal and disposal of domestic waste	Domestic waste	Land pollution, unpleasant odours, decreased aesthetic integrity of the site.	Objective(s) - To ensure that waste is correctly stored and disposed of, decreasing the visual and possible environmental impact during the construction and post construction period. Target: - The Contractor must supply waste bins at the construction camp for the storage of domestic waste; - Personnel must be informed about the necessity of using the waste drums; - The Contractor must do site clean-ups of litter other than construction waste on a daily basis, and dispose of it in the designated refuse bins provided at the Contractor's Camp; - The contractor must ensure that general site-wide litter clean-up will occur at least once a week; and - The Contractor must dispose of all domestic refuse generated by his staff and Sub-Contractors on a weekly basis at a registered waste disposal facility. The Contractor must provide proof of this to the ECO in the form of a safe disposal certificate.	Evidence of domestic waste stored, removed and disposed of according to the requirements indicated in this EMP.	Contractor and CECO	The waste bins / skips must be available prior to construction. Removal of waste throughout the construction period.	ECO	The ECO will determine the frequency of waste removal from site.
Storage, removal and disposal of hazardous waste.	Hazardous waste	Soil pollution, groundwater contamination.	Objective(s): - To ensure that soil and the rest of the surrounding environment on site is protected from hazardous waste. Target: - The Contractor is required by the National Environmental Management: Waste Act (no 59 of 2008) and the globally harmonised system for the classification of waste to determine whether any substance (new or waste) stored on site is subject to controls contained within the act; - All hazardous waste must be stored in sealed and suitably marked containers for removal to a registered hazardous waste disposal facility; - Hazardous waste may only be stored on site for a period of 90 days, where after it must be disposed of at a registered hazardous waste disposal site;	All mitigation measures with regards to Hazardous waste mentioned in the EMP are implemented.	Contractor and CECO	Hazardous wastes must be collected in sealable, safe containers. Removal of hazardous waste throughout the construction process.	ECO	During the entire construction period.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			Any oil spillage on site will be excavated to a depth determined between the CECO and ECO and disposed of for removal to a registered hazardous waste disposal site. Excavated areas are to be refilled with suitable replacement material. Alternative in-situ remediation techniques could be used, if approved by the ECO.					
Dust								
Trenching and transport or soils	Dust, smoke and emission control	Air pollution	Objective(s): - To reduce the generation of dust on the construction site. Target: - Dust suppression is to be conducted during construction or as complaints are received; - The Contractor is to take appropriate measures to minimise the generation of dust as a result of excavation works. Such measures include frequent water spraying during low rainfall periods or by using chemical dust binding agents approved by the ECO; - Speed limits must be enforced in all areas to reduce the generation of dust; - Cover dump trucks before traveling on public roads; - Keep soil moist while loading into dump trucks to minimise fugitive dust; - Keep soil loads below the freeboard of the truck to minimise fugitive dust; - Minimise drop heights when loaders dump soil into trucks; - Revegetate disturbed areas as soon as possible after disturbance; - When feasible, shut down idling construction machinery; - Tighten gate seals on dump trucks; and - No burning on site and close to settlements.	Dust is kept at its lowest level on site.	Contractor and CECO	Throughout construction period	ECO	During periods of low rainfall or as required by the ECO.
General construction activities								
Construction activities	Construction vehicles, plant and machinery	Noise and vibration	Objective(s): - Noise on site kept to a minimum. Target: - Should construction have to continue after hours, all residents affected must be notified; and - All machinery and equipment must be maintained in good working order, and fitted with approved and specified muffler systems.	Construction vehicles and machinery fitted with mufflers silencers. Working hours are adhered to.	Contractor and CECO	Throughout the construction period.	ECO	Ongoing
Construction activities	Existing infrastructure	Disruption of services, damage to installations, damage or loss of plant.	Objective(s): - To have control over and prevent temporary or permanent damage to plant and installations; - To prevent interference with the normal operation of plant and installations; and - Securing the safe use of infrastructure, plant and installations have control over actions and activities in close proximity to inhabited areas. Target:	No unplanned disruptions of services. No damage to any plant or installations. No complaints from authorities or Landowners	Contractor, CECO.	Throughout construction	ECO	During construction.

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			- Where pipelines are found along the route, the depth of the pipes under the surface shall be determined to ensure that proper protection is afforded to such structures; - Any damage to pipelines shall be repaired immediately; - All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties; - Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect; - Upon completion of the project all roads directly damaged by construction activities shall be repaired to their original state; and - Power cuts to facilitate construction must be carefully planned. If possible, disruptions must be kept to a minimum and should be well advertised and communicated to the Landowners.	regarding disruption of services. No litigation due to losses of plant, installations and crops.				
Concrete batching	Batching plants	Damage to vegetation. Damage to topsoil. Surface water contamination. Disturbance to area.	Objective(s): - To ensure all agreements with Landowners are adhered to; and - To prevent complaints from Landowners. Successful rehabilitation of disturbed areas. Target: - The siting of batching plants shall be done in conjunction with the engineer and ECO; - The batching plant area shall be operated in such a way as to prevent contaminated water from running off the site and polluting waterbodies; - Sibanye shall ensure that all agreements reached with the Landowner are fulfilled, and that such areas be rehabilitated once construction is completed; and - Should any claim be instituted against Sibanye, due to the actions of the Contractor at a batching plant site, Sibanye shall hold the Contractor fully responsible for the claim until such time that the Contractor can prove otherwise with the necessary documentation.	No complaints from Landowners. All disturbed areas successfully rehabilitated three months after completion of the Contract.	Contractor, CECO.	Throughout construction	ECO	During construction.
Actions by site staff	Littering on site	Untidy and polluted site and surrounding land	Objective(s): - To maintain a neat and tidy workplace. Target: - Littering by the employees of the Contractor shall not be allowed; and - The ECO shall monitor the tidiness of the work sites as well as the campsite.	No visible sign of littering. No complaints from Landowners.	Contractor, CECO.	Throughout construction	ECO.	During construction.
Rehabilitation								
Rehabilitation of construction site	Rehabilitation	Fauna and flora	Objective(s): - To minimise damage to topsoil and environment at construction areas. - Successful rehabilitation of all damaged areas. - Prevention of erosion. Target:	No loss of topsoil due to construction activities. All disturbed areas successfully rehabilitated after decommissioning	Contractor, CECO.	During decommissioning phase	ECO	Once-off

Activity	Aspect	Potential Impact	Mitigation Measure (Objective and Target)	Performance Indicator	Implementation Responsibility	Time Schedule	Verification Responsibility	Frequency
			• All areas earmarked for construction shall have the topsoil removed separately and stored for later use during rehabilitation of such areas; • During backfilling operations, the Contractor shall take care not to dump the topsoil in the bottom of the foundation and then put spoil on top. Topsoil must also be replaced on top of the backfilled areas; • Re-seeding shall be done on disturbed areas as directed by the ECO, if this option is chosen above agriculture; • Maintenance of the re-seeded areas shall be conducted until an acceptable cover has been established, meaning 75% ground cover with no gaps exceeding 500mm. Maintenance includes watering, mowing and weeding as well as preventing the development of erosion channels; • To get the best results in a specific area, consult with a specialist or the local extension officer of the Dept. of Agriculture; • Re-seeding, as well as fencing in of badly damaged areas, will always be at the discretion of the ECO, unless specifically requested by the Landowner; • The removal of all construction facilities and materials from the construction camp will be required, and rehabilitation carried out including the removal of concrete and compacted earth platforms, fuel storage tanks and chemical toilets; • All access roads no longer in use shall be rehabilitated; • Any contaminated material or soil must be removed to a registered hazardous waste disposal facility and the prescribed re-vegetation process must then be followed thereafter; • Rehabilitation must be carried out as soon as possible after the construction is completed; and • All rehabilitation is to be done with approval of Sibanye's environmental management department.	the transmission lines and associated infrastructure.				

5 Construction Phase Impacts and Mitigation

Provided below is a summary of the impacts and their recommended mitigation measures as detailed in the ecological walkdown assessment (see Appendix E).

5.1 Plant Search, Rescue and Relocation, and Habitat Management Plan

Scientific Terrestrial Services CC (STS) performed a Plant Search, Rescue and Relocation, and Habitat Management Plan for the authorised 132 kilovolt (kV) transmission powerline alignment (Figure 3).

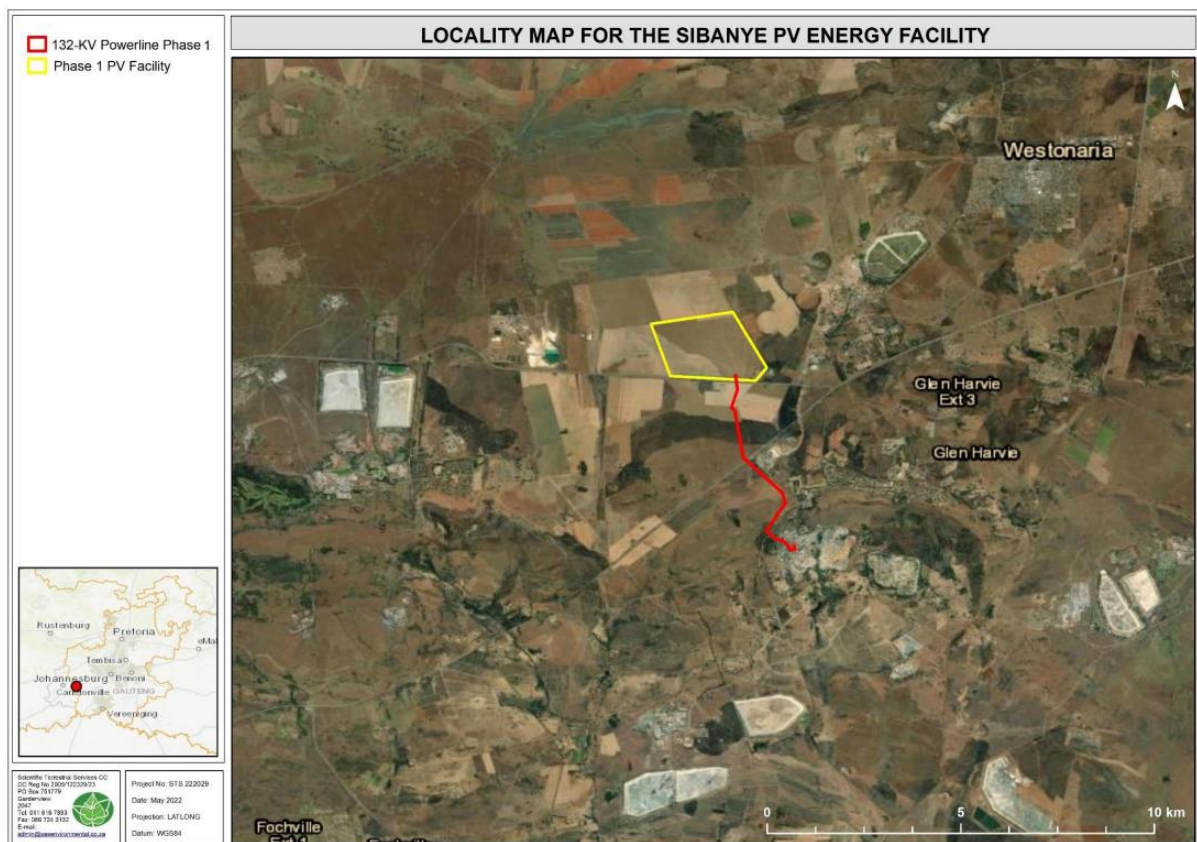


Figure 3: Digital satellite image depicting the Sibanye PV Energy Facility project area in relation to the surrounding areas

5.1.1 Receiving Environment

The 132 kV powerline corridor crosses over three roads, namely the R501 in its northern extent (just before connecting to the Phase 1 PV Facility), the N12 in its central extent, and a small unnamed road to the Sibanye Gold training academy in its southern extent. The 200 MW PV energy facility is entirely on agricultural fields, with the 132 kV Powerline Phase 1 crossing over both agricultural fields and stretches of open veld and a ridge.

A site walkdown was restricted to Phase 1 of the Sibanye PV Energy Facility project and was undertaken during May 2022 to record all Red Data Listed (RDL), provincially- (Orange Listed) or nationally protected plant species (henceforth “floral SCC”).

5.1.2 Rescue and Relocation Plan

Two Orange Listed plant species were encountered along the 132 kV transmission powerline:

- ▶ Seven (7) *Boophone disticha* individuals (least concern (LC) nationally but declining on the Orange List) were recorded within Secondary Grassland. Refer to Section 6.2.1 and Appendix B of the report for more details; and
- ▶ One hundred and forty three (143) *Hypoxis hemerocallidea* individuals (LC nationally, but declining on the Orange List). Of the 143 individuals recorded, a total of 64 specimens of *Hypoxis hemerocallidea* were recorded in the Secondary Grassland and a total of 79 within the Ridge Habitat. Refer to Section 6.2.2 and Appendix B of the report on Appendix E for more details.

According to the Gauteng Department of Agriculture and Rural Development (GDARD) (now known as GDARDE) principles⁴, Orange Listed species do not require permits for relocation if the species are relocated within the project area.

A population of 87 of the near-threatened (NT) *Adromischus umbraticola subsp. umbraticola* was encountered within the Ridge Habitat. Protocols regarding the relocation of NT species require special attention and stringent planning and mitigation measures. As such, the feasibility for the rescue and relocation of the NT *Adromischus umbraticola subsp. umbraticola* were guided by GDARDE. After a site visit by officials from GDARDE, it was determined that relocation of the NT *Adromischus umbraticola subsp. umbraticola* population is not feasible and no such attempts must be made. Refer to Appendix B of the report for locality records of this species as recorded on site.

5.1.3 Potential Impacts and mitigation measures

In line with the South African National Biodiversity Institute (SANBI) principles, avoidance of impacts to floral SCC is the primary recommendation. The 132 kV Powerline Phase 1 activities will only require the removal of vegetation (and the relocation of Orange Listed species) underneath the pylon structures and associated foundations, i.e., no vegetation clearance is required along the transmission lines. As such, to ensure minimum requirements for relocation initiatives, it is recommended that placement of the pylons be planned to limit impacts to floral SCC. Where this is not feasible, section 6.2 of the Plant Search, Rescue and Relocation, and Habitat Management Plan report should be implemented.

Provided that the activities presented in this plan are executed in a cogent and well managed fashion, the relocation of Orange Listed species that may be affected by the proposed 132 kV Powerline Phase 1 will be successful.

The below tables present species-specific details and recommendations pertaining to the rescue and relocation of protected floral species, if avoidance of impacts is not deemed possible. Following each table is a series of maps depicting the localities of the Orange Listed plants along alignment of the 132 kV transmission powerline.

⁴ Gauteng Department of Agriculture and Rural Development (GDARD) (now GDARDE) Biodiversity Directorate's minimum requirements for vegetation assessments of March 2014.

Table 5: *Boophone disticha*

REFERENCE PHOTOS	
	
The first two photos were taken on site. The last three are from online resources (iNaturalist – Photo Licence: CCO ²).	
SPECIES DETAILS	
Taxonomy	Scientific Name: <i>Boophone disticha</i> (L.f.) Herb. Higher Classification: Monocotyledons Family: Amaryllidaceae Synonyms: <i>Boophone longepedunculata</i> Pax Common Names: Boesmangibol (a), Bushman Poison Bulb (e), Candelabra Flower (e), Cape Poison Bulb (e), Century Plant (e), Gifbol (a), Gifui (a), Incotoho (z), Incoto (nd), Incwadi (x), Kaffir Onion (e), Khutsane Ea Na Ha (ss), Kopseerblom (a), Kxutsana-ya-naha (ss), Leshoma (ss), Lesoma (ss), Malgif (a), Malkopgiff (a), Mottatsisa (ss), Perdespook (a), Poison Bulb (e), Red Posy (e), Seeroogblom (a), Sore-eye Flower (e), Tumblehead (e), Veld Fan (e), Wind Ball (e)
Growth form	Succulent geophyte.
Flowering Time	October-January
Literature Description⁶:	Bulb up to 25 cm in diameter, the apex often emergent from the ground. Leaves up to 60 × 1.5-4 cm, greyish-green or glaucous, developing after the flowers. Scape 5-30 cm, with a spherical inflorescence of 50-100 (or more) flowers. Pedicels 3-8 cm at anthesis, elongating to 40 cm in fruit, angular. Flowers pink to dark purple; tube 0.5-2 cm, narrowly funnel-shaped, always shorter than segments; segments 2-3 × 0.2-0.4 cm, recurved towards apex. Capsule up to 3 cm, irregularly dehiscent. Notes: The flowers appear from a large bulb and are very noticeable after veld fires. The dried stalks and fruits of the inflorescence form "tumble weeds", which, rolled by the wind, disperse the seeds. The leaves only appear after the flowers are finished and form a distinct upright fan.
Condition and size class of species within footprint area	All specimens in site were moderately large, healthy individuals. The bulb varied between 8 cm and 15 cm in diameter above ground (below-ground not measured). The fan of the leaves was dying back at the time of assessment, but it could be established that the fans reached approximately 30 cm – 50 cm in height.
	Number of species recorded: Seven (7) individuals.
Classification	LC nationally, but Declining on the Gauteng Orange List
Permit requirements	No permit application required for species relocated within in project area.
Locality Records	Refer to Appendix B
RESCUE AND RELOCATION DETAILS	
Preferred Option (where avoidance is not possible): Translocation / Relocation	
Best results for rescue and relocation will be transplanting, i.e., digging up the mature individual and planting it at a nearby site. This must be carried out by trained personnel (or under the supervision of a horticulturist) and overseen by a suitably qualified expert to ensure the required conditions are met for successful translocation. There is always potential for plant mortality following translocation attempts and as such it is recommended to also plant harvested propagules⁷ at a ratio of 1:3 to decrease the probability of population declines (i.e., residual impacts from the 132-KV transmission powerline project). The propagules must be planted at randomly spaced intervals around the transplanted specimen at a minimum distance of 1 m, and a maximum distance of 5 m from the transplanted specimen. The planting of propagules does not have to take place during the relocation exercise as propagules may not yet be available. During maintenance activities, note must be taken of when the remaining <i>Boophone disticha</i> individuals set seed so that some seed may be harvested for planting in receptor sites.	
Step 1: Pegging and GPS capturing - Ensure all individuals that will be impacted, and that required relocation, are pegged with colourful flags. Labels can be placed on the pegs to mark the specimen. Corresponding labels to be placed on the pegs used to indicate receptor sites. - The GPS locality must be recorded for each specimen to be relocated. Refer to the recommended field recording sheet in section 6.3. - Easy options for labelling for short-term use would be masking tape (not as sticky as other tapes and can be removed easily). Permanent markers to be used on the labels. - Receptor sites should be pegged before the specimens are dug up and labelled accordingly. - GPS localities of receptor must be recorded. - Receptor sites must be chosen carefully, making sure the new location will cause minimal damage to the receiving environment.	
Step 2: Removing the bulb (manual process) - Soil around the bulb must first be softened by means of sufficiently soaking the ground. - Measure how much of the bulb is above-ground and take note of this for relocation (the bulb of the <i>Boophone disticha</i> species must not be fully submerged when replanted). - To ensure no damage comes to the bulb, the excavated area around the specimen must include a minimum distance of approximately 40 cm away from the aboveground material. Use of a garden hand-shovel (or similar) should suffice. The plant may not be pulled out of the soil by the leaves as this may result in damage to the roots. - All ventrally located adventitious rooting systems must be carefully avoided. Damage to the root system must be avoided. The 40 cm mentioned above is a guide only and where it is evident that roots grow deeper (or wider), the excavation must also be deeper (or wider). - Careful handling of the excavated specimen must take place at all times. Damage to the bulb and the root systems must be avoided. Excavated specimens can be bagged (though not essential if immediately being relocated) using in-situ soil material. Bags to be labelled accordingly. - The bulb is poisonous and handling the bulb must take place with gloves.	
Step 3: Relocation of the bulb (manual process):	

- The receptor site must be within 50 m of the original site; however, **the closer the better** as long as the specimen is relocated to a position where:
 - 1) Relocated species will not be affected by the maintenance activities of the transmission powerlines;
 - 2) No loss of other floral SCC will occur or where the relocation activities may cause extensive damage to the receiving environment;
 - 3) Relocated species will not be outcompeted by surrounding vegetation for resources (spots with less dense vegetation should be chosen);
 - 4) Relocated species are not within a watercourse or the 1:100 year floodline of a watercourse (highly unlikely for the site at hand);
 - 5) Soils are well-drained and similar to the source population (again, receptor sites must be as close to the source population as possible to mimic climatic and soil conditions better); and
 - 6) Relocated species will be within the 200 m authorised servitude of the transmission powerlines where no future development is likely to impact on them.
- Ensure a hole is dug of similar size to the one where the *Boophone disticha* specimen has been removed from (as a guide, the hole must be roughly 30 cm wide and 15 cm deep).
- Incorporate a small amount of sufficiently decomposed compost into the bottom of the excavated hole in order to provide sufficient nutrients, organic carbon, and water retention for the recovery of the individual after the relocation process.
- The bottom of the hole must be flattened (by standing in it) to firm the soil so that the plant does not settle in deeper at later stage.
- When the specimen is placed back into the hole, ensure no damage to the roots occur. Make use of the dug-out soil to fill the hole but ensure that the bulb is not entirely underground. As measured before the plant was dug-up, the same portion of the bulb must be above ground when relocating to receptor sites.
- A layer of mulch must be applied around the base of the plants to help hold in moisture and keep out competing plants.
- After the hole has been filled up, the soil must only be slightly patted down in order to avoid compaction and potential damage to the placed individual.
- Photos of the relocated specimens must be taken for monitoring purposes.

Season of relocation:

- Relocated specimens should be planted in protected areas – although the species is drought-resistant, it is frost-sensitive. If the specimen is relocated during the winter months and the area is prone to frost, ensure that specimens are protected by e.g., a horticultural fleece.
- If specimens are relocated during the winter months, ensure that they are **not watered** after relocation as this may result in the bulb to rot. The first watering of the plants may only take place in September (preferably by means of the first natural rains).

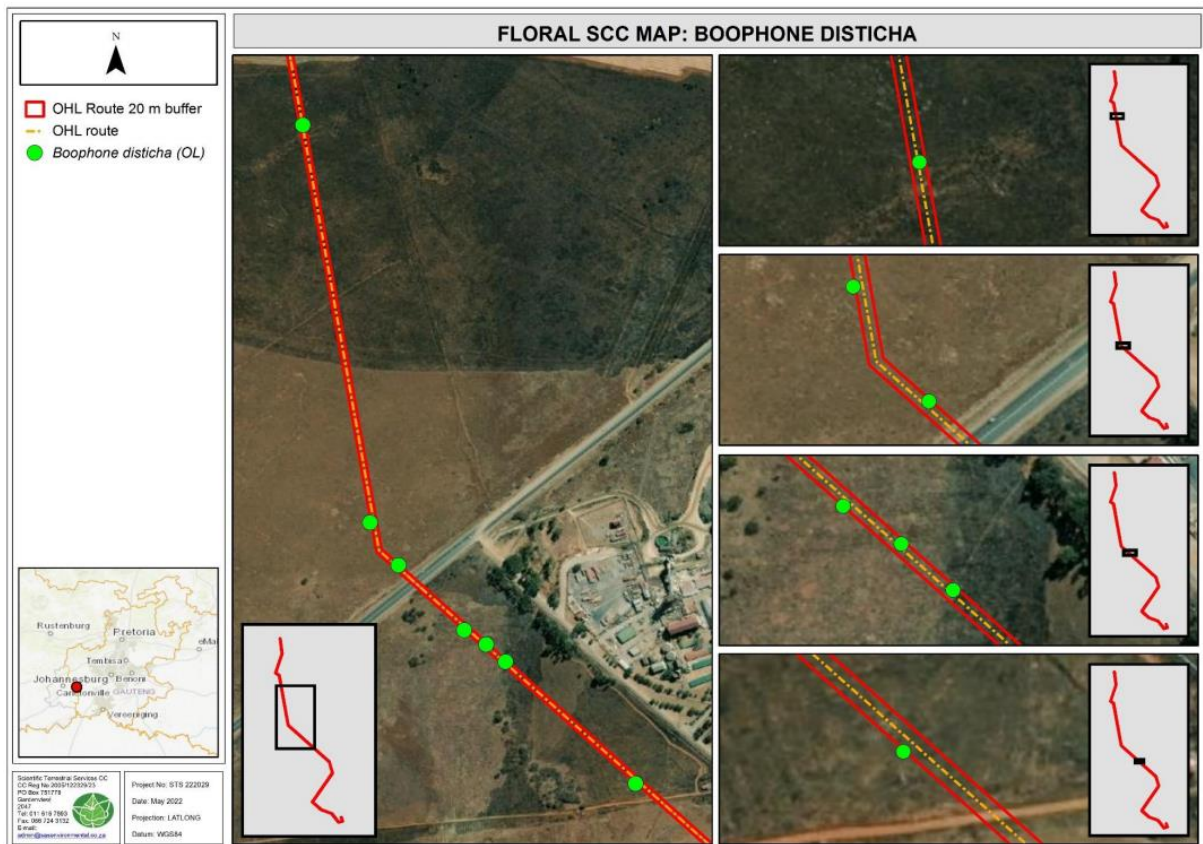


Figure 4: Map depicting the localities of the *Boophone disticha* along the 132 kV transmission powerline

Table 6: *Hypoxis hemerocallidea*

REFERENCE PHOTOS	
 The first two photos were taken on site. The last three are from online resources (iNaturalist – Photo Licence: CCO®).	
SPECIES DETAILS	
Taxonomy	Scientific Name: <i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. & Avé-Lall. Higher Classification: Monocotyledons Family: Hypoxidaceae Synonyms: <i>Hypoxis obconica</i> Nel, <i>Hypoxis patula</i> Nel, <i>Hypoxis rooperii</i> T.Moore Common Names: Gifbol (a), Inkomfe (z), Kaffertulp (a), Lotsane (ss), Moli Kharatsa (ss), Star-flower (e), Sterblom (a), Yellow Star (e)
Growth form	Geophyte.
Flowering Time	September-March.
Literature Description*:	Robust perennial herb, up to 40 cm tall, growing from a stout vertical rhizome. Leaves 7-16, overlapping at the base, 10-60 cm long, finely many-ribbed, greyish pubescent beneath with mostly 2-armed hairs. Inflorescences 2-14, usually appearing with the leaves, up to 30 cm long. Flowers 2-10 in a raceme-like arrangement 3-10 cm long; bracts linear-lanceolate, 7-30 mm long, densely greyish hairy; tepals up to 2 cm long, yellow, greyish hairy on the outside; outer tepals slightly longer than inner. Capsule 5-8 mm long with black and glossy seeds.
Condition and size class of species within footprint area	All specimens in site were moderately large, healthy individuals. The species were starting to die back for the winter (leaves fall off and the plant will no longer be visible above ground).
Classification	LC nationally, but Declining on the Gauteng Orange List.
Permit requirements	No permit application required for species relocated within in project area.
Locality Records	Refer to Appendix B

RESCUE AND RELOCATION DETAILS	
Preferred Option (where avoidance is not possible): Translocation	
Best results for rescue and relocation will be transplanting, i.e., digging up the mature individual and planting it at a nearby site. This must be carried out by trained personnel (or under the supervision of a horticulturist) and overseen by a suitably qualified expert to ensure the required conditions are met for successful translocation. There is always potential for plant mortality following translocation attempts; however, making use of propagules as a means to substitute relocated individuals is not a feasible option (seed dormancy difficult to break and due to unpredictable seed viability, combinational dormancy, and poor seedling establishment (Mofokeng <i>et al.</i>, 2020)). As such, the relocation activities for <i>Hypoxis hemerocallidea</i> must be undertaken with great care.	
Step 1: Pegging and GPS capturing - Ensure all individuals that will be impacted, and that required relocation, are pegged with colourful flags. Labels can be placed on the pegs to mark the specimen. Corresponding labels to be placed on the pegs used to indicate receptor sites. - The GPS locality must be recorded for each specimen to be relocated. Refer to the recommended field recording sheet in section 6.3. - Easy options for labelling for short-term use would be masking tape (not as sticky as other tapes and can be removed easily). Permanent markers to be used on the labels. - Receptor sites should be pegged before the specimens are dug up and labelled accordingly. - GPS localities of receptor must be recorded. - Receptor sites must be chosen carefully, making sure the new location will cause minimal damage to the receiving environment.	
Step 2: Removing the corm (manual process) - Soil around the bulb must first be softened by means of sufficiently soaking the ground. This will allow easy extraction and reduce risks of root damage. - The <i>Hypoxis hemerocallidea</i> corms should be extracted carefully and no pulling of the plant by its leaves must be allowed (this will increase risk of damage to the roots). The plant can be pushed up from the rootstock / corm. As much as possible soil should remain around the specimen when relocated so to further buffer against damage to roots and to ensure micro habitat around the roots do not change drastically in receptor sites. - <i>Hypoxis hemerocallidea</i> is a hardy plant but careful handling of the excavated specimen must still take place at all times. Excavated specimens can be bagged (though not essential if immediately being relocated) using in-situ soil material. Bags to be labelled accordingly.	
Step 3: Relocation of the corm (manual process): - The receptor site must be within 50 m of the original site; however, the closer the better as long as the specimen is relocated to a position where: 1) Relocated species will not be affected by the maintenance activities of the transmission powerlines; 2) No loss of other floral SCC will occur or where the relocation activities may cause extensive damage to the receiving environment; 3) Relocated species will not be outcompeted by surrounding vegetation for resources (spots with less dense vegetation should be chosen); 4) Relocated species are not within a watercourse or the 1:100 year floodline of a watercourse (highly unlikely for the site at hand); 5) Soils are well-drained and similar to the source population (again, receptor sites must be as close to the source population as possible to mimic climatic and soil conditions better); and 6) Relocated species will be within the 200 m authorised servitude of the transmission powerlines where no future development is likely to impact on them. - The receptor site must be a minimum of 30 cm x 30 cm (wide and deep). - Incorporate a small amount of sufficiently decomposed compost into the bottom of the excavated hole in order to provide sufficient nutrients, organic carbon, and water retention for the recovery of the individual after the relocation process. This step is not essential but may be useful. - The bottom of the hole must be flattened (by standing in it) to firm the soil so that the plant does not settle in deeper at later stage.	
- When the specimen is placed back into the hole, ensure no damage to the roots occur. Make use of the dug-out soil to fill the hole. The corm may be fully underground but not too deep. - A layer of mulch must be applied around the base of the plants to help hold in moisture and keep out competing plants. - After the hole has been filled up, the soil must only be slightly patted down in order to avoid compaction and potential damage to the placed individual. - Photos of the relocated specimens must be taken for monitoring purposes.	
Season of relocation: - Relocated specimens should be planted in protected areas. - Relocation activities must preferably take place before the species go into their dormancy period. In the event that construction occurs when specimens are dormant, it is recommended that excavated topsoil be searched for corms. - Minimal watering of specimens to take place after relocation to prevent rotting of the corms.	

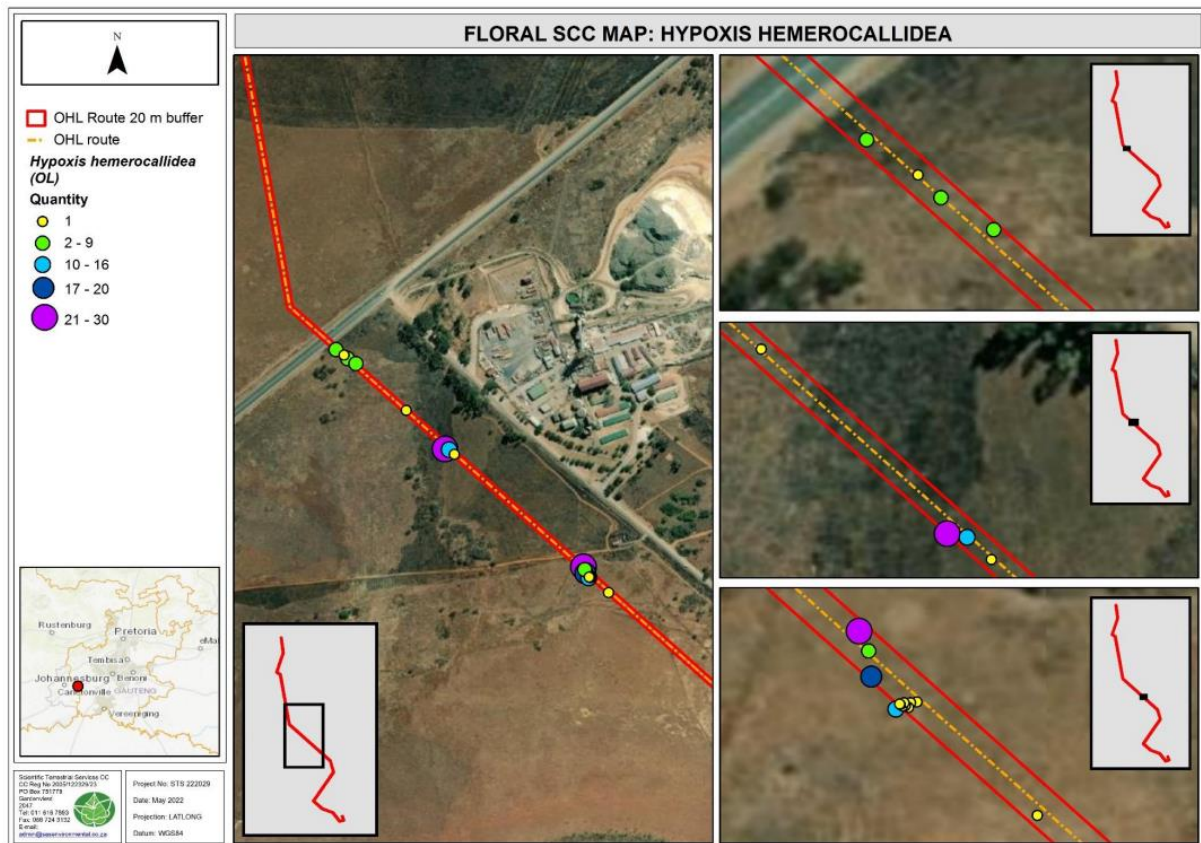


Figure 5: Map depicting the localities of the *Hypoxis hemerocallidea* along the 132 kV transmission powerline

5.1.4 Recommended Receptor Site(s)

Figure 6 below provides the recommended receptor sites for species that may be affected by the 132 kV Powerline Phase 1. Receptor sites must be within 50 m of the source population. However, where the receptor sites of *Hypoxis hemerocallidea* overlap with the receptor sites of *Boophone disticha*, a larger area of 100 m from the source population was allowed to ensure no competition between relocated specimens.

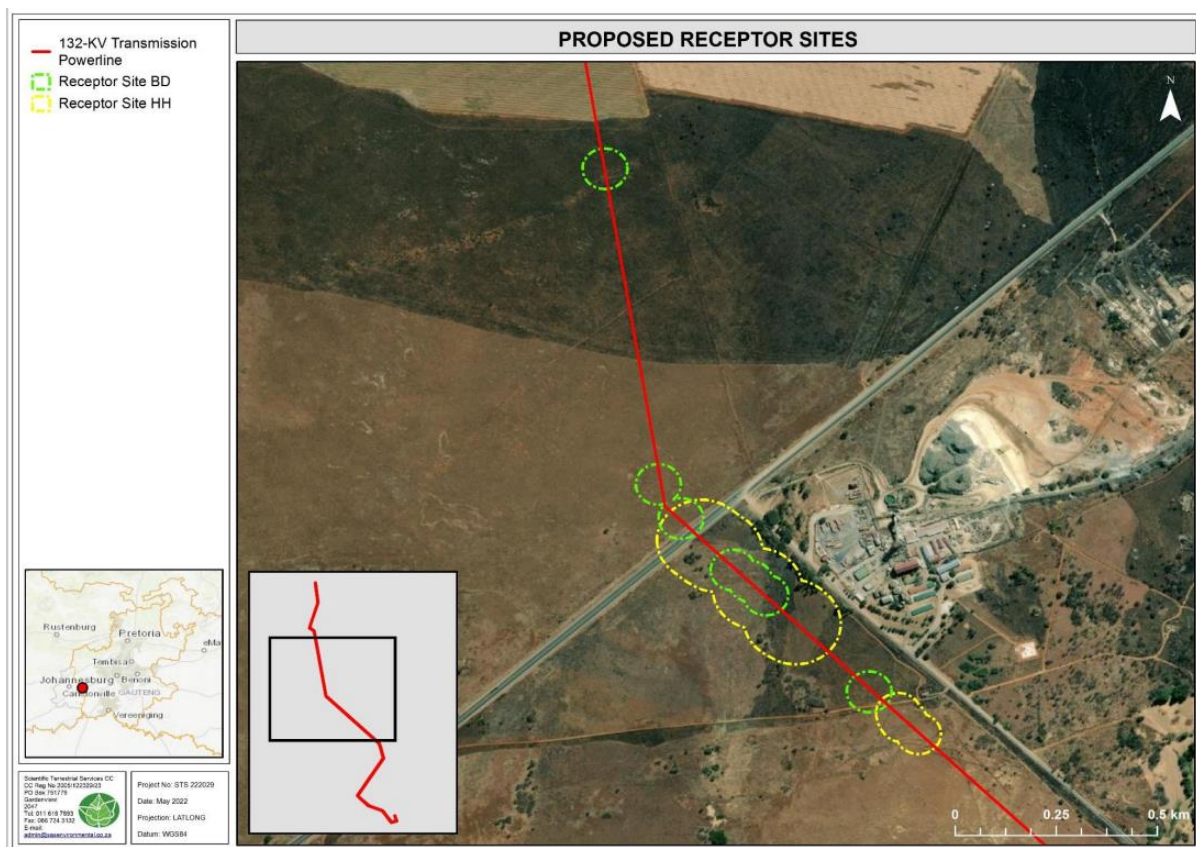


Figure 6: Recommended Receptor sites for *Boophone disticha* and *Hypoxis hemerocallidea*

Monitoring and reporting on receptor sites should be done every three months for the first year to ensure that the efficacy of measures in the Plant Search, Rescue and Relocation, and Habitat Management Plan can be ascertained. The real value of monitoring, however, lies in the accumulation of information over the longer term. Therefore, after the first year, monitoring should continue on an annual basis. General monitoring recommendations include:

- ▶ Monitoring methods should be clearly described in the relevant documentation to ensure that monitoring is repeatable;
- ▶ All data gathered should be measurable (qualitative and quantitative);
- ▶ Data should be auditable; and
- ▶ Data, when compared to previous sets, should show spatial and temporal trends.

Operational Phase Impacts and Mitigation

The operational phase commences when the proposed development is being used for its intended purposes i.e. electricity transmission.

A written notification of operation must be given to the CA no later than 14 days prior to the commencement of the project's operation.

6.1 Fauna, Flora and Alien Invasive Plant Management

A Plant Search, Rescue and Relocation, and Habitat Management Plan, approved as part of the Basic Assessment process, is included in Appendix E of this EMP. Ongoing alien and invasive plant (AIP) monitoring and clearing/control should take place throughout the operational phase, and the project perimeters should be regularly checked for AIP establishment to prevent spread into surrounding natural areas.

Monitoring of rescued and relocated floral and faunal species of conservation concern (SCC) should continue during the operational and maintenance phase until it is evident that the species have successfully established.

As far as possible, no collection of floral SCC / protected or medicinal floral species within the focus area or adjacent natural habitat must be allowed during the operational and maintenance phase of the proposed development.

Edge effect control needs to be implemented to prevent further degradation and potential loss of floral SCC / protected species or suitable habitat for such species outside of the proposed development footprint.

6.2 Erosion Control

The areas surrounding the sites, particularly watercourses, must be monitored for signs of erosion and remedial actions must be implemented where required. Erosion management specifications described under the construction phase EMP must be implemented, where applicable.

7 Decommissioning Phase Impacts and Mitigation

The decommissioning phase commences when the project has reached the end of its lifespan.

The solar PV plant is expected to have a lifespan of approximately 25 years. The possibility of upgrading the proposed facility to more advantageous technologies will be investigated at the end of this period. The future of the transmission line at that time will depend on the decision for further operation of the solar PV plant. Even if a decision is taken for the decommissioning of the solar PV plant, the transmission line may still have value to continue operating for other reasons.

Should the facility undergo expansion or significant upgrading, an environmental process may be required at that time, in accordance with the prevailing legislation at the time.

Should decommissioning be the favourable option, it would potentially take between 6 to 12 months. Care should be taken during decommissioning of the facility by keeping in mind that this soil classification of a portion of the transmission line footprint is categorised with a moderate to moderately high agricultural potential. All effort should be made to restore the land back to arable land by implementing the following mitigation measures:

- The structures should be dismantled, and the concrete foundations would be removed. All underground cables should be excavated and removed. The buildings should be demolished and removed.
- Any pole structures such as fences, sign boards, light poles et cetera should be removed with the concrete footing and may not be cut off above surface. Such structures cause serious damage to agricultural equipment.
- The footprint of structures such as foundations (usually partly below surface), roads, parking areas, paved or tarred surfaces should be cleaned properly, and waste material should be removed to a suitable disposal facility.
- The footprints should be ripped to alleviate compaction.
- After demolishing of the structures, the footprint may not be left abandoned and unproductive since weeds and aliens can be expected to immediately invade the area. The total footprint must immediately be reintroduced to crop farming or otherwise the soils should be ameliorated and seeded with a grass mixture such as *Digitaria eriantha*, *Cenchrus ciliaris* and other available local climax species or species recommended by an ecologist.
- Where materials and infrastructure are not resold or recycled, they would be disposed of at an approved landfill site. Any hazardous substances shall be removed and disposed of in terms of the requirements of the relevant legislation (e.g. Hazardous Substances Act, No. 15 of 1973) and SANS specifications.
- The rehabilitation of the disturbed areas would form part of the decommissioning phase and must take cognisance of the future proposed land use of the area. Should the need arise to decommission the transmission lines and associated infrastructure, the foundations would need to be demolished and disposed of. Roads which are no longer required after decommissioning should be scarified and the areas rehabilitated with the assistance of a rehabilitation specialist.

A detailed decommissioning plan must be developed approximately 24 months before closure of the facility. The construction phase EMPr could be used as a guideline to facilitate the detailed decommission phase EMPr. Mitigation measures listed below are provisional mitigation measures:

- All transmission lines and associated infrastructure, structures, fencing and cables should be removed, and resold or recycled, as far as possible.
- Building structures should be broken down (including foundations).
- The rubble should be managed according to National Environmental Management Waste Act (No. 59 of 2008) and deposited at a registered landfill if it cannot be recycled or reused.
- Monitoring for soil erosion should be undertaken every six months for a year following the completion of closure phase.
- Shape footprint area to reflect natural landscape.
- Wind-blown rubble and dust management needs to be implemented as required.

- After cessation of disturbance, re-spread topsoil over the surface and re-vegetate. Any additional overburden (uncontaminated) must be re-spread below the topsoil layer, not mixed with it.
- Dispose of any sub-surface spoils from excavations where they will not impact on agricultural land (for example use as road surfacing), or where they can't be effectively covered with topsoil.
- Control dust as per standard construction site measures.
- Disturbance of any stream channels should be limited to the designated access roads.
- Activities should as far as possible be limited to the delineated site for the proposed development.
- All disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth.
- The rehabilitated area must be monitored and must consider amongst others erosion, alien vegetation, re-establishment of indigenous vegetation and indigenous fauna moving back to the site; and
- Implement an effective system of stormwater run-off control where it is required.

8 NON-COMPLIANCE AND PENALTIES

The ECO must monitor compliance with this EMPr and report results in monthly ECO Reports. Non-compliance must be reported to the competent authority as per the requirements of the EA.

Penalties/fines must be issued at the discretion of the Engineer as per the penalties agreement between the Engineer and Contractor. The ECO to take up any non-compliance issues that may result in a fine/penalty with the Engineer.

The nature of the project activities may, even with the best of intentions, inevitably cause some form of environmental degradation. The costs of having to make good on such environmental degradation is usually sufficient punishment without the need to look to other punitive measures. The implementation of a penalty system therefore requires careful consideration. The following issues need to be considered in such a decision:

- Penalties would typically be warranted by persistent negligence on the part of the Contractor or failure to respond adequately to environmental considerations;
- Removal from site would typically be warranted where a particular staff member or piece of equipment is the cause of persistent environmental damage following previous warnings; and
- Suspension of the Works would only be warranted under rare circumstances where the Contractor's actions have caused or are likely to cause significant environmental degradation.

The type and extent of the corrective measures required to address non-compliance depend on the nature of the transgression and the Contractor's history of compliance with environmental obligations. When deciding on the nature of any punitive actions, it must be recognised that effective implementation of the Construction EMPr is dependent on the quality of the working relationships between the key role-players. Accordingly, an excessive response to non-compliance, particularly for a minor or unintentional transgression, may cause environmental degradation in the long term due to its effect in eroding the Contractor's commitment to meeting their environmental responsibilities. Other mechanisms, such as an expanded environmental induction programme, may prove more effective to control non-compliance in the long-term than purely punitive measures.

9 CONCLUSION

The EMPr should be regarded as a living document and changes should be made to the EMPr as required by project evolution, while retaining the underlying principles and objectives on which the document is based. Such changes need to be approved by the CA.

The compilation of the EMPr has incorporated impacts and mitigation measures from the EIA process as well as incorporating principles of best practice in terms of environmental management. This final EMPr further includes the additional conditions as set out in the EA, thereby ensuring compliance to the EA in terms of the EMPr.

By identifying the potential impacts, mitigation measures, performance indicators, responsibilities, available resources, potential schedule, and verification responsibility, the EMPr has provided a platform from which all phases of project development can be environmentally managed, and impacts can be managed.

It is the EAPs opinion that the implementation of this EMPr in its totality will reduce the negative environmental and social impacts of the project to an acceptable level, as approved by the EA. This EMPr is recommended to be approved as the final EMPr by the CA.

Appendix A: EAP CV



Reuben Heydenrych

Environmental Practitioner

Summary

Reuben is employed as an environmental assessment practitioner at Zutari. He has extensive experience in the project management of various small and large-scale infrastructural and environmental projects.

He has been involved in environmental impact assessment (EIA) and planning processes in South Africa, Botswana, Kenya, Lesotho, Mozambique, Namibia, Nigeria, Rwanda, Tanzania, Uganda, Zambia, Zimbabwe, Zambia and Antarctica, as required by relevant national legislation, financial institution performance standards and in terms of international requirements as EIA team leader and team member. These projects have included environmental assessments for projects as diverse as fuel storage facilities, mines, industrial developments, telecommunications, power generation (solar, wind, hydro, coal and nuclear), power transmission/distribution, water and sewage infrastructure, transport (airports, rail and roads), residential developments and game lodges. Many of these were completed to lender safeguard requirements, including the European Investment Bank, IFC, AfDB and Equator Principles.

Reuben also has experience in environmental advisory services and strategic environmental management, including strategic environmental assessments (SEAs), environmental scans, environmental feasibility studies and environmental management frameworks (EMFs); environmental management programmes (EMPRs) for construction and operation and environmental auditing, due diligence assessments, ISO 14001 systems development and auditing, legal compliance and waste and water use license audits.

Relevant experience

SKA-Mid Infrastructure Activity Management , South Africa, SKA Observatory HQ UK, 09/2021 - 02/2027, Environmental Specialist

Square Kilometre Array (SKA) is an international project to build the world's largest radio telescope. The project comprises of two main sites covering two components of the Square Kilometre Array, one being mid-frequency array (SKA-Mid) in the Karoo, South Africa. Zutari provides services of project manager (NEC4) including tender process facilitation, supervisor role (NEC4), construction management between infrastructure contracts, assembly integration and verification (AIV) services for combined SKA-mid infrastructure products, training and warranties management. The project management and supervision involve all electrical, fibre, structural and civil works. Responsible for review of contractor proposals against environmental criteria; review of contractor environmental management plans; as well as development of the environmental components of an ISO 14001-based environmental, health and safety management system.

ACED Harmony Gold technical and environmental due diligence for three solar photovoltaic projects (Eland, Tsepong and Nyala), South Africa, African Clean Energy Developments (ACED), 02/2022 - 12/2022, Environmental Specialist

Zutari performed environmental and social due diligence (ESSD) on the three solar PV projects. Responsible for writing of an Environmental and Social Due Diligence chapter of the due diligence report.

Nairobi-Nakuru-Mau Summit Highway Public Private Partnership (PPP) in Kenya, Kenya, CPCS Transcom Canada, 09/2021 - 12/2022, Environmental Specialist

Zutari performed Technical, Environmental and Social Due Diligence (ESSD) on the proposed Nairobi-Nakuru-Mau Summit (NMM) Highway, a proposed toll road between Nairobi and Mau Summit. Responsible for writing of an Environmental and Social Due Diligence chapter of the due diligence report.

Virginia Wilfred Private Hospital, South Africa, Development Bank of Southern Africa (DBSA), 06/2021 - 12/2022, Environmental Specialist

Qualifications

MPhil Environmental Management
BL Landscape Architecture

Professional registrations

Environmental Assessment Practitioner (EAP), Environmental Assessment Practitioners Association of South Africa (EAPASA)
Professional Landscape Architect, South African Council for the Landscape Architectural Profession (SACLAP)
Member, International Association for Impact Assessment, South Africa (IAIASa)

Specialisation

Environmental management

Years in industry

29

The Sponsors were granted approval by the KwaZulu Natal Department of Health to develop an 80-bed private hospital in Ixopo, Ubuhlebezwe Local Municipality in KwaZulu-Natal. Zutari was appointed for a lenders technical advisor review for the 80-bed Virginia Wilfred Hospital. Responsible for writing of an environmental and social due diligence report.

Project Umoyilanga environmental and social due diligence (ESSD), South Africa, EDF Renewables (Pty) Ltd, 04/2021 - 12/2022, Environmental Specialist

Zutari performed environmental and social due diligence (ESSD) on the Umoyilanga energy project, consisting of wind energy facilities (WEF), powerlines ("grid") and hybrid energy facilities (solar and battery storage). Responsible for writing of an environmental and social due diligence report.

Exxaro photovoltaic (PV) Owner's Engineer and project management, South Africa, Exxaro, 04/2021 - 12/2022, Environmental Specialist

Exxaro Energy has identified an opportunity for the development of a solar photovoltaic system for Grootegeluk and Belfast Coal Operations respectively. It contributes to building a renewable energy offering as part of Exxaro Energy's business strategy. Responsible for advice regarding permitting and independent review of another environmental assessment practitioner's scoping and environmental impact reports for the projects.

Anglo American prefeasibility studies, South Africa, Botswana, Namibia and Zimbabwe, Anglo Corporate Services SA, 07/2021 - 12/2022, Environmental Specialist

Anglo American has the objective to become carbon neutral by 2040 and appointed Zutari to provide technical advisory services in the development of an energy strategy for all its sites in South Africa, Botswana, Namibia, and Zimbabwe. This strategy need to provide a procurement perspective per site, in consideration on certain scenarios and criteria to be taken into account, among others: capacity and energy availability, finance, reliability, changing energy landscape, etc. based on taking all the criteria into account. Responsible for environmental screening (including a site visit and development of a screening report) for a solar PV project at Amandelbult Mine. Also responsible for desktop environmental screening for a wind farm at Oranjemund, as well as a desktop environmental screening for wind and solar generation facilities for Debswana Mines in Botswana.

Sibanye photovoltaic plant: amendment of Environmental Authorisation (EA), South Africa, Sibanye Gold Limited, 08/2021 - 12/2022, Environmental Assessment Practitioner

Zutari was appointed to amend conditions of the Environmental Authorisations (EAs) for the Sibanye Gold solar PV plant and associated powerlines that were issued in 2017. These processes include ecological walkdown assessments of the solar PV plant and powerlines, revision of the environmental management plans for both components, and an application for a basic assessment to authorise an additional EIA "listed activity". Responsible for the management of the environmental impact assessment process (EIA), including report writing and the public participation process, and review of all specialist reports; project management; authority liaison and communication.

Confidential green hydrogen project, South Africa, Sasol South Africa, 05/2022 - 11/2022, Environmental Specialist

Zutari was appointed to assist Sasol with environmental pre-feasibility planning for a green hydrogen production facility and associated renewable energy generation infrastructure for a large project in the Northern Cape. Responsible as secondment to Sasol's environmental team to manage Sasol's environmental screening consultant and to contribute to a number of Sasol deliverables, including environmental screening, internal discussion documents, and strategies for environmental permitting.

Mpumalanga Bamboo Project, South Africa, Terragr SA (Pty) Ltd, 04/2022 - 10/2022, Environmental Specialist

The project proposes the establishment of bamboo plantations on farmland in Mpumalanga. Zutari was appointed to compile an environmental screening report based on desktop information and a site visit, and a environmental legal screening to identify necessary legal authorisations. Responsible for site visit data collection, coordination of desktop environmental data, and compilation of a legal screening report.

Simba CM Projects, South Africa, Simba (Pty) Ltd, 05/2021 - 09/2022, Environmental Assessment Practitioner

The project entailed an environmental scoping for the proposed Simba Isando biogas plant. Zutari was appointed to undertake an impact assessment process is to identify, assess and report on any potential impacts that the proposed project may have on the receiving environment, if implemented. The investigation outcome described how impacts on the biophysical and socio-economic environment can be, as far as possible, enhanced or mitigated and managed as the case may be. Responsible for environmental screening and compilation of a basic assessment report.

Herolim Private Hospital technical review, South Africa, Herolim (Pty) Ltd, 05/2021 - 09/2022, Environmental Specialist

Technical review for the development of the 130-bed private hospital licence that was issued to Dr Mashiyi by the Eastern Cape Department of Health. The development has been split into two phases, with the phase one being

approximately 76 beds and phase two 60 beds. Responsible for writing of an environmental and social due diligence report.

Anglo American pumped hydro studies, South Africa, Anglo Corporate Services SA, 02/2021 - 08/2022, Environmental Specialist

The Mototolo Mine is a Platinum Group Metal mine in the Limpopo Province of South Africa where several iterations were considered for developing a pumped hydro storage scheme near the mine. A hydrological assessment of the catchment upstream of the proposed abstraction site needs to be performed in order to inform the client about the hydrological characteristics of the site and the catchment upstream. Responsible for data collection, identification of environmental and social risks, and generation of the environmental permitting chapter of the pre-feasibility reports.

Displacement Screening LADAR Bolana, South Africa, North West, Rustenburg Platinum Mines, 03/2022 - 07/2022, Environmental Specialist

Anglo American Platinum Pty Ltd appointed Zutari to undertake a detailed screening assessment aimed at determining whether an operation of the company is having displacement impacts on a local community. An Anglo operation received a letter of complaints from the community, raising several concerns, including, health and safety conditions, environmental conditions, provision of services, and high unemployment within the community. The community requested a meeting with Anglo to "address and redress the challenges and frustrations faced". Subsequent to this letter, the Bolana community and Anglo-American representatives met with the Member of the Mayoral Committee (MMC) for Intergovernmental Relations (IGR) and Special Projects at the Local Municipality (LM) to request assistance with the provision of basic services. As a result, the Monitoring and Evaluation Department of the RLM undertook a high-level survey of the community to better understand the challenges and how best to address them. Responsible for writing of the environmental chapter.

Lesego Private Clinic, South Africa, RH Managers (Pty) Ltd, 07/2021 - 07/2022, Environmental Specialist

A 50-bed hospital is being developed in Mogwase in the North West Province. Zutari undertook the technical due diligence review in relation to the equipment and working capital. Responsible for writing of an Environmental and Social Due Diligence Report.

Technical due diligence of the 50 MW Namanve Thermal Power Plant (NTPP), Uganda, KPMG Uganda, 02/2021 - 07/2022, Environmental Specialist

Zutari was appointed to advise the 50 MW Namanve Thermal Power Plant (NTPP) of its current condition through a technical due diligence study. Responsible for writing of environmental due diligence chapter for the due diligence report.

Project Oya environmental and social due diligence (ESSD), South Africa, G7 Renewable Energies (Pty) Ltd, 04/2021 - 06/2022, Environmental Specialist

Zutari performed environmental and social due diligence (ESSD) on the Project Oya energy project, consisting of wind energy facilities (WEF), powerlines ("grid") and hybrid energy facilities (solar and battery storage). Responsible for writing of an environmental and social due diligence report review of the client's environmental and social management system against IFC PS 1 and ISO 14001.

Peakers conversion pre-feasibility study (PFS), South Africa, Avon Peaking Power (RF) (Pty) Ltd, 06/2020 - 03/2022, Environmental Specialist

Avon and Peakers investigated the conversion of its existing diesel-fired Open Cycle Gas Turbine peaking power stations at Avon (in KZN) and Dedisa, in the Eastern Cape, to operate on LNG, which is proposed to be supplied via FSRU from Richards Bay. The possibility to utilise methane rich gas (MRG) from the Sasol Lilly pipeline for Avon peaking operation was also considered. Zutari was appointed to deliver the techno-economic feasibility study for the conversion of the Avon and Dedisa power plant and associated infrastructure. Zutari undertook a technical review and assessment of all documentation, including the NERSA licence application documentation pack, servitude applications, environmental impact assessment (EIA), environmental risk assessment (ERA) authorisation, as well as pipeline storage and design. Responsible for writing of environmental due diligence chapter for the due diligence report, including review of the project against national legal requirements, IFC environmental and social performance standards and Equator Principles.

North-South Corridor rail pre-feasibility study, South Africa, Zimbabwe, Zambia and Eswatini, World Bank Group USA, 09/2020 - 02/2022, Environmental Specialist

The overall aim of the project is to support the NEPAD Business Foundation in assessing and testing various options for private sector participation for a functioning block train service between the ports of Durban/Richards Bay in South Africa to Ndola in Zambia (eventually Kolwezi in DRC). This would include a robust analysis of all possible alternatives (alternatives in alignments, in selection of standards, etc.) and comparison with international experience and good practice among a variety of countries. Responsible for environmental screening study – identification of environmental permitting requirements in each affected country; and identification of environmentally and socially sensitive features along the corridor.

Wartsila - South African design basis , South Africa, Wärtsilä Southern Africa Pty.Ltd, 11/2020 - 01/2022, Environmental Specialist

Zutari was contracted by Wartsila, an engineering, procurement, and construction (EPC) contractor who provides power generation solutions worldwide and across Africa, to develop design basis and philosophies applicable to South Africa for electrical, civil and mechanical engineering. The scope also included the infrastructure approval process, necessary environmental approvals as well as the socioeconomical requirements. Responsible for defining environmental permitting requirements.

Weba, Weco Muzi Hydropower Project feasibility study, Zambia, Frontier Energy Hydro Power Zambia, 10/2019 - 03/2021, Environmental Practitioner

Zutari was appointed to undertake technical, environmental and social feasibility studies for three small (up to 20 MW) hydropower projects on small rivers along the Zambezi Valley escarpment in Southern Zambia. The environmental scope involved scoping and environmental impact assessment to Zambian legal requirements and IFC performance standards. Responsible for report review and quality control of deliverables.

Technical due diligence of 150 MW power plant, Mozambique, AP Moller Capitol, 08/2020 - 03/2021, Environmental Specialist

Zutari performed technical due diligence for a bidder in the sale of a 150 MW gas-fired reciprocating engine power plant. The due diligence included review of the plant design, thermal performance, operation and maintenance, condition, service contracts, fuel supply agreement plus environmental compliance with applicable standards, including the IFC Performance Standards for Environmental and Social Sustainability and the Equator Principles III. Responsible for writing of environmental due diligence chapter for the due diligence report, including review of the project against national legal requirements, IFC environmental and social performance standards and Equator Principles.

Project Zebra: Ekland Safaris Lodge upgrade, South Africa, Limpopo, OBMI, 02/2017 - 02/2021, Environmental Practitioner

Zutari was appointed to undertake the sewer and water design of four existing lodges in the Ekland Safaris luxury game lodge near Louis Trichardt in Limpopo. The extensions to the lodges include spa's and private suites. The project also comprised the upgrade and rehabilitation of an existing runway to comply with ICAO Annex 14 standards and recommended practices in order to operate the Pilates PC12 and Cessna Caravan. The design included the addition of a surfaced apron, terminal building, airfield ground lighting and all associated services. The stormwater boundary fence and drainage system of the airstrip needed to be redesigned in order to accommodate the increase runway width and runway strip dimensions. All associated airfield ground lighting, services and access roads was included in the design. The project involved several environmental authorisation applications, including those for a lodges, fencing, staff housing facilities and other related facilities. Responsible for report review and quality control of deliverables.

LNG-to-power bid for the Port of Ngqura, South Africa, ENGIE Africa, 09/2020 - 01/2021, Environmental Specialist

ENGIE expressed interest to the Department of Mineral Resources and Energy (DMRE) for developing a liquefied-natural-gas-to-power (LNG-to-power) project in Ngqura, as part of the Risk Mitigation Power Procurement Program (RMPPP). Zutari was responsible for the preliminary marine infrastructure design and studies required for the FSU including mooring and berthing dolphins. The scope of works included master planning (port planning) considering existing and future operations and navigation, development of site design data, undertaking a downtime study, preliminary designs of the berthing structures including cost estimates and a project timeline and project specifications. Responsible for environmental screening study – identification of environmental permitting requirements.

BPC Lot 1 North West Transmission Grid (NWTG) project, Botswana, Botswana Power Corporation (BPC), 10/2014 - 12/2020, Independent Environmental Reviewer

The Botswana Power Corporation required the development of a robust and adequately dimensioned transmission system which links power sources to the various load centres at various sites in the north western part of Botswana. The scope of works entailed electrical engineering consultancy services for the design, supply, installation, testing and commissioning of a 400 kV line bay at Morupule B 400 kV substation, a 230 km 400 kV line from Morupule B substation to proposed Letlhakane 400/220 kV substation, the proposed substation at Letlhakane and a 17 km 220 kV line from the proposed substation to the existing Orapa 220 kV switching station. Work also included a 60 MVAR line-connected reactor at Morupule B substation on Letlhakane line and 2 x 60 MVAR line-connected reactors at Letlhakane substation and 30 MVAR switched tertiary connected shunt reactor for each primary grid transformer at Letlhakane. Zutari's services also included geotechnical investigation, aerial survey as well as an environmental and social impact assessment for the proposed transmission line route and substation site. Responsible for the review of the environmental and social impact assessment and environmental and social management plans.

Transaction advisor for the Mogalakwena PV plant, South Africa, Limpopo, Cresco Project Finance, 08/2017 - 08/2020, Environmental Specialist

Anglo American Platinum (AAP) has a large base load power demand at its Mogalakwena Platinum Mine and

intends to reduce its consumption of grid-supplied power by procuring locally generated solar power from an independent power producer (IPP). The solar power is to be generated from an approximately 75 MW photovoltaic (PV) farm to be located near the mine and processing plant. A transaction advisory team, consisting of financial, legal and technical consulting firms, has been appointed to assist in defining, structuring, evaluating and negotiating the IPP procurement. Zutari is fulfilling the role of technical advisor within the transaction advisory team. Zutari's scope includes site visits and data gathering; power consumption data analysis; geographic information systems (GIS) mapping and site selection; solar resource analysis; plant sizing and performance modelling; load flow analysis and identification of electrical connection point/s. The scope further involves capital and operations and maintenance (O&M) cost estimates, technical advice relating to structuring of the procurement process, drafting/inputs to request for qualification (RFQ) and request for proposal (RFP) documentation, including technical requirements, power purchase agreement (PPA), etc., evaluation of RFQ and RFP submissions from IPPs and negotiations with the preferred IPPs. Responsible for environmental screening of potential alternative sites, considering biodiversity risks and heritage risks; identification of potential environmental red flags or fatal flaws per site; identification of appropriate environmental authorisation processes.

Engineering services for the Aga Khan University Hospital Kampala, Uganda, Kampala, Aga Khan University Hospital (AKUH), 09/2016 - 06/2020, Environmental Impact Assessment Team Leader

Aga Khan University Hospital (AKUH) intends to develop a 600-bed hospital on a 60 acre site at the junction of Jinja and New Port Bell Rd in Nakawa, Kampala. The initial phase of the project known as the "Launch Phase" will be developed on a 7 – 10 acre portion of the site and will consist of a 85-bed teaching hospital with an estimated 14 300 m² gross building area. Responsible for the site visit and compilation of the report for the Phase 1 environmental site assessment and for management of the environmental impact assessment process (EIA), including report writing and the public participation process, and review of all specialist reports.

RMB Lender's Technical Advisor for the new Terminal Port of Ngqura, South Africa, Eastern Cape, Oiltanking Grindrod Calulo, 04/2019 - 06/2020, Environmental Specialist

Zutari acted in an advisory role to the lender (Rand Merchant Bank - RMB) on the construction of a 155,000 cbm liquid bulk storage facility undertaken by Oiltanking Grindrod Calulo (Pty) Ltd ("OTGC"). Zutari went through two phases of review with the aim to limit risk and guide the project to financial close. The review included both a commercial and technical due diligence. Throughout the duration of this project, Zutari worked closely with both the lender (RMB) and the owner (OTGC). Responsible for due diligence of project compliance with the Performance Standards of the International Finance Corporation and Equator principles.

Nkomazi Game Reserve, South Africa, Mpumalanga, AP Vos & Sons (Pty) Ltd, 05/2019 - 05/2020, Environmental Practitioner

Environmental management services were undertaken for the tented camp at Nkomazi Game Reserve. Mkomazi Game Reserve, near Barberton in Mpumalanga, is constructing a number tented camp facilities for tourist accommodation. Zutari was appointed to assist them with the environmental applications for these facilities. Responsible for report review and quality control of deliverables.

Cato Ridge land development pre-feasibility study, South Africa, KwaZulu-Natal, Cato Ridge Development Company Ltd/Assmang, 04/2019 - 04/2020, Environmental Practitioner

A pre-feasibility investigation was undertaken for a financial model to determine the extent of the project area, based on physical encumbrances on the properties and the expected CAPEX to develop the land and measure the financial inputs against the market. The main objective was to release and develop land in a responsible manner to achieve triple bottom line and hence a benefit for all stakeholders. In doing so, Assmang wished to leave behind a positive legacy in Cato Ridge. Responsible for environmental component of the pre-feasibility study, which included investigation of the natural and social (heritage and palaeontological) baseline of the site and the identification of potential fatal flaws, red flags and other concerns and the interpretation of specialist findings for the client.

Due diligence for the head Office of the Department of Rural Development and Land Reform, South Africa, Gauteng, African Infrastructure Investment Managers (AIIM), 02/2020 - 04/2020, Environmental Practitioner

The Department of Rural Development and Land Reform has been planning since 2009 to construct a new head office complex at a site in Berea Park, Pretoria. This complex is proposed to be constructed through Public-Private Partnership (PPP). African Infrastructure Investment Managers (AIIM), one of the potential investors in this PPP, develops and manages private equity infrastructure funds designed to invest long-term institutional unlisted equity in African infrastructure projects. AIIM requested a comprehensive technical and commercial due diligence assessment of the project. The objective of the Environmental and Social Due Diligence (ESDD) was to identify and assess all-project related environmental, community, social and health and safety risks and impacts associated with the investment, and to identify areas where positive project impacts can be enhanced, as part of a larger commercial due diligence that AIIM will undertake on the investment. Responsible for written assessment of the ESDD, which includes a description of the risks and gaps identified against applicable environmental and social requirements; recommendations to address identified risks and gaps through a high-level environmental and social action plan (ESAP) as per the AIIM ESAP format; and identified opportunities for value creation through ES interventions.

Transaction advisory services for Angola-Namibia (ANNA) transmission line interconnector, Namibia and Angola, Southern African Power Pool (SAPP), 03/2017 - 03/2020, Environmental and social impact assessment (ESIA) Manager

Zutari was appointed for the provision of transaction advisory services for the Angola Namibia (ANNA) Transmission Interconnector Feasibility Study. It includes multidisciplinary study to support an investment decision to build the interconnector. It also comprises the pre-feasibility including the development of concept; Part 2: feasibility to PIM; and Part 3: PIM to EPC and financial close. In addition, Part 4 is included, with the focus on training and knowledge transfer to the SAPP as the client and the two utility Sponsors, being NamPower (Namibia) and RNT (Angola). Responsible for coordinating and managing the environmental and social impact assessment (ESIA) and resettlement action plan for the proposed 400 kV powerline.

Luapula River Hydroelectric Scheme, Zambia and Democratic Republic of the Congo, Southern African Power Pool (SAPP), 07/2018 - 03/2020, Environmental Practitioner

Zambia and the Democratic Republic of Congo (DRC) have decided to jointly expedite the development of hydropower on the common sites of the transboundary Luapula River. Zutari was contracted to undertake pre-feasibility studies for the proposed scheme. Zutari was engaged to carry out pre-feasibility studies for the environmental and social impact assessment (ESIA) opportunity for the development of the proposed Luapula River Hydroelectric Scheme. The scheme, which includes multiple dams with capacities ranging from 600 to 900 MW, is geared to secure electricity supply for Zambia and the Democratic Republic of the Congo (DRC). To bring this vision to life, Zutari will work in parallel with a technical team to document the project baseline, assess and recommend alternatives, and identify the environmental and social concerns. The project team will also develop terms of reference (ToR), which will guide the ESIA. Responsible for development of an Environmental and Social Screening Report to identify potentially significant environmental and social fatal flaws, red flags and other concerns. This included a comprehensive assessment of environmental and social baseline conditions, based on secondary and primary data collection, and identification of potential environmental and social impacts and constraints and assessment of alternative designs and project configurations (e.g. dams at different sites and full supply levels). The Screening Report included a Resettlement Planning Framework, a Stakeholder Engagement Framework and Terms of Reference for an Environmental and Social Impact Assessment and stakeholder engagement results.

Tiapata Hydropower feasibility study, Guinea, responsAbility Renewable Energy, 05/2018 - 02/2020, Environmental Practitioner

Tiapata Small Hydropower Project (SHP) aims to abstract water from the Saala River which descends through a series of rapids and waterfalls within the Fouta Djallon Highlands region of central Guinea. Zutari was appointed to upgrade the feasibility study completed by SAEMS Hydro Ltd and Wollstra (2018) to a bankable feasibility level. Zutari was responsible for carrying out the prefeasibility study and then the feasibility study of the preferred option. The scheme will likely comprise of a diversion weir, 2.3 m diameter low pressure pipeline, surge tank, 2.3 m diameter steel penstock and a power station housing 4 Pelton wheel turbines. Responsible for the environmental impact assessment to national standards and to IFC standards.

Meta Abo brewery expansion, Ethiopia, Diageo Great Britain, 08/2017 - 01/2020, Environmental Assessment Practitioner

Zutari was appointed in combination with Yerer Engineering to undertake an environmental impact assessment study and develop an environmental management plan for the planned expansion of the Meta Abo Brewery, to include a spirits bottling plant. Responsible for coordination and management of the environmental and social impact assessment (ESIA).

New Bugesera International Airport (NBIA), Rwanda, Bugesera Airport Company Limited (BAC), 08/2017 - 12/2019, Environmental Construction Officer

Zutari is providing design review and construction supervision services on the greenfield New Bugesera International Airport (NBIA) project, with capacity for 1.44 million passengers per year utilising a terminal building of approximately 30 000 m². The runway and parallel taxiway length will be 3.8 km, with the Airbus A330 as design aircraft. This is an engineering and procurement (EPC) contract between the Bugesera Airport Company (BAC) and Mota-Engil Africa (MEA). Responsible for environmental audits of the contractor (Mota-Engil) against the approved Environmental and Social Management Plan; Mota-Engil's own Project Environmental and Social Plan (PESP); and the client's Construction Environmental and Social Management Plan (CESMP).

rAREH Tanzania Reconnaissance Study, Tanzania, responsAbility Renewable Energy, 02/2019 - 12/2019, Environmental Specialist

Zutari was appointed by responsAbility Renewable Energy Holding (rAREH) for a desktop study and a reconnaissance study to identify potential hydropower sites in Tanzania, and refine the findings of the sites' actual potential. The services were carried out by first conducting, a desktop study to identify possible hydropower sites using topographical mapping, applications such as Google Earth®, obtaining information on the river systems, etc., and thereafter a reconnaissance of selected/preferred sites. Henceforth, two separate reports compiled, namely, the desktop study report and a reconnaissance study. The project has a three-facet approach, the first one being to identify sites from scratch, the second being to identify 'owners' of sites who are looking for investors to partner with

them in the development of the sites and lastly, whilst on the site reconnaissance, to speak to the locals and obtain information about other potential sites which might not have been picked up during the desktop study phase. Responsible for desktop level environmental screening of potential project sites.

Assessment of trade and transport needs in North-West Uganda, Uganda, TradeMark East Africa Uganda, 09/2018 - 11/2019, Environmental Specialist

Uganda is home to around 1.1 million refugees, from countries such as South Sudan, Democratic Republic of Congo (DRC) and Somalia. Several humanitarian organisations are involved in attending to the needs of refugees (such as WFP and UNHCR) providing support in the form of food and non-food items. The presence of refugees and the continuous support in the form of food and non-food items has a significant impact on the transport logistics of Uganda. Warehouses have been erected, while vehicle fleets distribute the goods to storage facilities and ultimately to refugees in settlements. Considering the above, TradeMark East Africa (TMEA) appointed Zutari to prepare a scoping study of the trade and transport needs in North-West Uganda, with specific focus on the impact of the refugee influx. This included a high-level screening of the potential environmental impacts of refugee camps and the transport interventions. Responsible for generation of an environmental screening report of the potential environmental impacts of refugee camps and transport options.

Viability analysis for a Private-Public Partnership for implementation of the Flue Gas Desulphurisation (FGD) project at Medupi Power Station, South Africa, Limpopo, PriceWaterhouseCoopers (PwC), 01/2017 - 07/2019, Environmental Specialist

Zutari was appointed by PriceWaterhouseCoopers to assist with a viability analysis of proposed public-private partnerships (PPP) for the implementation of various capital projects by Eskom Generation at its power stations. This included the Flue Gas Desulphurization (FGD) project at Medupi Power Station. Responsible for generation of the environmental portion of the viability analysis report.

ZESCO Lusaka transmission and distribution refurbishment (TDR) project, Zambia and USA, ZESCO Limited, 10/2014 - 05/2019, Independent Environmental Reviewer

ZESCO intended to reinforce and upgrade the power transmission and distribution infrastructure in the Lusaka area as a priority to increase the capacity and improve the reliability of the electricity network for all consumers throughout the area. Zutari was appointed to carry out investigations and planning, design, procurement, construction supervision and project management services for ZESCO Lusaka transmission and distribution refurbishment project. Responsible for the review of the environmental and social impact assessment and environmental and social management plans against European Investment Bank standards.

Square Kilometre Array Central Processing Facility Upgrade, South Africa, Northern Cape, National Research Foundation (NRF), 07/2017 - 01/2019, Environmental Specialist

The Square Kilometre Array (SKA) Telescope is a science mega-project that aims to build the world's largest radio telescope. The SKA1 Observatory will consist of two instruments – the SKA1_Mid telescope to be constructed in South Africa and the SKA1_Low telescope to be constructed in Australia. SKA1_Mid includes approximately 133 steerable dishes that are 15 m in diameter combined with 64 dishes from the MeerKAT precursor instrument. The SKA1_Low includes roughly 130,000 smaller dipole fixed antennas. The scope of works for this project involved various sub-element upgrades concomitant with the upgrade of the Central Processing Facility (CPF) to serve the SKA1_MID telescope. The main components of the power infrastructure included a 33 kV overhead line from Eskom's Karoo Substation (near Carnarvon); a central core site substation at the Site Complex called the Power Facility (PF); and a 22 kV underground cable network supplying mini-substations which in turn supplies groups of MeerKAT dish antennas at 400 V. Responsible for generation of environmental screening report; analysis of environmental legal requirements; review of potential environmental risks of construction; generation of an environmental management plan.

Marine fibre cable landing sites environmental screening, South Africa, Vodacom, 11/2017 - 01/2019, Environmental Specialist

The project entailed environmental screening of potential landing sites for marine fibre lines near Port Elizabeth (Eastern Cape) and Amamzimtoti (KZN) and identification of potentially applicable environmental and related authorisation requirements. Responsible for generation of environmental screening report; analysis of environmental legal requirements; review of potential environmental risks of alternative landing sites; recommendation for most suitable landing sites.

Usafi Transport Terminal, Uganda, Kampala, Pegasys AME, 01/2018 - 11/2018, Environmental Specialist

The objective of this assignment was to provide a detailed plan for developing Kampala's Usafi Market area into a private sector mixed-use development with public transport connections. Zutari, in partnership with IMC Worldwide and Pegasys, was engaged in December 2017 to undertake a pre-feasibility study that investigates private sector-delivered options for a mixed-use development with public transport connections at the Usafi Market in Kampala. Works included supporting the overall management of the project; overseeing the development of a methodology for carrying out the study; client interaction; and stakeholder consultation. Responsible for environmental pre-feasibility study of environmental and social opportunities and risks.

EIA/WULA for bridge over watercourse, Mbombela, South Africa, Mpumalanga, Sommereg Beleggings,

04/2017 - 11/2018, Environmental Assessment Practitioner

Zutari was appointed for a basic assessment process and water use license application (WULA) for the construction of a bridge and concrete wall along the eastern edge of the watercourse adjacent to the BUCO commercial facility in Mbombela, Mpumalanga. Responsible for review of basic assessment report and appendices, including environmental management plan.

Sisi and Simu Hydropower Project feasibility study, Uganda, ResponsAbility Africa, 02/2017 - 04/2018, Environmental Impact Assessment (EIA) Reviewer

Zutari was appointed for the bankable feasibility study, environmental and social impact assessment and for drafting the employer's requirements. The project entailed an environmental impact assessment (EIA) for the proposed hydro-electric project on the Sisi and Simu Rivers on Mount Elgon. Responsible for reviewing the EIA deliverables of a local consultant appointed to undertake an EIA in order to ensure compliance with the requirements of the International Finance Corporation (IFC) and the Equator Principles (EPs).

Lagos Cable Transit Project - environmental services, Nigeria, Niger, African Development Bank (AfDB), 05/2012 - 03/2018, Environmental Reviewer

The Lagos Cable Transit Project, an African first, consists of the construction of three cable propelled transit (CPT) lines for mass transit which will link Lagos Island with Lagos Mainland and will also link residential and business areas. The implementation of the CPT lines could serve as a model for implementation of similar systems in other congested African cities. Zutari was responsible for undertaking technical advisory services related to all technical aspects of the project. The environmental component of the project comprised a review of the environmental and social impact assessment (ESIA) of the proposed the Lagos Cable Car Transit. The review comprised a comparison of the requirements of the Nigerian EIA legislation, the International Finance Corporation's Performance Standards for Environmental and Social Sustainability and the Equator Principles. Responsible for review of environmental impact assessment: It also entailed an analysis and assessment of the content and quality of the ESIA report against these requirements; identification of environmental and social impacts that are likely to occur as a result of the proposed project; an assessment of the adequacy' of the ESIA in addressing environmental impacts and recommending appropriate mitigation measures and the identification of gaps in the ESIA and recommendations to rectify shortcomings.

24G environmental application for Standerton Oil Mill, South Africa, Mpumalanga, Standerton Oil Mills, 11/2016 - 02/2018, Environmental Management System Specialist/Internal Environmental Reviewer

The project entailed applications for legalisation of infrastructure that had been commenced illegally in relation to the Standerton Oil Mills operations. This included the compilation of an environmental impacts and aspects register towards the development of an ISO 14001 environmental management system. Responsible for review of the Section 24G legislation documents, and for compilation of the environmental impacts and aspects register.

Transnet Tippler 3 Project FEL 3 Port of Richards Bay, South Africa, KwaZulu-Natal, Transnet SOC Richards Bay, 01/2017 - 01/2018, Internal Environmental Reviewer

Zutari was appointed by Transnet Capital Projects to undertake the complete design and construction methodology of the tippler and all bulk material handling equipment and services for a single cell tippler installation in the Port of Richards Bay. The appointment involved the preparation of various drawings for mechanical, structural, electrical and control and instrumentation elements of the tippler. In addition, various environmental and sustainability documentation were produced by Zutari. Responsible for internal review of the following report deliverables: sustainability report; environmental and community interface report and design criteria report.

Baseline design for the construction of railway line from Dar es Salaam - Isaka, Tanzania, CPCS Transcom St Michael Barbados, 09/2016 - 12/2017, Environmental Practitioner

Zutari was appointed for the baseline design for the construction of a railway line from Dar es Salaam to Isaka in Tanzania. Part of the scope included an environmental screening exercise to determine the environmental feasibility of the upgrading and re-alignment of the railway line. Responsible for site visit, compilation and editing of environmental screening report, which identified the applicable IFC performance standards, potential environmental and social impacts and requirements for the update of the environmental and social impact assessment.

Overvaal Rail Tunnel, South Africa, Mpumalanga, Transnet Freight Rail, 06/2017 - 12/2017, Internal Environmental Reviewer

The project entailed the compilation of a number of sustainability reports for Transnet to review the sustainability of the proposed second Overvaal Rail Tunnel. Responsible for internal review of the following report deliverables: sustainability report; environmental and community interface report and water use license report.

Aviation master plan for North West Province, South Africa, North West, North West Department of Community Safety and Transport Management, 04/2017 - 12/2017, Environmental Specialist

The project entailed master planning for the network of airports and airfields in the North West Province. The environmental scope of work involved screening of each airport to determine the environmental opportunities and constraints regarding potential expansion at each of these airports or airfields. Responsible for the compilation of a

screening report.

Sibanye Gold photovoltaic plant environmental impact assessment (EIA), South Africa, Gauteng, Sibanye Gold Shared Services/Sibanye Stillwater, 06/2015 - 11/2017, Environmental Assessment Practitioner

Zutari managed the environmental impact assessment (EIA) process required for authorising the proposed photovoltaic facility in terms of the National Environmental Management Act. Sibanye Gold, a mining company, intends to develop the project to gain greater independence from Eskom. The project will provide power exclusively to Sibanye Gold. The generated electricity may be used at any one of its mines in the Westonaria/Carletonville region. Responsible for the management of the environmental impact assessment process (EIA), including report writing and the public participation process, and review of all specialist reports. Also responsible for amendment of the environmental authorisation and related authority liaison, as well as undertaking a Phase 1 environmental site assessment of the proposed site to confirm the presence of any potential environmental risks for project development.

Haakdoorndrift opencast project, South Africa, Limpopo, Anglo American Platinum, 03/2016 - 11/2017, Environmental Assessment Practitioner

Zutari was appointed by Anglo American Platinum to undertake the environmental impact assessment (EIA), waste and water licenses for the Haakdoorndrift opencast project at their Amandelbult Complex as part of their opencast activities. Specialist studies include groundwater, soil and land capability, terrestrial and aquatic biodiversity, noise, blasting and vibration, heritage and palaeontology, social impact assessment (SIA) as well as floodline determination. An environmental screening exercise determined the environmental feasibility of relocation of a railway line on a proposed opencast pit in the Amandelbult mining complex. Three environmental basic assessments applied for environmental authorisation for Open Pits 37, 62 East and 36W. Zutari also audited the implementation of a phase out plan for polychlorinated biphenyl (PCB)-containing materials at Anglo's Waterval Smelter near Rustenburg. Responsible for the compilation of environmental screening report for a number of proposed open pits. Also responsible for the management, coordination and quality control of the basic assessments for Pits 37 and 62 East, including review of specialist studies. Other duties included the management, coordination and quality control of the environmental management programme for Open Pit 36W, as well as authority liaison, meetings and follow -ups regarding granting of authorisation and correction of mistakes on authorisations that had been granted. Furthermore, he was responsible for the internal review of an audit of PCB-containing materials at the Waterval Smelter.

Lord's View Data Centre, South Africa, Gauteng, Dark Fibre Africa (DFA), 09/2017 - 11/2017, Internal Environmental Reviewer

Zutari undertook the feasibility assessment for the establishment of a data centre in an industrial park. The environmental feasibility study was one of several technical feasibility studies. Responsible for internal review of the environmental screening report.

Kiwira pre-feasibility study for hydro-electric power stations, Tanzania, Mbeya, Kiwira Energy Limited, 11/2016 - 10/2017, Environmental Specialist

Zutari was appointed to undertake a pre-feasibility investigation for a number of small scale hydroelectric sites along the Kiwira River in western Tanzania. Responsible for identification of environmental fatal flaws and red flags through site visits. Also responsible for the generation of environmental project briefs and project registration with the Tanzanian National Environmental Management Council (NEMC) to initiate the environmental authorisation process. Other duties included the compilation and internal review of a scoping report for the proposed Kiwira II hydroelectric site, in addition to the compilation of an environmental screening report for the proposed Momba Dam.

Dragline relocation pre-feasibility study at Landau Colliery, South Africa, Mpumalanga, Anglo Operations Proprietary, 11/2015 - 09/2017, Environmental Practitioner

Zutari was appointed to undertake a dragline relocation pre-feasibility study at Landau Colliery located in eMahlaleni. The scope of works extended to waste classification of discard material sources for Madini and Elandsfontein dumps. The works also included the compilation of a scoping and environmental impact report for the proposed construction of a road, with the purpose of relocating the dragline from the Kromdraai Section to the Navigation Section of Landau Colliery. Responsible for an internal review of scoping and environmental impact reports and public participation documents; as well as participation in impact assessment workshops and client review workshops.

Environmental screening and general environmental advice to SAIL Mining, South Africa, Gauteng, SAIL Mining, 05/2014 - 06/2017, Environmental Advisor

The project entailed environmental screening to determine the need for any environmental authorisations as well as providing general advice regarding the management of environmental risks on the site in Rosslyn (chrome, waste, stormwater and dust) and management of a dust monitoring programme. Responsible for drafting of an environmental screening report and provision of ad hoc environmental advice.

Mohembo Bridge over the Okavango River, Botswana, Itinera/Cimola JV, 11/2016 - 06/2017, Environmental Assessment Practitioner

Zutari was appointed by Itinera, a contractor, to develop a site-specific Environmental, Health and Safety Management Plan (EHSMP) for the construction of the Mohembo Bridge over the Okavango River in the north-west of Botswana. Responsible for the development of the environmental portion of the EHSMP.

Mogalakwena 33 kV powerline, South Africa, Limpopo, Mogalakwena Local Municipality, 05/2015 - 06/2017, Internal Environmental Reviewer/Environmental Assessment Practitioner

The Mogalakwena Local Municipality appointed Zutari to design a 33 kV powerline in the Waterberg, and to obtain environmental authorisation under the environmental impact assessment (EIA) regulations in terms of the National Environmental Management Act, 1998. Responsible for internal review of the environmental basic assessment report and environmental management programme.

Waterberg feasibility (FEL 3) study for rail infrastructure, South Africa, Transnet SOC Johannesburg, 12/2014 - 12/2016, Environmental Practitioner

Zutari was appointed to assist Transnet in attaining their business goal of establishing an incremental rail capacity development plan for coal tonnage throughput up to 24 Mtpa, for export and domestic destinations. Zutari investigated and established the requirements in terms of upgrading the existing rail infrastructure between Lephalale and Ermelo in order to support the envisaged expansion, which includes infrastructure, rolling stock and other assets. Responsible for editing and revision of FEL 3 environmental feasibility reports, including the environmental design criteria report, environmental and social governance report and sustainable development design report.

Environmental, health and safety legal register of Khanyisa Power Station, South Africa, Mpumalanga, Alstom/General Electric, 06/2016 - 12/2016, Environmental Specialist

Zutari was tasked with the compilation of a comprehensive database of environmental, health and safety and spatial planning legal authorisations for construction of the proposed Khanyisa Power Station, with a focus on requirements applicable to the contractor. Responsible for project management and identification of environmental legal requirements.

Menlyn diesel spill response, South Africa, Gauteng, Pareto, 08/2016 - 11/2016, Independent Environmental Specialist

The project entailed a response to spillage of approximately 20 000 litres of diesel from Menlyn Park shopping centre into the Moreletaspruit in eastern Pretoria. Responsible for review of spill response in terms of company's procedures and processes; compilation of emergency reports to relevant environmental authorities; liaison with authorities; and review of specialist ecological reports.

Overvaal Tunnel FEL 3 and FEL 4, South Africa, Mpumalanga, Transnet SOC Johannesburg, 06/2014 - 11/2016, Internal Environmental Reviewer

Zutari was appointed for the feasibility (FEL 3) development in respect of the construction of the second Overvaal tunnel as well as the complete engineering (FEL 4) thereof. In addition to the development of the tunnel, Transnet SOC required to reinstate, upgrade and/or construct a ventilation system for the existing tunnel. The new tunnel needs to accommodate a double electrified signalled track. Responsible for the review of the environmental and social management plan (ESMP) and the water use license application report.

Sebokeng CBD feasibility study, South Africa, Gauteng, Development Bank of Southern Africa (DBSA), 09/2015 - 10/2016, Environmental Practitioner

The purpose of the feasibility study is to determine the potential technical and financial sustainability and success of the project to be implemented. An environmental screening exercise was undertaken to determine environmental feasibility of the development of a mixed use precinct in Sebokeng. Responsible for the compilation of the screening report.

Pilgrim's Rest residential development, South Africa, Mpumalanga, Mpumalanga Provincial Government: Department of Human Settlements, 10/2015 - 10/2016, Environmental Assessment Practitioner

The project comprised an environmental basic assessment process for the authorisation of the construction of a residential area at Pilgrim's Rest. Responsible for internal review of basic assessment report, participation documents and specialist reports.

Independent engineering audits for the South African National Roads Agency Limited (SANRAL) and the N3 Toll Concession (N3TC), South Africa, South African National Roads Agency Limited (SANRAL) and N3 Toll Concession (Pty) Ltd (N3TC), 09/2009 - 09/2016, Environmental Specialist

The South African National Roads Agency Limited (SANRAL) signed a 30-year concession contract with the N3 Toll Concession (N3TC) to maintain and upgrade the section of National Route 3 (N3) between Cedara and Heidelberg. Zutari was appointed as the independent engineer to oversee and audit the contract, including reviewing all designs, audit construction work, maintenance work and the toll plaza operations as well as environmental audits of the environmental system implementation. Responsible for auditing and monitoring of the environmental system.

Ingula pumped storage scheme, South Africa, Gauteng, Eskom Holdings SOC, 11/2011 - 08/2016, Environmental Reviewer

The project comprised annual environmental compliance audits against the requirements of the Ingula pumped storage scheme's water use licence (WUL) and integrated water use licence (IWUL). Responsible for the compilation of and review of integrated waste and water management plan (IWWMP) audits.

Lesotho knit fabric mill development, Lesotho, Lesotho National Development Corporation (LNDC), 04/2016 - 08/2016, Environmental Practitioner

Zutari was appointed to develop options for service delivery for three knit fabric mill plants located in existing industrial parks in Tikoe, Nyenye and Ha Belo in Lesotho. The scope of works entailed preparing a block plan for each of the three estates indicating the consolidation of stands required to suit the needs of each investor, investigating the available supply of electricity and making recommendations regarding upgrades that were required, ensuring that measures were in place to improve electricity efficiency were outlined, investigating potential water supply sources and covering ground water, surface water and municipal supply. Additional services include undertaking a cost benefit analysis on the three options for each individual site, designing a wastewater treatment package plant to suit the capacity requirements for each investor based on the contaminants specified by the investor, and as well as carrying out a high level environmental screening highlighting all potential environmental issues and applications required. Responsible for compilation of the screening report.

Mokolo Crocodile Water Augmentation Project (MCWAP), South Africa, Limpopo, Trans-Caledon Tunnel Authority (TCTA), 09/2009 - 06/2016, Reviewer

The project entailed comprehensive engineering services for the Mokolo Crocodile Water Augmentation Project (MCWAP), including the construction of two major bulk raw water transfer systems and associated infrastructure. The MCWAP supplies raw water to meet the demands of the new power station in Lephalale, mines and industry, and domestic users. The main components of the scheme are abstraction weirs, pump stations, pipelines and balancing storage. Responsible for the independent review of a draft basic assessment report (BAR).

Olifants River water resources development project, Phase 2, South Africa, Limpopo, Trans-Caledon Tunnel Authority (TCTA), 09/2009 - 06/2016, Internal Reviewer

The second phase of the Olifants River water resources development project (ORWRDP-2) is an extensive water resource development project to supply water for domestic and industrial (mining) use in the Limpopo Province, South Africa. The Trans-Caledon Tunnel Authority (TCTA) appointed the Aurecon (now Zutari) Nnodana Joint Venture (ANJV) to undertake the design and construction supervision of the project. Responsible for internal review of a visual impact assessment for upgrading of reservoirs and pipelines.

Klipplaats 400 kV line deviation, South Africa, Mpumalanga, Glencore Xstrata Coal South Africa (Glencore South Africa (Pty) Ltd), 01/2015 - 05/2016, Environmental Reviewer

The project entailed environmental studies, water use license application and preliminary design for the Klipplaats 400 kV line deviation at the Tweefontein Coal Mine, the registered land owner of the farm Klipplaats 141S in Mpumalanga. Responsible for the review and quality control of the basic assessment report and environmental management programme.

Servitudes and EMP for transmission line construction, South Africa, Gauteng, Eskom Holdings SOC Limited, 05/2013 - 05/2016, Internal Reviewer

Zutari's appointment entails the acquisition of options to register servitudes over land within an environmentally approved corridor for 2 x 400 kV transmission lines for a distance of 119.611 km from Matla Power Station near Secunda, Mpumalanga Province to Jupiter B Substation, in the vicinity of Rosherville, Gauteng Province and the management of the EMP during construction of the corridor on behalf of Eskom. Responsible for the review of the internal report.

Lesotho MCA Health Infrastructure Programme 2010, Lesotho, Millennium Challenge Account (MCA) - Lesotho, 10/2009 - 04/2016, Health, Safety and Environment (HSE) and Environmental Management (EM) Manager

This project involved the provision of programme management, construction supervision and environmental management services for the health infrastructure programme in Lesotho. This included the design of the National Reference Laboratory (NRL) and blood transfusion centre, the design of student and staff hostels at existing Lesotho Hospital, and the construction of 138 new health centres and 14 new outpatient departments (OPDs). Responsible for liaising between client and contractor to facilitate resolution of outstanding construction to address health, safety and environmental (HSE) issues.

Legal authorisation requirements for a variety of solar photovoltaic facilities, South Africa, SunEdison, 09/2015 - 03/2016, Reviewer

The project comprised the identification of potential gaps in existing environmental authorisations (e.g. listed activities, validity of previous authorisations, etc.) for five different planned solar photovoltaic facilities. Responsible as internal reviewer.

Basic assessment for the upgrade of Island View substation, South Africa, KwaZulu-Natal, Transnet SOC, 06/2015 - 02/2016, Environmental Assessment Practitioner

Appointed for the basic assessment for the proposed upgrade of Island View substation, Fynlands industrial basin, Port of Durban. Responsible for the management of the basic assessment (BA) process, including report writing and the public participation process, and review of all specialist reports.

Environmental impact assessment (EIA) at the Komati Mill, South Africa, Mpumalanga, TSB Sugar, 06/2014 - 12/2015, Environmental Assessment Practitioner

The project entailed environmental authorisation application and water use licence application (WULA) for the establishment of new cane fields at TSB Sugar's sugar mill near Malalane. Responsible for the management of the environmental impact assessment process (EIA).

Environmental control officer (ECO) services for the construction of the KDS-Homestead power line, South Africa, Northern Cape, Eskom Distribution, 07/2014 - 12/2015, Environmental Assessment Practitioner

The project comprised the environmental monitoring of construction of the KDS-Homestead distribution power line in Kimberley. Responsible for the management and review of environmental monitoring deliverables.

Feasibility (FEL 3) development for the construction of a second Overvaal tunnel (Part 1) and the complete engineering (FEL 4) for Part 2, South Africa, Mpumalanga, Transnet SOC Johannesburg, 06/2014 - 12/2015, Reviewer

Zutari was appointed for the feasibility (FEL 3) development in respect of the construction of the second Overvaal tunnel as well as the complete engineering (FEL 4) thereof. In addition to the development of the tunnel, Transnet SOC required to reinstate, upgrade and/or construct a ventilation system for the existing tunnel. The new tunnel needs to accommodate a double electrified signalled track. Responsible for the review of the environmental and social management plan (ESMP) and the water use license application report.

Kinangop Wind Farm, 1A status review and risk assessment, Kenya, Kinangop Wind Park, 11/2015 - 12/2015, Report Contributor

Following termination of the EPC contract, Zutari was appointed to assess the project status and risks associated with remobilising the 60.8 MW wind farm project. Responsible as report contributor regarding legal and administrative requirements.

Khanyisa Power Station, South Africa, Mpumalanga, ACWA Power, 02/2015 - 11/2015, Environmental Assessment Practitioner

The project involved the application for amendment of an existing environmental authorisation for the expansion of the authorised capacity of 450 MW to 600 MW and other related processes. Responsible for the management of the environmental impact assessment process (EIA), amendment report, amendment report, revision of the environmental management programme (EMPr), and all related specialist reports.

Uganda's detailed strategic implementation plan (SIP), Uganda, Ministry of Works and Transport (Uganda), 09/2014 - 10/2015, Environmental Specialist

As a land-locked country, Uganda depends on regional road, rail and inland water transport systems for the transportation of goods. Majority of the import and export traffic passes through the Northern corridor to Mombasa, little using the Central corridor to Dar-es-Salaam in Tanzania. In order to strengthen the use of the Central Corridor, the National Transport Masterplan (NTMP) was implemented and adopted a multi-modal approach. Responsible for the compilation of report on environmental and social safeguard issues to be considered in project prioritisation, as well client training on these issues.

Identification of legal requirements for a gas-fired power station, South Africa, Enel, 07/2015 - 10/2015, Report Author

Appointed for the compilation of a database of legal authorisation requirements for the construction and operation of a gas-fired power station. Other authors contributed sections on health and safety, grid planning and land use authorisations. Responsible as report author.

Richards Bay Coal Terminal (RBCT) short-term coal stockpile, South Africa, KwaZulu-Natal, Transnet National Ports Authority (TNPA), 05/2013 - 07/2015, Internal Reviewer

Design of a short-term coal stockpile at Richards Bay Coal Terminal (RBCT) to handle 1.0 Mtpa of coal for New Entrants Miners. Responsible for the review of the internal report.

Netcare Energy Policy, South Africa, Netcare Limited, 02/2015 - 05/2015, Policy Writer

The project entailed drafting an energy management policy for Netcare, a health service provider, towards the development of their environmental management system. Responsible for the drafting of policy.

National Transport master plan (NATMAP) review and upgrade, South Africa, Department of Transport, 01/2015 - 05/2015, Reviewer

The project involved the revision of the National Transport master plan, a strategic plan for transport development in South Africa developed by the Department of Transport. The initial draft document was developed in 2007 and was required to be revised to be accepted by the Department of transport and Cabinet. Responsible for data collection, presentation of the current status quo and revision of Chapter 8 (Energy and Environment).

Bankable feasibility study (BFS) for a small hydropower scheme on the Nithi River in Central Kenya, Kenya, Frontier Investment Management, 04/2014 - 04/2015, Environmental Impact Assessment (EIA) Reviewer

The project entailed an environmental impact assessment (EIA) for the proposed hydro-electric project on the Nithi River, Mount Kenya. Responsible for reviewing the EIA deliverables of a local consultant appointed to undertake an EIA in order to ensure compliance with the requirements of the International Finance Corporation (IFC) and the Equator Principles (EPs).

Contamination assessment of selected Transnet properties, South Africa, Transnet SOC, 03/2014 - 03/2015, Environmental Reviewer

The project comprised contamination assessment of various sites to identify environmental contamination as well as compile site assessment reports and financial model for the closure and rehabilitation of these sites - included various specialist studies. Responsible for the review and quality control of the contaminated site assessment report.

Mobile disaster recovery trailers for Vodacom, South Africa, Gauteng, Planning & Cost Engineering Services (Pty) Ltd (PaCE), 10/2014 - 03/2015, External Reviewer

The project entailed mobile disaster recovery trailers for Vodacom's Gauteng data centres, with the scope of work being communicated as the project progresses. Responsible for the role of an external reviewer.

Feasibility assessment for proposed small-scale hydro-electric facilities on the Tugela River, South Africa, KwaZulu-Natal, Various clients, 01/2015 - 01/2015, Report Author

The project comprised environmental opportunities and constraints and a fatal flaw assessment (as contribution to a feasibility study) for four proposed mini hydro-electric facilities between Bergville and Ladysmith. Responsible as report author.

Feasibility study of the Nyamagasani II Hydropower Project, Uganda, Frontier Investment Management, 02/2014 - 12/2014, Environmental Impact Assessment (EIA) Reviewer

The project comprises a feasibility study and environmental and social impact assessment (ESIA) for the 5 MW Nyamagasani II Hydropower Project, located on the Nyamagasani River. The feasibility study includes geotechnical; hydrological (daily flows and floods); environmental and social, including resettlement action plan (RAP) and environmental management plan (EMP); civil and hydraulics; mechanical, electrical and interconnection, flow measurements and economic studies. Responsible for reviewing the EIA deliverables of a local consultant appointed to undertake the EIA in order to ensure compliance with the requirements of the International Finance Corporation (IFC) and the Equator Principles (EPs).

Ekurhuleni smart metering feasibility study, South Africa, Gauteng, Ekurhuleni Metropolitan Municipality, 09/2013 - 10/2014, Report Author

The Grantee's Energy Department's (EED's) electricity metering and billing processes and systems suffered from several shortcomings, which consisted of inaccurate meter reading, delays in billing, delays in revenue collection, and unbilled electricity. Zutari was appointed to carry out a feasibility study to evaluate the technical, financial, environmental and other critical aspects of implementing advanced metering infrastructure in Ekurhuleni, South Africa. Responsible for undertaking an environmental screening exercise to identify potential environmental and social impacts and review environmental authorisation requirements. Also responsible as a report author.

Feasibility study investigating the upgrading the 98 km Thaba Tseka – Taung - Mokhotlong road to a bituminous surfacing standard, Lesotho, Lesotho Ministry of Public Works and Transport, 04/2014 - 07/2014, Environmental Specialist

The project entailed a pre-feasibility assessment of the proposed upgrading of the Thaba Tseka - Mokhotlong dirt road to a tarred road. Responsible for reviewing the environmental issues relevant to the proposed upgrading of the road, including a site visit and a review of an environmental impact assessment (EIA) undertaken on the same project in 2006.

AFGRI Mill ISO 14001 certification audit, South Africa, Mpumalanga, AFGRI Milling, 11/2013 - 06/2014, Lead Environmental Auditor

The project entailed a third party Stage 1 ISO 14001 certification audit for AFGRI Mill in Kinross. Responsible for conducting the Stage 1 ISO 14001 certification audit of the environmental management system (EMS).

Basic assessment (BA) and Section 24G rectification assessment of the Vaal River pipeline, South Africa, North West, AngloGold Ashanti, 11/2009 - 03/2014, Senior Environmental Scientist

The project entailed an environmental basic assessment (BA) for the installation of a water pipeline on the Vaal River Gold Mine in Orkney. Responsible for project management and quality control of deliverables.

Nuclear-1 environmental impact assessment (EIA), South Africa, Eastern Cape, Eskom Generation, 04/2013 - 03/2014, Project Leader

The project entailed an environmental impact assessment (EIA) process for the proposed Nuclear-1 Power Station. Responsible for project management, responding to stakeholder comments, and authority liaison, review of approximately 30 specialist reports and providing overall strategic guidance of the EIA process.

Port of Saldanha Expansion Project, South Africa, Western Cape, Transnet SOC Limited, 11/2013 - 03/2014, Project Leader

The project involved environmental impact assessment (EIA) processes and atmospheric emission licence for the installation of a third tippler at the Port of Saldanha. The project also included a scoping and environmental impact report (EIR) process for the expansion of the port (the latter was suspended prior to submission of the draft scoping report). Responsible for the finalisation and submission of the basic assessment report (BAR) for the third tippler, responding to the interested and affected parties' (I&AP's) comments and authority liaison to ensure a timeous authorisation, and post-authorisation amendment of the authorisation and response to appeals by interested parties.

Third party ISO 14001 audit reports, South Africa, Various clients, 04/2013 - 03/2014, Internal Reviewer

The project comprised an internal review of a range of third party ISO 14001 audit reports for various clients throughout South Africa.

Engineering design (FEL 4) for Nacala Port, Mozambique, Nampula, Vale Moçambique Limitada, 10/2011 - 11/2013, Senior Environmental Scientist

Zutari was appointed for the complete on-shore port front-end-engineering design (FEED) for the Nacala Port, consisting of bulk materials handling (BMH), bulk earthworks, rail embankment and utilities and transportation infrastructure. Zutari undertook a number of general functions during its detailed design, including verifying and updating the design criteria documents generated during the Nacala Port front-end loading 3 (FEL 3) study and the engineering design to achieve the requirements for the construction phase. Responsible for review of engineering reports and designs and strategic advice on environmental issues and implications of the design for the environmental authorisation.

ABSA Project X, South Africa, Gauteng, ABSA, 04/2012 - 11/2013, Due Diligence Assessor

Zutari was part of a professional team involved in the conversion and upgrading of an existing factory building and office block of 24 000 m² in Waltloo into a call centre, administration building, canteen, two large gate houses and security buildings and a data centre. Zutari provided structural, civil, fire, wet services, roads and landscaping services on the project. Responsible for the site visit and the compilation of the environmental due diligence assessment (EDDA).

Nuclear-1 environmental impact assessment (EIA), South Africa, Eastern Cape, Arcus GIBB, 06/2012 - 04/2013, Senior Environmental Scientist

The project entailed an environmental impact assessment (EIA) for a proposed Generation III nuclear power station with a maximum generation capacity of 4 000 MW to be located at one of three alternative sites in the Eastern and Western Cape. Zutari was contracted to assist GIBB with the revision of the revised draft environmental impact report (EIR) and to respond to stakeholder comments on this report. Responsible for the revision of the EIR, responding to stakeholder comments, and authority liaison.

Saldanha Tank Farm, South Africa, Western Cape, WorleyParsons, 03/2012 - 03/2013, Visual Impact Assessment (VIA) Specialist

The project involved a visual impact assessment (VIA) for a proposed oil storage facility at Saldanha. Responsible for project management and quality control of deliverables.

Environmental basic assessment for the return water pipeline at Mponeng Gold Mine, South Africa, Gauteng, AngloGold Ashanti, 07/2011 - 02/2013, Senior Environmental Scientist

Zutari was appointed to do the tender design for the replacement of the existing return water pipeline that feeds into the Mponeng process plant in Carletonville. The project included a 4 km pipeline with a 400 mm diameter. Responsible for project management and quality control of deliverables.

Port of Richards Bay capacity expansion conceptual study (FEL 1), South Africa, KwaZulu-Natal, Transnet SOC, 03/2012 - 11/2012, Reviewer

The port facilities in Richards Bay reached operational capacity necessitating expansion. The key objectives of the conceptual (FEL 1) and pre-feasibility (FEL 2) studies were to determine the requirements for all land, rail, terminal, port and marine service engineering options to facilitate the expansionary development of the terminal ports. Zutari's services included rail infrastructure, bulk materials handling (BMH), civil and structural infrastructure, port structural engineering, marine and berth engineering, earthworks, geotechnical and electrical engineering, utilities, health and safety, environmental and solid waste. Responsible for the internal review of report deliverables, including an environmental and community interface report and a sustainability report.

Pre-feasibility study of Mulepe-1 Diamond Mine, Angola, Lunda Norte, De Beers Consolidated Mines (DBCM), 11/2011 - 05/2012, Senior Environmental Scientist

Zutari was appointed to carry out the pre-feasibility study of the hydropower potential in three rivers surrounding De Beers' Mulepe-1 Concession. The project consisted of the measurement of flows in the rivers, rainfall/runoff hydrological modelling, environmental fatal flaw analysis, site reconnaissance, preliminary geological evaluation and determination of the hydropower potential. Zutari determined the optimal and most cost effective solution for the supply of reliable clean energy to the mine. Responsible for the compilation of the screening report.

Environmental advice for the construction of a remote apron stand at OR Tambo International Airport (ORTIA), South Africa, Gauteng, Airports Company South Africa (ACSA), 04/2012 - 05/2012, Senior Environmental Scientist

The project involved providing environmental advice regarding the interpretation of legal requirements for the recommencement of construction of the remote apron stand at OR Tambo International Airport (ORTIA) in Kempton Park. Responsible for the review of legal requirements and drafting of a report on the recommended way forward.

Tau Tona pipeline basic assessment (BA), South Africa, Gauteng, AngloGold Ashanti, 07/2010 - 04/2012, Senior Environmental Scientist

The project entailed an environmental basic assessment (BA) for a pipeline at Tau Tona Gold Mine in Carletonville. Responsible for project management and quality control of deliverables.

Visual opinion for Witberg, South Africa, Western Cape, Arcus GIBB, 11/2011 - 01/2012, Visual Impact Assessment (VIA) Specialist

The project involved giving an opinion on the visual impact of an access road to the proposed Witberg Wind Farm near Matjiesfontein. Responsible for the site visit and the compilation of a brief opinion on the expected visual impacts.

Extension of Sunderland Ridge wastewater treatment works (WWTW), South Africa, Gauteng, City of Tshwane Metropolitan Municipality (CTMM), 01/2007 - 12/2011, Senior Environmental Scientist

Zutari was appointed to provide the engineering services for the extension of the Sunderland Ridge wastewater treatment works (WWTW) to 95 Ml/d. The purpose of the project was to provide a feasibility study for the 30 Ml/d extension; licence applications; environmental impact assessments (EIAs) and the relevant authorisations for the 30 Ml/d extension and process design of the extension. Responsible for project management and quality control of deliverables.

Environmental impact assessment (EIA) for St. Helena Wind Farm, South Africa, Western Cape, Arcus GIBB, 09/2011 - 11/2011, Senior Environmental Scientist

The project comprised a visual impact assessment (VIA) of the St. Helena Wind Farm near Saldanha as part of the environmental impact assessment (EIA) phase. Responsible for project management and quality control of deliverables.

Scoping phase for St. Helena Wind Farm, South Africa, Western Cape, Just Energy, 01/2011 - 06/2011, Senior Environmental Scientist

During the scoping phase of this project, a visual impact assessment (VIA) was prepared for the St. Helena Wind Farm near Saldanha. Responsible for project management and quality control of deliverables.

ISO 14001 auditing, South Africa, South African National Accreditation System (SANAS), 01/2005 - 01/2011, Technical Expert

The project comprised ISO 14001 auditing for the South African National Accreditation System (SANAS), including witnessing of the conduct of the ISO 14001 Certification Body auditors during audits and the assessment of certification body management systems and documentation. Responsible for the assessment of the competence of accredited environmental auditors.

Visual impact assessment (VIA) for Langebaan boathouse for the 4 Special Forces Regiment, South Africa, Western Cape, Department of Public Works (DPW), 07/2010 - 09/2010, Senior Environmental Scientist

The project entailed an environmental impact assessment (EIA) and a visual impact assessment (VIA) for the National Environmental Management Act (NEMA), Section 24G, application for the authorisation of a boathouse construction for the 4 Special Forces Regiment at Langebaan. Responsible for the compilation of VIA.

Second party ISO 14001 environmental management systems (EMSs) audits, South Africa, Western Cape, Eskom Generation, 01/2008 - 01/2010, Environmental Auditor

The project entailed second party ISO 14001 environmental management systems (EMSs) audits, including three-day second party comprehensive EMSs audits of coal-fired power stations in Mpumalanga, a pumped storage scheme in KwaZulu-Natal and gas turbine plants in the Western Cape. Responsible for environmental auditing.

Greater Port Harcourt, Nigeria, Niger, Rivers State Government of Nigeria and Greater Port Harcourt Development Authority (GPHDA), 01/2008 - 01/2010, Senior Environmental Scientist

The project comprised a strategic environmental assessment (SEA), generic environmental management plan (EMP) and the development of terms of reference (TOR) for the environmental impact assessments (EIAs) for Greater Port Harcourt. Responsible for the compilation of the SEA.

Environmental management programme (EMPR) for Finsch Mine, South Africa, Northern Cape, De Beers, 01/2008 - 01/2009, Project Leader and Senior Environmental Scientist

The project entailed updating the environmental management programme (EMPR) to consolidate various guidelines and operating procedures. Responsible for the updating of the EMPR.

Development of a master plan for Matjhabeng (Welkom) Local Municipality, South Africa, Free State, Latitude Management Services, 01/2008 - 01/2009, Senior Environmental Scientist

The project involved the compilation of the environmental portion of the status quo assessment, critical interventions and master plan for the municipality. Responsible for the development of environmental components of the master plan.

Namakwa Sands basic assessment processes for co-generation power plants, South Africa, Promethium Carbon/Prana Energy, 01/2008 - 01/2009, Senior Environmental Scientist

The project involved basic assessment processes for the installation of co-generation power plants at mines and industrial facilities across South Africa, for the generation of electricity from waste gas. The projects enable the project initiator to earn carbon credits through the clean development mechanism (CDM) in terms of the Kyoto Protocol under the United Nations Framework Convention on Climate Change (UNFCCC). Responsible for project management and quality control of deliverables.

Strategic environmental technical support team for the Gautrain Project, South Africa, Gauteng, Gautrain, 01/2008 - 01/2009, Senior Environmental Scientist

The project entailed the provision of a strategic environmental technical support team to the Gauteng Provincial Government (GPG) for the R20 billion Gautrain Project. Technical support was provided during the construction and operational phases of this flagship transport service project. Responsible for the environmental monitoring of contractor activities; the review of the environmental snag list; attendance and advice to the monthly provincial environmental committee (PEC) and the environmental management committee (EMC) meetings and coordination and management of annual external environmental audits.

Mokopane Integration Project, South Africa, Limpopo, Savannah Environmental (Pty) Ltd, 01/2008 - 01/2009, Senior Independent Reviewer

The project entailed an environmental impact assessment (EIA) of the Mokopane Integration Project, including transmission lines and substations. Responsible for the independent review of the EIA documentation and the compilation of a review report.

Nuclear power station, South Africa, Western Cape, Eskom Generation, 01/2008 - 01/2009, Senior Environmental Scientist

The project, implemented by the Generation Division of Eskom Holdings Limited, entailed a detailed environmental impact assessment (EIA), including the screening and selection of a suitable site for the nuclear plant, and a scoping process. The project also included social and biophysical specialist studies, public consultation and legal and nuclear technology studies. Responsible for the compilation of the environmental impact report (EIR) and environmental management plan (EMP).

Kalukundi Copper-Cobalt Project, Democratic Republic of the Congo, Africo Resources, 01/2008 - 01/2009, Senior Environmental Manager

The project entailed environmental services for the proposed copper and cobalt mine in the Kolwezi District in the Eastern Democratic Republic of the Congo (DRC). Responsible for field surveys, an environmental impact assessment (EIA) and an environmental management plan (EMP).

Hendrina-Prairie-Marathon transmission line, South Africa, Mpumalanga, Eskom Transmission, 05/2007 - 06/2008, Project Manager

The project comprised an environmental impact assessment (EIA) for the proposed 185 km-long, 400 kV Hendrina-Prairie-Marathon transmission line between Hendrina and Nelspruit. Responsible for project management and quality control of deliverables.

Huddle Park Golf & Recreation Estate, South Africa, Gauteng, Tiyani Consortium, 01/2005 - 01/2008, Project Leader and Senior Environmental Scientist

The project entailed an environmental impact assessment (EIA) for the Huddle Park Golf & Recreation Estate in Johannesburg. Responsible for the EIA, client liaison, team management, financial management and quality control.

Millsite Development in Krugersdorp, South Africa, Gauteng, Rand Leases, 01/2007 - 01/2008, Project Manager

The project comprised scoping and an environmental impact assessment (EIA) for the proposed Millsite Development in Krugersdorp. Responsible for client liaison, team management, financial management and quality control.

Backlog of the environmental impact assessment (EIA), scoping and exemption applications in terms of the Environment Conservation Act, 1989 (Act No. 73 of 1989), South Africa, Limpopo, Department of Environmental Affairs and Tourism (DEAT), 01/2007 - 01/2008, Reviewer

The project involved the backlog of the environmental impact assessment (EIA), scoping and exemption applications in terms of the Environment Conservation Act, 1989 (Act No. 73 of 1989), on behalf of the Limpopo Department of Economic Development, Environment and Tourism (LDEDET) and the Mpumalanga Department of Agriculture and Land Administration (MDALA). Responsible for the review of environmental scoping and impact assessment reports.

Senqu Sources Protected Area strategic environmental assessment (SEA), Lesotho, Maloti Drakensberg Transfrontier Project (MDTP), 01/2006 - 01/2008, Project Leader and Senior Environmental Manager

The project entailed a strategic environmental assessment (SEA) for the proposed Senqu Sources Protected Area with the aim of establishing a network of formally protected areas in the Maloti Drakensberg Region. Responsible for client liaison, team management, financial management, quality control and fieldwork.

K'Shani Golf and Nature Reserve near Nelspruit, South Africa, Mpumalanga, K'Shani Golf and Nature Reserve (Pty) Ltd, 01/2006 - 01/2007, Project Manager

The project entailed an environmental impact assessment (EIA) process in terms of the National Environmental Management Act's (NEMA's) EIA regulations for the proposed 2 300 ha K'Shani Golf and Nature Reserve near Nelspruit. Responsible for project management and quality control of deliverables.

Eskom Kudu Integration Project, South Africa and Namibia, Eskom, 01/2006 - 01/2007, Project Leader/Senior Environmental Scientist

The project entailed an environmental impact assessment (EIA) for the Eskom Kudu Integration Project for a proposed 400 km-long, 400 kV electricity transmission line from the Kudu Combined Cycle Gas Turbine (CCGT) power station in Oranjemund, Namibia, through the Northern Cape, to Vredendal in the Western Cape, South Africa. Responsible for leading the EIA, client liaison, team management, financial management and quality control.

Flood control of the Apies River in Pretoria, South Africa, Gauteng, BKS Group (Pty) Ltd, 01/2006 - 01/2007, Project Manager

The project comprised environmental scoping for proposed flood control berms in the Apies River floodplain between Wonderboompoort and the Bon Accord Dam. Responsible for client liaison, team management, financial management and quality control.

Menlyn Roads Project: upgrading of the National Route 1 (N1) highway in the eastern part of Pretoria, South Africa, Gauteng, City of Tshwane Metropolitan Municipality/South African National Roads Agency Limited (SANRAL), 01/2005 - 01/2006, Project Manager

The project entailed an environmental impact assessment (EIA) for the Menlyn Roads Project, including the upgrading of municipal roads and the National Route 1 (N1) highway in the eastern part of Pretoria. Responsible for project management and quality control of deliverables for the municipal and national road upgrades.

Water pipeline between the Vaal Dam and Secunda, South Africa, Gauteng, Trans-Caledon Tunnel Authority (TCTA), 03/2005 - 07/2005, Project Manager

The project was concerned with an environmental impact assessment (EIA) for a 115 km, 1.9 m diameter water pipeline between the Vaal Dam and Secunda, as part of the Vaal River Eastern Subsystem Augmentation Project (VRESAP). Responsible for client liaison, team management, financial management and quality control.

Cellular phone mast sites for Cell C, South Africa, Aurecon, 01/1999 - 01/2002, Environmental Manager

The project entailed exemption applications of approximately 300 cell phone mast sites for the Cell C network. Responsible for site visits, assessments and reporting.

Nissan environmental management system (EMS), Pretoria, South Africa, Gauteng, Nissan South Africa, 01/1998 - 01/1999, Group Environmental Manager

The project entailed the implementation and certification of ISO 14001 compliant environmental management system (EMS). Responsible for company-wide coordination of EMS implementation, environmental auditing, training, general advice, strategic review of EMS performance and reporting to top management.

Environmental impact assessment (EIA) for Marion Island, South Africa, Western Cape, Department of Environmental Affairs and Tourism (DEAT), 01/1997 - 01/1998, Environmental Manager

The project comprised an environmental impact assessment (EIA) of the proposed tourism to Marion Island. Responsible for site visits, data collection, specialist study coordination and report writing.

ISO 14001 certification and surveillance audits, South Africa, South African Bureau of Standards (SABS), 01/1997 - 01/1998, Environmental Auditor

The project entailed ISO 14001 certification and surveillance audits of four companies in various provinces of South Africa. Responsible for environmental auditing.

Environmental impact assessment (EIA) for Letsibogo Dam, Botswana, Cave Klapwijk & Associates (CKA), 01/1994 - 01/1995, Environmental Assistant

The project entailed an environmental impact assessment (EIA) of the Letsibogo Dam on the Motloutse River in north eastern Botswana. Responsible for report writing, quality control and review of the sub-consultant's deliverables.

Open cast coal mining rehabilitation, South Africa, Mpumalanga, Amcoal, 11/1991 - 01/1992, Researcher

The project entailed fieldwork for the rehabilitation of open cast coal mining, including vegetation monitoring and soil compaction monitoring on Amcoal's open cast coal mines. Responsible for the collection of field data.

Scoping phase for Wolseley Wind Farm, South Africa, Western Cape, SAGIT Energy Ventures, 01/2011 - Click or tap to enter a date., Senior Environmental Scientist

This project entailed a visual impact assessment (VIA) for the proposed Wolseley Wind Farm near Wolseley. Responsible for the compilation of a scoping phase visual impact assessment.

Revision of the initial report for Langehoogte Wind Farm, South Africa, Western Cape, Arcus GIBB, 10/2011 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed the revision of the visual impact assessment (VIA) for the Langehoogte Wind Farm near Caledon. Responsible for report revision based on peer review comments.

Tumelo distribution power line, South Africa, Gauteng, Eskom Distribution, 01/2009 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed an environmental impact assessment (EIA) process of the Tumelo distribution power line near Kagiso. Responsible for project management and quality control of deliverables.

De Hoek Cement Factory, South Africa, Western Cape, Pretoria Portland Cement (PPC), 01/2009 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed basic assessments (Bas) for upgrades to the Pretoria Portland Cement's (PPC's) De Hoek Cement Factory in Malmesbury. Responsible for project management and quality control of deliverables.

OR Tambo International Airport (ORTIA) Midfield Development, South Africa, Gauteng, Airports Company South Africa (ACSA), 01/2009 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed the provision of a strategic advisory team (SAT) to the Airports Company South Africa (ACSA) for the Midfield Development at OR Tambo International Airport (ORTIA) in Kempton Park. Responsible for providing inputs for strategic advice to ACSA regarding environmental implications of proposed upgrades.

Delta Apron at OR Tambo International Airport (ORTIA), South Africa, Gauteng, Airports Company South Africa (ACSA), 01/2008 - Click or tap to enter a date., Project Leader/Senior Environmental Scientist

The project comprised a basic assessment for the upgrading of the Delta Apron at OR Tambo International Airport (ORTIA) in Kempton Park. Responsible for the environmental impact assessment (EIA).

Medupi Landfill Site Project, South Africa, Limpopo, Envirolution Consulting, 01/2009 - Click or tap to enter a date., Senior Independent Reviewer

The project entailed an environmental impact assessment (EIA) of the Medupi Landfill Site Project in Lephalale. Responsible for the review of EIA documentation.

Apollo-Lepini distribution power line, South Africa, Gauteng, Envirolution Consulting, 01/2009 - Click or tap to enter a date., Senior Independent Reviewer

The project entailed an environmental impact assessment (EIA) of the Apollo-Lepini distribution power line. Responsible for reviewing applicable legislation and projects against EIA legislation requirements.

Watershed-Mmabatho distribution power line, South Africa, North West, Eskom Distribution, 01/2009 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed an environmental basic assessment (BA) for the Watershed-Mmabatho distribution power line. Responsible for project management and quality control of deliverables.

Westgate-Tarlton-Kromdraai distribution power line, South Africa, Gauteng, Eskom Distribution, 01/2009 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed an environmental impact assessment (EIA) of the Westgate-Tarlton-Kromdraai distribution power line. Responsible for project management and quality control of deliverables.

Mulilo Coal-fired Power Station, South Africa, Limpopo, Mulilo Power (through Parsons Brinkerhoff), 01/2009 - Click or tap to enter a date., Senior Environmental Scientist

The project involved an environmental impact assessment (EIA) process of the proposed Mulilo Coal-fired Power Station near Musina. Responsible for project management and quality control of deliverables.

Environmental management plan (EMP) for Eskom Transmission, South Africa, Western Cape, Eskom Transmission, 01/2008 - Click or tap to enter a date., Senior Environmental Scientist

The project comprised the compilation of an environmental management plan (EMP) for the construction and operational phases of the Perseus-Gamma, and Hydra-Gamma 765 kV transmission power lines, an extension to the Hydra Substation, turn-ins of the Beta-Hydra 765 kV transmission power line to Perseus and the upgrading of the Perseus Substation. Responsible for the review of project documentation and the EMP.

Crude acrylic acid (CAA) tank, South Africa, Free State, Sasol, 01/2008 - Click or tap to enter a date., Project Manager

The project entailed a scoping and an environmental impact assessment (EIA) process for the installation of a crude acrylic acid (CAA) tank at Sasol's site in Sasolburg. Responsible for project management and quality control of deliverables.

Eskom Komati Water Scheme pipeline and power line project, South Africa, Mpumalanga, Eskom Generation, 01/2008 - Click or tap to enter a date., Project Manager

The project entailed scoping and an environmental impact assessment (EIA) for the proposed Eskom Komati Water Scheme pipeline and power line project. Responsible for the EIA.

Viking Bay Development, South Africa, Gauteng, Tribid Investments, 01/2006 - Click or tap to enter a date., Project Manager

The project comprised an environmental impact assessment (EIA) for the new hotel, residential golf estate and game farm development at Viking Bay, adjacent to the Vaal Dam. Responsible for client liaison, team management, financial management and quality control.

Orlando Dam Intersection in Soweto, South Africa, Gauteng, Johannesburg Property Company (JPC), 01/2007 - Click or tap to enter a date., Project Leader and Senior Environmental Manager

The project entailed environmental scoping for the proposed Orlando Dam Intersection, a mixed-use redevelopment at the former Orlando Power Station site in Soweto, including an environmental impact assessment (EIA). Responsible for client liaison, team management, financial management and quality control.

Development of Comet in Boksburg, South Africa, Gauteng, Urban Dynamics, 01/2007 - Click or tap to enter a date., Project Manager

The project comprised scoping and an environmental impact assessment (EIA) for the proposed Comet Extension, including eight commercial and light industrial developments. Responsible for client liaison, team management, financial management and quality control.

Ispat brick making plant, South Africa, Clay Fusion Technologies (Pty) Limited, 01/2006 - Click or tap to enter a date., Project Manager

The project entailed an environmental impact report (EIR) for a brick making plant at Ispat Iscor site. Responsible for client liaison, team management, financial management and quality control.

Upgrade of Ispat Galvanising plant in Vanderbijlpark, South Africa, Gauteng, Iscor, 01/2006 - Click or tap to enter a date., Project Manager

The project entailed environmental scoping for the upgrading of the galvanising plant at Ispat Iscor. Responsible for client liaison, team management, financial management and quality control.

Widening of 14th Avenue in Johannesburg, South Africa, Gauteng, Arup, 01/2005 - Click or tap to enter a date., Project Manager

The project entailed environmental scoping for the widening of 14th Avenue in Johannesburg. Responsible for client liaison, team management, financial management and quality control.

Widening of Addo Road in Port Elizabeth, South Africa, Eastern Cape, PD Naidoo & Associates (PNA), 01/2005 - Click or tap to enter a date., Project Manager

The project entailed environmental scoping for the widening of Addo Road (Road MR 450) in Port Elizabeth. Responsible for client liaison, team management, financial management and quality control.

Desilting of Alberton Dam, South Africa, Gauteng, SRK Consulting, 01/2004 - Click or tap to enter a date., Project Leader and Environmental Manager

The project involved environmental scoping and an environmental management plan (EMP) for the desilting of the Alberton Dam. Responsible for client liaison, team management, financial management and quality control.

Development of a shopping centre on agricultural holdings, South Africa, Gauteng, AJP Group, 01/2004 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping for the development of a shopping centre on Holdings 34 and 35 in Kempton Park, Pretoria. Responsible for report writing, site assessment of alternative sites and the public participation process (PPP).

Electricity supply cables between Pretoria North Substation and Annlin Extension 19, South Africa, Gauteng, Moolman Group, 01/2003 - Click or tap to enter a date., Environmental Manager

The project involved environmental scoping for the installation of electricity supply cables between Pretoria North Substation and the proposed Annlin Extension 19. Responsible for report writing, site assessment of alternative sites and the public participation process (PPP).

Access road for The Innovation Hub, South Africa, Gauteng, Arup, 01/2003 - Click or tap to enter a date., Environmental Manager

The project involved environmental scoping for the access road to the Innovation Hub in Pretoria. Responsible for report writing, site assessment and public participation process (PPP) meetings.

Water pipeline from Driefontein Dam to Duvha Power Station, South Africa, Mpumalanga, Eskom, 01/2004 - Click or tap to enter a date., Environmental Manager

The project comprised environmental scoping for a water pipeline from Driefontein Dam to Duvha Power Station in Emalehleni. Responsible for site visits, environmental impact assessments (EIAs), report writing and public participation.

Dunkeld West Filling Station in Johannesburg, South Africa, Gauteng, Seedprop Consolidated Investments, 01/2003 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping for a filling station in Dunkeld West, Johannesburg. Responsible for site visits, environmental impact assessments (EIAs), report writing and public participation.

Environmental scoping for the upgrading of the Sinter Plant at Iscor, South Africa, Gauteng, Iscor Flat Steel, 01/2003 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping for the upgrading of the Sinter Plant at Iscor in Vanderbijlpark. Responsible for site visits, environmental impact assessments (EIAs), report writing, public participation and sub-consultant management.

Extensions to Clover Hill in Bronkhorstspuit, South Africa, Gauteng, Clover Hill Developments (Pty) Ltd, 01/2004 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping for the Clover Hill Extensions 1 - 4, adjacent to the Bronkhorstspuit Dam. Responsible for public participation (stakeholder engagement) and report writing.

Midrand Estates Development, South Africa, Gauteng, Eco Assessments, 01/2000 - Click or tap to enter a date., Environmental Manager

The project entailed an environmental impact assessment (EIA) of the proposed Midrand Estates development. Responsible for fieldwork, site assessment and report writing.

Statue of Freedom in Port Elizabeth, South Africa, Eastern Cape, KPMG Consortium - GAPP Architects, 01/2005 - Click or tap to enter a date., Environmental Manager

The project comprised environmental feasibility/risk assessment for the Statue of Freedom in Port Elizabeth. Responsible for report writing and assessment of alternative sites.

Development of a lodge for the Automotive Supplier Park (ASP), South Africa, Gauteng, PD Naidoo & Associates (PNA), 01/2004 - Click or tap to enter a date., Project Leader and Environmental Manager

The project entailed environmental considerations for the development of a lodge at the Automotive Supplier Park (ASP) in Rosslyn. Responsible for client liaison, team management, financial management and quality control.

Road upgrades for Madikwe Game Reserve, South Africa, North West, Eco Assessments CC, 01/2002 - Click or tap to enter a date., Environmental Manager

The project included fieldwork, public participation, the development of an environmental management plan (EMP) and environmental scoping of roads and the bulk water supply system at Madikwe Game Reserve. Responsible for

fieldwork assessment, public participation (stakeholder engagement) and report writing.

Development of Alberton Waterfront, South Africa, Gauteng, Odyssey Development and Construction, 01/2001 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping for the development of the Alberton Waterfront. Responsible for fieldwork assessment, public participation (stakeholder engagement) and report writing.

Brits/Doreen Roads filling station in Pretoria, South Africa, Gauteng, Gerneke & Potgieter, 01/2002 - Click or tap to enter a date., Environmental Manager

The project entailed the development of a filling station on the corner of Brits Road and Doreen Road in Akasia, Pretoria. Responsible for fieldwork assessment, public participation (stakeholder engagement) and report writing.

Makgabetlwane water pipeline, South Africa, North West, Munayi Malaka Engineers, 01/2001 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping of a water pipeline at Makgabetlwane. Responsible for public participation (stakeholder engagement) and report writing.

Marion Island research base in the South Atlantic Ocean, South Africa, Western Cape, Department of Environmental Affairs and Tourism (DEAT), 01/2002 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping for the research base on Marion Island. Responsible for public participation (stakeholder engagement), report writing and the development of an environmental management plan (EMP).

Telecommunications tower for the Council of Scientific and Industrial Research (CSIR), South Africa, Gauteng, Telkom, 01/2003 - Click or tap to enter a date., Environmental Control Officer (ECO)

The project entailed an environmental management plan (EMP) for the construction of a 40 m-tall concrete microwave telecommunications tower at the Council for Scientific and Industrial Research (CSIR). Responsible for on-site monitoring of environmental effects of construction work.

Alluvial Diamond Prospecting, South Africa, Northern Cape, South African National Parks (SANParks) through Cameron Cross Inc., 01/2008 - Click or tap to enter a date., Reviewer

Pico Diamonds environmental management plan (EMP) for Alluvial Diamond Prospecting in the Richtersveld National Park. Responsible for review of scoping and environmental impact assessment (EIA) reports.

Kliprivier Nature Estate, South Africa, Limpopo, Dabchick Consultancy Limited, 01/2008 - Click or tap to enter a date., Reviewer

The project comprised a scoping report for the proposed Kliprivier Nature Estate on Portions 4 and 8 of the farm Kliprivier 464 KQ, and Portion 10 of the farm Rhenosterfontein 465 KQ. Responsible for review of scoping and environmental impact assessment (EIA) reports.

Limpopo Wildlife Estate, South Africa, Limpopo, South African National Parks (SANParks) through Cameron Cross Associates, 01/2007 - Click or tap to enter a date., Reviewer

The project entailed a scoping report for the proposed Limpopo Wildlife Estate on portions of the farms Modena 13 MS, Parma 40 MS and Pontdrift 12 MS in Limpopo. Responsible for the review of scoping and environmental impact assessment (EIA) reports.

Dome Paradise Township, South Africa, North West, Advocate Jaco Venter, 01/2007 - Click or tap to enter a date., Reviewer

The project entailed scoping and environmental impact assessment (EIA) reports for the proposed Dome Paradise Township on Portions 19 and 37 of the Farm Rietpoort 518 IQ. Responsible for the review of scoping and EIA reports.

Shopping centre and residential development on the Farm Klipriviersdal, South Africa, Gauteng, Rand Merchant Bank (RMB), 01/2007 - Click or tap to enter a date., Reviewer

The project involved a scoping and an environmental impact assessment (EIA) application for a proposed shopping centre and residential development on the Farm Klipriviersdal 371 in Meyerton. Responsible for the review of EIA documentation and report writing.

Mmamabula-Delta 400 kV transmission lines, South Africa, Limpopo, Haygon Safaris (Pty) Ltd, 05/2007 - Click or tap to enter a date., Reviewer

The project entailed an environmental impact assessment (EIA) process for the four proposed 400 kV Mmamabula-Delta transmission lines in Lephalale. Responsible for site visits, review of EIA documentation, client liaison and general project management.

Variant alignment for the Gautrain, South Africa, Gauteng, Centurion Association for a Reasonable Environment (WeCARE), 01/2006 - [Click or tap to enter a date.](#), Reviewer

The project entailed several environmental impact assessment (EIA) reports and the environmental management plan (EMP) for the proposed variant alignment of the Gautrain through the Centurion area. Responsible for the review of the EIA reports, the EMPs and other related documents, quality control, client liaison and financial management.

Gauteng Communication Network Strategy (GAUCONS), South Africa, Gauteng, Gauteng Department of Agriculture and Rural Development (GDARD), 01/2002 - [Click or tap to enter a date.](#), Environmental Manager

The project entailed the development of the Gauteng Communication Network Strategy (GAUCONS), a decision-support and administration system for the authorisation of telecommunications masts in Johannesburg. Responsible for report writing and stakeholder liaison.

Buffer Zone projects, South Africa, Gauteng Department of Agriculture and Rural Development (GDARD), 01/2002 - [Click or tap to enter a date.](#), Environmental Manager

This project entailed Phases 1 and 2 of the Buffer Zone projects for the Gauteng Department of Agriculture and Rural Developments (GDARD), which provides guidelines for the authorisation of developments in proximity to activities that cause pollution, including landfill sites, sewage treatment plants (STPs), industries and mine dumps. Responsible for report writing and fieldwork.

National Forest Inventory (NFI) for the Eastern Cape, South Africa, Eastern Cape, Department of Water Affairs (DWA), 01/2002 - [Click or tap to enter a date.](#), Environmental Assistant

The project entailed data gathering and database population of the National Forest Inventory (NFI). Responsible for data gathering and capturing and stakeholder liaison.

Alexandra Renewal Project (ARP) in Johannesburg, South Africa, Gauteng, Gauteng Department of Agriculture and Rural Development (GDARD), 01/2002 - [Click or tap to enter a date.](#), Environmental Manager

The project delivered a report on the environmental management framework (EMF) for the Alexandra Renewal Project (ARP) in Johannesburg. Responsible for field data.

Environmental management framework (EMF) for the Loch Vaal area, South Africa, Gauteng, Aurecon, 01/2001 - [Click or tap to enter a date.](#), Environmental Manager

The project included a report on data gathering and fieldwork, and an environmental management framework (EMF) for the Loch Vaal area in Centurion. Responsible for the compilation of the EMF document.

Environmental management framework (EMF) for Centurion, South Africa, Gauteng, Gauteng Department of Agriculture and Rural Development (GDARD), 01/2002 - [Click or tap to enter a date.](#), Project Assistant

The project comprised the development of an environmental management framework (EMF) for the Loch Vaal region in Centurion. Responsible for field work and report writing.

Emalahleni integrated municipal environmental programme (IMEP), South Africa, Mpumalanga, Emalahleni Local Municipality, 01/2007 - [Click or tap to enter a date.](#), Senior Environmental Scientist

The project entailed the auditing of legal compliance for the Emalahleni Local Municipality's integrated municipal environmental programme (IMEP) in Witbank. Responsible for an audit of environmental legal compliance.

Environmental implementation plan (EIP) for Pretoria, South Africa, Gauteng, Department of Trade and Industry (DTI), 01/2006 - [Click or tap to enter a date.](#), Project Manager

The project entailed the development of a second edition environmental implementation plan (EIP), in terms of the National Environmental Management Act (NEMA) (No. 107 of 1998). Responsible for client liaison, team management, financial management and quality control.

Development of an environmental management system (EMS) for Nelspruit, South Africa, Mpumalanga, Mbombela Local Municipality, 01/2003 - [Click or tap to enter a date.](#), Project Leader and Environmental Manager

The project was concerned with the development of an environmental management system (EMS) for the Mbombela Local Municipality in Nelspruit. Responsible for client liaison, team management, financial management, quality control and training of client representatives.

Development of an environmental policy for Nelspruit, South Africa, Mpumalanga, Mbombela Local Municipality, 01/2003 - [Click or tap to enter a date.](#), Project Leader and Environmental Manager

The project entailed the development of an environmental policy for the Mbombela Local Municipality in Nelspruit. Responsible for client liaison, team management, financial management and quality control.

Information management system (IMS) directorate for Pretoria, South Africa, Gauteng, Department of Water Affairs (DWA), 01/1998 - [Click or tap to enter a date.](#), Project Assistant

The project comprised the development of an information management system (IMS) directorate, namely the Forest Regulation of the Department of Water Affairs (DWA). Responsible for report writing, conducting interviews, reporting and the monitoring of templates.

Environmental management system (EMS) for Johannesburg, South Africa, Gauteng, De Beers Research and Development Company (DebTech), 01/1998 - [Click or tap to enter a date.](#), Project Leader and Senior Environmental Manager

The project entailed the development of an ISO 14001 environmental management system (EMS) for the De Beers Research and Development Centre (DebTech). Responsible for client liaison, team management, financial management, quality control and initial review of client's environmental impacts and aspects.

Environmental management system (EMS) for Antarctica, , Department of Environmental Affairs and Tourism (DEAT), 01/1995 - [Click or tap to enter a date.](#), Environmental Auditor

The project entailed the development of an environmental management system (EMS) for the South African National Antarctic Expedition's (SANAE's) IV Base. Responsible for environmental auditing.

Abattoir Waste Management Guideline Manual (AWM Guideline Manual) document and standard environmental management plan (EMP), South Africa, Gauteng Department of Agriculture and Rural Development (GDARD), 01/2007 - [Click or tap to enter a date.](#), Project Manager

The project involved the provision of an Abattoir Waste Management Guideline Manual (AWM Guideline Manual) and a standard environmental management plan (EMP) for the evaluation of environmental impact assessment (EIA) applications. Responsible for client liaison, team management, financial management, quality control and presentations to stakeholders.

Environmental impact assessment (EIA) regulations training manual, South Africa, Gauteng, Department of Environmental Affairs and Tourism (DEAT), 01/2006 - [Click or tap to enter a date.](#), Senior Environmental Manager

The project entailed the development of a presentation for a series of information seminars on environmental impact assessment (EIA) regulations in terms of the National Environmental Management Act (NEMA) (No. 107 of 1998) in Pretoria. Responsible for preparation of presentations and interpretation of legal requirements.

Socio-Economic Impact Assessment and Risk Management, Integrated Environmental Management Information Series 22 and 23, South Africa, Gauteng, Department of Environmental Affairs and Tourism (DEAT), 01/2005 - [Click or tap to enter a date.](#), Editor and Project Manager

The project entailed the editing and project management of the Integrated Environmental Management Information Series 22 and 23 documents, namely the Socio-Economic Impact Assessment and the Risk Management documents, for the Pretoria area. Responsible for management of sub-consultants, quality and financial management and report writing.

Environmental Assessment of International Agreements, Integrated Environmental Management Information Series 19, South Africa, Department of Environmental Affairs and Tourism (DEAT), 01/2005 - [Click or tap to enter a date.](#), Co-author with James Cross

The project involved compiling the Environmental Assessment of International Agreements, Integrated Environmental Management Information Series 19 document. Responsible for management of sub-consultants, quality and financial management and report writing.

National strategy for the development of integrated environmental management (IEM), South Africa, Department of Environmental Affairs and Tourism (DEAT), 01/1998 - [Click or tap to enter a date.](#), Assistant

The project involved the development of a discussion document, namely a national strategy for the development of integrated environmental management (IEM). Responsible for report writing and management of sub-consultants and stakeholders.

Revision of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998), South Africa, Department of Environmental Affairs and Tourism (DEAT), 01/2003 - [Click or tap to enter a date.](#), Environmental Manager

The project included the revision of Chapter 5 of the National Environmental Management Act (NEMA) (Act No 107 of 1998), which deals with environmental impact assessment (EIA) and integrated environmental management (IEM) procedures. Responsible for report writing, stakeholder engagement, preparation of presentations and other project documentation.

National environmental management bills, South Africa, Department of Environmental Affairs and Tourism (DEAT), 01/2003 - [Click or tap to enter a date.](#), Assistant and Report Writer

The project involved costing of the promulgation of a series of six national environmental management bills, including the Air Quality Amendment Bill, the Biodiversity Bill, the Protected Areas Amendment Bill and the National Environmental Management Act's (NEMA's) 1st and 2nd Amendment Bills. Responsible for the management of sub-consultants, report writing and stakeholder liaison.

Development of a Cell Phone Code of Practice, South Africa, South African Bureau of Standards (SABS), 01/1999 - Click or tap to enter a date., Assistant

The project entailed the development of a South African Code of Practice, including environmental considerations for the planning and management of telecommunications structures. Responsible for report writing and providing of general project assistance.

Lesotho rehabilitation and conservation strategy, Lesotho, Lesotho Department of Water Affairs, 01/2007 - Click or tap to enter a date., Project Manager

The project entailed supplemental field studies and beneficiary analysis related to a proposed rehabilitation and conservation strategy for the wetlands in the highlands of Lesotho, including an environmental impact assessment (EIA). Responsible for client liaison, team management and financial management.

Declaration of the Prince Edward Islands (PEI) as a world heritage site, , Department of Environmental Affairs and Tourism (DEAT), 01/2001 - Click or tap to enter a date., Environmental Manager

The project entailed a motivation report for the declaration of the Prince Edward Island (PEI) as a world heritage site (WHS). Responsible for report writing and management of consultants.

Rehabilitation of cutting, South Africa, Naas Grimbeek, 01/2002 - Click or tap to enter a date., Environmental Manager

The project involved the rehabilitation of a cutting at the house of Mr Naas Grimbeek at the Hartebeespoort Dam. Responsible for site inspections and the development of a rehabilitation plan.

Scoping phase for Langehoogte Wind Farm, South Africa, Western Cape, SAGIT Energy Ventures, 01/2011 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed a visual impact assessment (VIA) for the Langehoogte Wind Farm near Caledon. Responsible for report based on peer review comments.

Visual assessment of Springfontein Wind Farm, South Africa, Free State, Savannah Environmental (Pty) Ltd, 06/2012 - Click or tap to enter a date., Visual Impact Assessment (VIA) Specialist

The project entailed a visual impact assessment (VIA) of the proposed wind farm near Springfontein. Responsible for the site visit, quality control of deliverables and revision of the VIA report.

Environmental audit of the Matola Coal Terminal (TCM), Mozambique, Maputo, Grindrod Limited, 03/2012 - Click or tap to enter a date., Environmental Audit Team Leader

The project entailed an environmental audit of the operation of the Matola Coal Terminal (TCM) in Maputo. Responsible for one site audit and the compilation of the audit report.

Foskor integrated water and waste management plan (IWWMP), South Africa, KwaZulu-Natal, Foskor, 03/2014 - Click or tap to enter a date., Internal Reviewer

The project involved an internal review of a draft integrated water and waste management plan (IWWMP) for the installation of a proposed expansion to the phosphate handling facilities in Richards Bay. Responsible for conducting an internal review.

ISO 14001 internal audit for the Matimba Power Station, South Africa, Limpopo, Eskom Generation: Matimba Power Station, 08/2014 - Click or tap to enter a date., Environmental Auditor

The project comprised a second party internal environmental management systems (EMS) audit of the coal-fired Matimba Power Station in Lephalale. Responsible for environmental auditing against ISO 14001 and audit management system requirements.

Epol Rustenburg Feed Mill ISO 14001 certification audit, South Africa, North West, Epol, 09/2013 - Click or tap to enter a date., Lead Environmental Auditor

The project entailed a third party Stage 1 ISO 14001 certification audit for the Epol Feed Mill in Rustenburg. Responsible for conducting the Stage 1 ISO 14001 certification audit of the environmental management system (EMS).

Feasibility study for Southern Energy's 2x330 MW coal fired power plant project, Zimbabwe, Southern Energy, 01/2015 - Click or tap to enter a date., Environmental Reviewer

The project entailed a review of a feasibility study report for the construction of a proposed new 660 MW coal-fired power station near Hwange in Zimbabwe. Responsible for the review of the feasibility study against the

performance standards of international development finance institutions.



Zinzi Portia Xakayi

Junior Environmental Consultant

Summary

Zinzi Portia is an environmental consultant at Zutari. She has experience in the compilation of environmental management programmes (EMPrs), basic assessment reports (BARs), and environmental screening reports. She has also assisted in undertaking public participation processes for renewable energy projects in the Limpopo and Gauteng Provinces and for a green building project in the Mpumalanga Province. Zinzi has previous working experience in geo-informatics and geographic information systems (GIS). She has two years of experience working with GIS, which she has gained whilst working on projects for the private sector. She has specialised in spatial analysis, data processing and mapping while her technical responsibilities include inter alia the evaluation of data, digitising, editing, and converting spatial data and non-spatial data from various formats and manipulating data in Esri ArcMap, GeoMedia and QGIS.

Since joining Zutari, she has worked extensively on renewable energy projects, during which she assisted in compiling basic assessment reports, environmental management programmes and undertaking the public participation process. She is also involved in various feasibility screenings for photovoltaic (solar PV) projects in the Limpopo Province and works as an environmental compliance officer (ECO) for green buildings projects in Gauteng.

Relevant experience

Strengthening of TR1/1, South Africa, Western Cape, Provincial Government of the Western Cape (PGWC): Department of Transport and Public Works (DTPW), 06/2018 - 01/2026, Environmental Consultant

Zutari was appointed by the Department of Transport and Public Works: Roads Infrastructure Branch of the Western Cape Government (WCG) to undertake full engineering services of the strengthening of TR1/1 – George to Oudtshoorn. Zutari provided advice on the scope of work and also provided design input and deliverables to the client, as well as procurement and contract administration. Responsible for finalising the final basic assessment report for submission to the competent authority.

God's Window Skywalk, South Africa, Mpumalanga, Motsamayi Tourism Group (Pty) Ltd, 08/2021 - 06/2025, Environmental Consultant

Zutari was appointed to conduct an environmental impact assessment (EIA) and water use licence application (WULA) for the proposed construction of a skywalk and skybridge at God's Window in the Mpumalanga Province. These services are to ensure compliance with the National Environmental Management Act (Act No. 107 of 1998) (NEMA), National Water Act, 1998, as well as other associated or required environmental authorisations. Responsible for compiling the project EMPr and coordinating the public participation process for the basic assessment process.

New Pacaltsdorp reservoir, tower and pump station, South Africa, Western Cape, George Local Municipality, 03/2022 - 06/2024, GIS Consultant

To address the inadequate security of potable water supply in Pacaltsdorp (West), George Municipality required the construction of a new reservoir and pumpstation. Zutari's scope of works entail the management and design for the new 2.5 Ml reinforced concrete reservoir, tower, pump station and interconnecting pipework as well as the design of a new supply main should the existing 315mm Ø supply main be found inadequate. This also includes the management of the documentation and procurement of contractor/s for the civil, mechanical and electrical works; contract administration and site supervision. Responsible for producing maps.

Waste management support, South Africa, Limpopo, Rustenburg Platinum Mines, 07/2021 - 06/2023, Environmental Compliance Officer

Qualifications

BSc (Hons) Geography and Environmental Science
BSc Geography

Professional registrations

Member, Golden Key International Honour Society (GKIHS)
Member, Geo-Information Society of South Africa (GISSA)
Member, International Association for Impact Assessment (IAIA)

Specialisation

Geographic information systems (GIS) and telecommunication masts

Years in industry

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Zutari was appointed to assess the waste management practices at Mogalakwena Mine to make recommendations for improvement. This included developing a Waste Management Plan (WMP); conducting site assessments for both internal and external waste facilities including contractors; developing a waste inventory as well as developing and conducting training for four levels within the operations for Mogalakwena Complex (MC). Responsible for conducting an environmental assessment (EA) and environmental management programme (EMPr) audit for the Mogalakwena Fuel Depot.

Kokerboom 2, South Africa, Business Venture Investments No 178, 01/2015 - 04/2023, Environmental Consultant

Zutari was appointed by Business Venture Investments, as the independent environmental assessment practitioner to undertake the Part 1 Amendment in terms of the 2014 Environmental Impact Assessment (EIA) Regulations of 2014 (Regulation 29(a)) (as amended) pursuant to the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA). Responsible for coordinating the Public Participation Process and undertaking the part 1 amendment process.

Upgrading of Marakabei-Monontša road, Lesotho, China Geo-Engineering Corporation Lesotho (Pty) Ltd (China Geo), 01/2019 - 04/2023, Environmental Consultant

Zutari is assisting the Lesotho Government in improving the way of life for its citizens, this time by providing detailed design services for the upgrading of Marakabei-Monontša road in Butha-Buthe District of northern Lesotho. As project designer to the Design and Build Contractor, China Geo, Zutari is delivering detailed design, including geometric, materials and pavement design, as well as geotechnical investigations for the road, the bridge and the accompanying drainage structures. Responsible for auditing the construction site and writing an addendum report to the existing environmental management programme (EMPr).

Ilanga Emoyeni, South Africa, Windlab Developments South Africa, 04/2022 - 03/2023, Environmental Consultant

Windlab Developments South Africa (Pty) Ltd appointed Zutari as the independent environmental assessment practitioner (EAP) to undertake the applications for Environmental Authorisation (EA) in terms of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and its Environmental Impact Assessment (EIA) Regulations (2014 as amended in 2017). Responsible for compiling basic assessment reports for Ilanga Emoyeni PV2 and PV3 and the environmental management programme (EMPr) reports for the Ilanga Emoyeni Solar Suite.

Environmental and social impact assessment (ESIA) for Serengeti Energy Baoma Project Phase II, Sierra Leone, CEMMATS Group Limited, 09/2022 - 01/2023, Environmental Consultant

Serengeti Energy contracted CEMMATS Group Ltd, in association with Zutari, to conduct an Environmental and social impact assessment (ESIA) study for its solar power plant construction and operation. Responsible for ensuring that all the relevant documents are reviewed, according to the IFC performance standards, by the different specialists.

Seriti KHU Coal Improvement, South Africa, Mpumalanga, Seriti Power (Pty) Ltd, 01/2022 - 12/2022, Environmental Consultant

Zutari was appointed to undertake a coal quality improvement pre-feasibility study (PFS) to further develop the options identified by the concept study and select a go-forward case that is sustainable and cost-effective as an option that would provide the Kendal "240" quality specification from the Khutala complex and supplementary Seriti Power equity coal. Responsible for environmental screening.

Sibanye photovoltaic plant: amendment of environmental authorisation (EA), South Africa, Gauteng, Sibanye Gold Limited, 08/2021 - 12/2022, Environmental Consultant

Zutari was appointed to amend conditions of the environmental authorisations (EAs) for the Sibanye Gold solar PV plant and associated powerlines that were issued in 2017. These processes include ecological walkdown assessments of the solar PV plant and powerlines, revision of the environmental management plans for both components, and an application for a basic assessment to authorise an additional EIA "listed activity". Responsible for compiling the basic assessment report (BAR), environmental management programme (EMPr) and public participation documentation.

Water feasibility study for a combined treatment plant at Arnot Coal Mine closed colliery, South Africa, Seriti Coal (Pty) Ltd, 01/2020 - 10/2022, Environmental Consultant

Zutari was appointed to undertake a feasibility study for further definition of the integrated water management plan (IWMP) for the collection of excess water and the treatment and discharge of reclaimed water from the Arnot mining area, as well as the management of all waste material produced due to the implementation of the IWMP. Responsible for the compilation of the DW901, DW902, and Section 21(A) water use licence applications (WULAs) on the Electronic Water Use Licence Application and Authorisation System (e-WULAAS).

Simba CM Projects, South Africa, Simba (Pty) Ltd, 05/2021 - 10/2022, Environmental Consultant

Zutari was appointed to undertake an impact assessment process is to identify, assess and report on any potential impacts that the proposed project may have on the receiving environment, if implemented. The investigation

outcome described how impacts on the biophysical and socio-economic environment can be, as far as possible, enhanced or mitigated and managed as the case may be. Responsible for compiling a NEMA inquiry for the Shakaskraal IP to CNG piping burner modifications.

Housing maintenance at Mogalakwena Mine, South Africa, Rustenburg Platinum Mines, 10/2021 - 09/2022, Social People Assistant

Zutari was appointed to undertake condition assessments of mining houses for the community living the Ga-Puka village and working at the Mogalakwena Mine. Responsible for conducting condition assessments.

Traffic impact assessment (TIA) for a solar photovoltaic (PV) plant at Mogalakwena Mine, South Africa, Rustenburg Platinum Mines, 07/2020 - 04/2022, Environmental Consultant

Zutari was appointed to undertake a traffic impact assessment (TIA) for a proposed 70-90 MW solar farm at Mogalakwena Mine in the Limpopo Province. The TIA was undertaken as part of an application for an environmental authorisation scoping phase of the legislated impact assessment process. Responsible for compiling sub-consultancy agreements for specialists, public participation documents and authorisation reports for submission to the competent authority.

Venetia Diamond Mine independent power producer (IPP) project, South Africa, Cresco Project Finance, 04/2021 - 04/2022, Environmental Consultant

Zutari was appointed as the environmental assessment practitioner (EAP) to undertake the application for an environmental authorisation for an independent power producer (IPP) for Venetia Diamond Mine in Limpopo. Responsible for assisting with the public participation process (PPP) during the environmental implementation review (EIR) phase and assisting with the compilation of the environmental management programme (EMPr) report.

Appendix B: Environmental Authorisation



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447- PRETORIA - 0001- Environment House - 473 Steve Biko Road, Arcadia, - PRETORIA
Tel (+ 27 12) 399 9372

DEA Reference: 14/12/16/3/3/1/1606

Enquiries: Herman Alberts

Telephone: (012) 399 9371 E-mail: HAlberts@environment.gov.za

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Mr Nico Gewers
Sibanye Gold (Pty) Ltd
Private Bag X5
WESTONARIA
1780

Telephone Number: (011) 278 9749
Email Address: nico.gewers@sibanyegold.co.za

PER E-MAIL / MAIL

Dear Mr Gewers

JOHN KLEINTJES
COMMISSIONER OF OATHS EX OFFICIO
RIVERWALK OFFICE PARK
41 MATROOSBERG ROAD
ASHLEA GARDENS, EXTENSION 6
PRETORIA, 0081
ATTORNEY, SOUTH AFRICA

APPLICATION FOR ENVIRONMENTAL AUTHORISATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998: GN R. 982/983/985 FOR THE PROPOSED 132 KILOVOLT TRANSMISSION POWERLINES TO CONNECT THE 200 MEGAWATT SIBANYE GOLD PHOTOVOLTAIC ENERGY FACILITY FOR SIBANYE GOLD LIMITED, GAUTENG PROVINCE

With reference to the above application, please be advised that the Department has decided to grant authorisation. The Environmental Authorisation (EA) and reasons for the decision are attached herewith.

In terms of Regulation 4(2) of the Environmental Impact Assessment Regulations, 2014 (the Regulations), you are instructed to notify all registered interested and affected parties, in writing and within 14 (fourteen) days of the date of the EA, of the Department's decision in respect of your application as well as the provisions regarding the submission of appeals that are contained in the Regulations.

Your attention is drawn to Chapter 2 of Government Notice No. R.993, which prescribes the appeal procedure to be followed. Kindly include a copy of this document with the letter of notification to interested and affected parties.

Should any person wish to lodge an appeal against this decision, he/she must submit the appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered interested and affected party, and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the registered interested and affected parties by the applicant; or the date that the notification of the decision was sent to the applicant by the Department, whichever is applicable.

Appeals must be submitted in writing in the prescribed form to:

Mr Z Hassam, Director: Appeals and Legal Review of this Department at the below mentioned addresses.

By email: appealsdirector@environment.gov.za;

MS

By hand: Environment House
473 Steve Biko,
Arcadia,
Pretoria,
0083; or

By post: Private Bag X447,
Pretoria,
0001;

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Please note that in terms of section 43(7) of the National Environmental Management Act, 1998, the lodging of an appeal will suspend the environmental authorisation or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with the activity until such time that the appeal is finalised.

To obtain the prescribed appeal form and for guidance on the submission of appeals, please visit the Department's website at https://www.environment.gov.za/documents/forms#legal_authorisations or request a copy of the documents at appealsdirector@environment.gov.za.

Yours faithfully



Mr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Date: 10/01/2023

cc:	Mr Reuben Heydenrych	Aurecon South Africa (Pty) Ltd	Email: Reuben.heydenrych@aurecongroup.com
	Ms Rosemary Mbassa-Sigabi	GDARD	Email: kosana.giyose@gauteng.gov.za
	Mr Thabo Ndlovu	Westonaria Local Municipality	Email: mm@westonaria.gov.za
	Mr George Seitsho	Merafong City Local Municipality	Email: mmsecretary@merafong.gov.za

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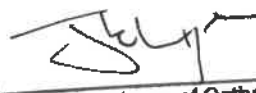


environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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Environmental Authorisation

In terms of Regulation 25 of the Environmental Impact Assessment Regulations, 2014

The construction of 132 kilovolt transmission powerlines to connect the 200 MW Sibanye Gold Photovoltaic Energy Facility for Sibanye Gold Limited, Gauteng Province

West Rand District Municipality

Authorisation register number:	14/12/16/3/3/1/1606
Last amended:	First issue
Holder of authorisation:	Sibanye Gold (Pty) Ltd
Location of activity:	Portions 0, 4, 6, 7, 9 and 11 of Farm Uilval 280 Portion 0 of Farm 283 Portions 0, 2, 4, 5, 8, 11, 22, 24 and 25 of Farm Driefontein 355 Portions 3, 11, 12, 21 and 77 of Farm Leeuwpoort 356 Portions 0, 2, 5, 12, 13, 14, 15, 41, 73 and 74 of Farm Rietfontein 349 Portions 2, 4, 19, 20, 23 and 31 of Farm Doornkloof 350 Portion 0 of Farm 348 Portions 10 and 28 of Farm 347 Westonaria Local Municipality West Rand District Municipality Gauteng Province

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This authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

Decision

The Department is satisfied, on the basis of information available to it and subject to compliance with the conditions of this environmental authorisation, that the applicant should be authorised to undertake the activities specified below.

Non-compliance with a condition of this environmental authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 and the EIA regulations.

Details regarding the basis on which the Department reached this decision are set out in Annexure 1.

Activities authorised

By virtue of the powers conferred on it by the National Environmental Management Act, 1998 (Act No.107 of 1998) and the Environmental Impact Assessment Regulations, 2014 the Department hereby authorises –

SIBANYE GOLD (PTY) LTD

(hereafter referred to as the holder of the authorisation)

with the following contact details –

Mr Nico Gewers
Libanon Business Park
1 Hospital Street, Libanon
WESTONARIA
1780

Telephone Number: (011) 278 9749
Fax Number: (086) 295 5752
Cell phone Number: (073) 105 5159
Email Address: nico.gewers@sibanyegold.co.za

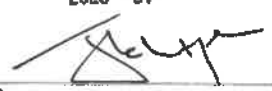
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to undertake the following activities (hereafter referred to as "the activity") indicated in Listing Notice 1 (GN R. 983) and Listing Notice 3 (GN R. 985):

Activity number	Activity description
<u>GN R. 983 Activity 11:</u> <i>"The development of facilities or infrastructure for the transmission and distribution of electricity-</i> <i>(i) Outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts"</i> Certified as a true copy of the original document. Signed at PRETORIA on 2023 -01- 30 	The construction of a number of 132 kilovolt (kV) transmission lines inside three 200 m wide assessed corridors. The proposed transmission lines would connect from the proposed Sibanye Gold PV Facility to a combination of existing Eskom distribution substations and Sibanye Gold substations or PODs, which are Sibanye Gold's internal distribution substations. The proposed transmission line corridors are located outside of the urban edge.
<u>GN R. 983: Activity 12:</u> <i>"The development of-</i> <i>(x) buildings exceeding 100 square metres in size; or</i> <i>(xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs-</i> <i>(a) within a watercourse;</i> <i>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse"</i>	Wetlands and drainage lines are scattered along the proposed transmission line corridors, particularly transmission corridor options 2 and 3. One or more structures or associated infrastructure would need to cross these areas. However, it is not proposed to place any transmission pylons within wetlands or watercourses.
<u>GN R. 983: Activity 19:</u> <i>"The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from-</i> <i>(i) a watercourse;"</i>	It is possible that one or more of the transmission line pylon bases and/or access roads would cross a watercourse and or drainage line where cumulatively more than 5 cubic meters of soil would be deposited or removed.

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as described in the Basic Assessment Report (BAR) dated September 2016 at:

Powerline Corridor 1	Latitude	Longitude
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	26° 21'14.50"S	27° 35'52.68"E
	26°20'48.54"S	27°36'51.00"E
	26°21'52.79"S	27°35'18.93"E

Powerline Corridor 2 	Latitude	Longitude
	26°22'42.62"S	27°30'49.77"E
	26°22'51.28"S	27°30'47.83"E
	26°22'55.06"S	27°30'26.92"E
	26°23'14.10"S	27°30'19.54"E

Powerline Corridor 3	Latitude	Longitude
JOHN KLEINTJES COMMISSIONER OF OATHS EX OFFICIO RIVERWALK OFFICE PARK 41 MATROOSBERG ROAD ASHLEA GARDENS, EXTENSION 6 PRETORIA, 0081 ATTORNEY, SOUTH AFRICA	26°24'11.76"S	27°35'46.61"E
	26°24'16.83"S	27°35'44.67"E
	26°24'36.32"S	27°36'38.84"E
	26°25'5.86"S	27°35'54.11"E
	26°25'52.24"S	27°37'24.82"E
	26°21'54.46"S	27°34'55.82"E
	26°23'14.85"S	27°35'18.43"E
	26°24'16.83"S	27°35'44.67"E

- for the construction of 132 kilovolt transmission powerlines to connect the 200 MW Sibanye Gold Photovoltaic Energy Facility for Sibanye Gold Limited in the Gauteng Province, hereafter referred to as "the property".

Technical details of the proposed facility:

Component	Description/ Dimensions
Location of the site	Approximately 8km southwest of Westonaria near the Sibanye Gold Driefontein and Kloof mining operations.

Length	Approximately 13.34km
SG Codes	T0IQ00000000028000006 T0IQ00000000028000000 T0IQ00000000028000007 T0IQ00000000028300000 T0IQ00000000028000006 T0IQ00000000028000009 T0IQ00000000028000004 T0IQ00000000035500022 T0IQ00000000035500004 T0IQ00000000035500011 T0IQ00000000035500024 T0IQ00000000035500002 T0IQ00000000035500008 T0IQ00000000035500025 T0IQ00000000035500000 T0IQ00000000035500005 T0IQ00000000035600012 T0IQ00000000035600003 T0IQ00000000035600021 T0IQ00000000035600011 T0IQ00000000035600077 T0IQ00000000028000006 T0IQ00000000028000009 T0IQ00000000028000011 T0IQ00000000034900002 T0IQ00000000034900000 T0IQ00000000035000023 T0IQ00000000035000002 T0IQ00000000035000031 T0IQ00000000034900012 T0IQ00000000034900013 T0IQ00000000034900014 T0IQ00000000034900015

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Preferred Site access	Access would be mostly from existing roads and, where this is not possible, the corridors would be accessed via 4x4 vehicles through the veld and/or agricultural land by means of informal single vehicle farm tracks.
Export capacity	132kV
Proposed technology	Standard Eskom monopole, steel structures have been selected as the preferred alternative for the transmission towers.
High of poles	24m
Width and length of required servitude	200m

Conditions of this Environmental Authorisation

Scope of authorisation

1. The construction of 132 kilovolt transmission powerlines to connect the 200 MW Sibanye Gold Photovoltaic Energy Facility for Sibanye Gold Limited in the Gauteng Province as described above is hereby approved.
2. Construction of this project may only commence once the 200 MW Sibanye Gold Limited Photovoltaic Energy Facility (14/12/16/3/3/2/919) has been authorised and has commenced with the construction phase.
3. Authorisation of the activity is subject to the conditions contained in this environmental authorisation, which form part of the environmental authorisation and are binding on the holder of the authorisation.
4. The holder of the authorisation is responsible for ensuring compliance with the conditions contained in this environmental authorisation. This includes any person acting on the holder's behalf, including but not limited

to, an agent, servant, contractor, sub-contractor, employee, consultant or person rendering a service to the holder of the authorisation.

5. The activities authorised may only be carried out at the property as described above.
6. Any changes to, or deviations from, the project description set out in this environmental authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further environmental authorisation in terms of the regulations.
7. The holder of an environmental authorisation must apply for an amendment of the environmental authorisation with the competent authority for any alienation, transfer or change of ownership rights in the property on which the activity is to take place.
8. This activity must commence within a period of five (05) years from the date of issue of this environmental authorisation. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.
9. Construction must be completed within five (05) years of the commencement of the activity on site.
10. Commencement with one activity listed in terms of this environmental authorisation constitutes commencement of all authorised activities.

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Notification of authorisation and right to appeal


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11. The holder of the authorisation must notify every registered interested and affected party, in writing and within 14 (fourteen) calendar days of the date of this environmental authorisation, of the decision to authorise the activity.
12. The notification referred to must –
 - 12.1. specify the date on which the authorisation was issued;
 - 12.2. inform the interested and affected party of the appeal procedure provided for in the National Appeal Regulations, 2014;
 - 12.3. advise the interested and affected party that a copy of the authorisation will be furnished on request; and
 - 12.4. give the reasons of the competent authority for the decision.
13. The holder of the authorisation must publish a notice –
 - 13.1. informing interested and affected parties of the decision;
 - 13.2. informing interested and affected parties where the decision

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- 13.3. drawing the attention of interested and affected parties to the fact that an appeal may be lodged against this decision in terms of the National Appeal Regulations, 2014. Signed at PRETORIA on

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Commencement of the activity

14. The authorised activity shall not commence until the period for the submission of appeals has elapsed as per the National Appeal Regulations, 2014. In terms of section 43(7), an appeal under section 43 of the National Environmental Management Act, 1998 will suspend the environmental authorisation or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with the activity until such time that the appeal has been finalised.

Management of the activity

15. A copy of the final development layout map must be made available for comments by registered interested and Affected Parties and the applicant must consider such comments. Once amended, the final development layout map must be submitted to the Department for written approval prior to commencement of the activity. All available biodiversity information must be used in the finalisation of the layout map. Existing infrastructure must be used as far as possible e.g. roads. The layout map must indicate the following:
- 15.1. Connection routes (including pylon positions) to the distribution/transmission network;
 - 15.2. Location of bird flappers to be installed;
 - 15.3. Internal roads indicating width;
 - 15.4. Wetlands, drainage lines, rivers, stream and water crossing of roads and cables;
 - 15.5. All sensitive features e.g. heritage sites, wetlands, pans and drainage channels that will be affected by the facility and associated infrastructure;
 - 15.6. All existing infrastructure on the site, especially roads; and,
 - 15.7. All "no-go" and buffer areas.
16. The Environmental Management Programme (EMPr) submitted as part of the BAR is not approved and must be amended to include measures as dictated by the final site lay-out map and micro-siting; and the provisions of this environmental authorisation. The EMPr must be made available for comments by registered interested and Affected Parties and the applicant must consider such comments. Once amended, the final EMPr must be submitted to the Department for written approval prior to commencement of the activity. Once approved the EMPr must be implemented and adhered to.

JOHN L. ...
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17. The EMPr is amendable and must be implemented and strictly enforced during all phases of the project. It shall be seen as a dynamic document and shall be included in all contract documentation for all phases of the development when approved.
18. Changes to the EMPr, which are environmentally defensible, shall be submitted to this Department for acceptance before such changes could be effected.
19. The Department reserves the right to amend the EMPr should any impacts that were not anticipated or covered in the BAR be discovered.
20. The provisions of the approved EMPr including recommendations and mitigation measures in the BAR and specialist studies shall be an extension of the conditions of this EA and therefore noncompliance with them would constitute noncompliance with the EA.
21. The EMPr must include the following:
 - 21.1. All recommendations and mitigation measures recorded in the BAR and specialist studies.
 - 21.2. The requirements and conditions of this authorisation.
 - 21.3. The final site layout map.

Frequency and process of updating the EMPr

22. The EMPr must be updated where the findings of the environmental audit reports, contemplated in Condition 29 below, indicate insufficient mitigation of environmental impacts associated with the undertaking of the activity, or insufficient levels of compliance with the environmental authorisation or EMPr.
23. The updated EMPr must contain recommendations to rectify the shortcomings identified in the environmental audit report.
24. The updated EMPr must be submitted to the Department for approval together with the environmental audit report, as per Regulation 34 of GN R. 982. The updated EMPr must have been subjected to a public participation process, which process has been agreed to by the Department, prior to submission of the updated EMPr to the Department for approval.
25. In assessing whether to grant approval of an EMPr which has been updated as a result of an audit, the Department will consider the processes prescribed in Regulation 35 of GN R.982. Prior to approving an amended EMPr, the Department may request such amendments to the EMPr as it deems appropriate to ensure that the EMPr sufficiently provides for avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity.
26. The holder of the authorisation may apply for an amendment of an EMPr, if such amendment is required before an audit is required. The holder must notify the Department of its intention to amend the EMPr at least 60 days prior to submitting such amendments to the EMPr to the Department for approval. In

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assessing whether to grant such approval or not, the Department will consider the processes and requirements prescribed in Regulation 37 of GN R. 982.

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Monitoring

27. The holder of the authorisation must appoint an experienced independent Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the mitigation/rehabilitation measures and recommendations referred to in this environmental authorisation are implemented and to ensure compliance with the provisions of the approved EMPr.
- 27.1. The ECO must be appointed before commencement of any authorised activities.
- 27.2. Once appointed, the name and contact details of the ECO must be submitted to the *Director: Compliance Monitoring* of the Department.
- 27.3. The ECO must keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- 27.4. The ECO must remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.

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Recording and reporting to the Department

28. All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the Department in terms of this environmental authorisation, must be submitted to the *Director: Compliance Monitoring* of the Department.
29. The holder of the environmental authorisation must, for the period during which the environmental authorisation and EMPr remain valid, ensure that project compliance with the conditions of the environmental authorisation and the EMPr are audited, and that the audit reports are submitted to the *Director: Compliance Monitoring* of the Department.
30. The frequency of auditing and of submission of the environmental audit reports must be as per the frequency indicated in the EMPr, taking into account the processes for such auditing as prescribed in Regulation 34 of GN R. 982.
31. The holder of the authorisation must, in addition, submit environmental audit reports to the Department within 30 days of completion of the construction phase (i.e. within 30 days of site handover) and a final environmental audit report within 30 days of completion of rehabilitation activities.
32. The environmental audit reports must be compiled in accordance with Appendix 7 of the EIA Regulations, 2014 and must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms

of compliance with the environmental authorisation conditions as well as the requirements of the approved EMPr.

33. Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

Notification to authorities

34. A written notification of commencement must be given to the Department not later than fourteen (14) days prior to the commencement of the activity. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence, as well as a reference number.

Operation of the activity

35. A written notification of operation must be given to the Department not later than fourteen (14) days prior to the commencement of the activity operational phase.

Site closure and decommissioning

36. Should the activity ever cease or become redundant, the holder of the authorisation must undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.

Specific conditions

37. The holder of the Environmental Authorisation shall ensure that the final EMPr (with all mitigations and monitoring measures) is submitted to this Department for approval after the pre-construction walkdown assessment and micro-siting have taken place.
38. A permit must be obtained from the relevant nature conservation agency for the removal or destruction of any indigenous protected and endangered plant and animal species if required.
39. Ablution facilities must be placed outside of the 1:100 year floodline of a watercourse.
40. No exotic plants may be used for rehabilitation purposes. Only indigenous plants occurring within a ten (10) kilometre radius of the development site must be utilised.
41. Vegetation clearing must be kept to an absolute minimum. Mitigation measures must be implemented to reduce the risk of erosion and the invasion of alien species.

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42. Construction must include design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water run-off.
43. An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate.
44. Any solid waste, which will not be recycled, must be disposed of at a landfill licensed in terms of section 20 (b) of the National Environment Management Waste Act, 2008 (Act No.59 of 2008). No waste material may be left on site after construction.
45. If any evidence of archaeological sites or remains (e.g., remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, marine shell and charcoal/ash concentrations), unmarked human burials, fossils or other categories of heritage resources are found during construction, the South African Heritage Resources Agency (SAHRA) must be alerted immediately, and a professional archaeologist or palaeontologist, must be contacted to inspect the findings.
46. The recommendations of the EAP in the BAR dated September 2016 and the specialist studies attached must be adhered to. In the event of any conflicting mitigation measures and conditions of the Environmental Authorisation, the specific condition of this Environmental Authorisation will take preference.

General

47. A copy of this environmental authorisation, the audit and compliance monitoring reports, and the approved EMPr, must be made available for inspection and copying-
 - 47.1. at the site of the authorised activity;
 - 47.2. to anyone on request; and
 - 47.3. where the holder of the environmental authorisation has a website, on such publicly accessible website.
48. National government, provincial government, local authorities or committees appointed in terms of the conditions of this authorisation or any other public authority shall not be held responsible for any damages or losses suffered by the holder of the authorisation or his/her successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the holder of the authorisation with the conditions of authorisation as set out in this document or any other subsequent document emanating from these conditions of authorisation.

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M.S

Date of environmental authorisation: 10/01/2017

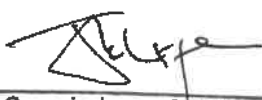

Mr Sabelo Malaza

Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs

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Annexure 1: Reasons for Decision

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1. Information considered in making the decision

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In reaching its decision, the Department took, *inter alia*, the following into consideration -

- The listed activities as applied for in the application form received on 25 July 2016.
- The information contained in the Draft BAR dated July 2016 and received on 25 July 2016.
- The information contained in the Final BAR dated September 2016 and received on 09 September 2016.
- The comments received from DAFF; GDARD and other I&APs as included in the Final BAR dated September 2016.
- Mitigation measures as proposed in the final BAR dated September 2016.
- The information contained in the specialist studies submitted as part of the Final BAR dated September 2016 and as appears below:

Title	Prepared by	Date
Floral Impact Assessment	Scientific Aquatic Services	July 2016
Faunal Impact Assessment	Scientific Aquatic Services	July 2016
Wetland Impact Assessment	Scientific Aquatic Services	July 2016
Visual Impact Assessment	Aurecon South Africa (Pty) Ltd	January 2016
Soil and Agricultural Potential Assessment	Rehab Green Monitoring Consultants CC	March 2016
Heritage Impact Assessment	Aurecon South Africa (Pty) Ltd	February 2016

- The objectives and requirements of relevant legislation, policies and guidelines, including section 2 of the National Environmental Management Act, 1998 (Act 107 of 1998).

2. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

- The findings of all the specialist studies conducted and their recommended mitigation measures.

- b) The need for the 132kV transmission powerlines and substation is to connect the proposed 200 MW Sibanye Gold Photovoltaic Energy Facility.
- c) The BAR dated September 2016 identified all legislation and guidelines.
- d) The methodology used in assessing the potential impacts identified in the BAR dated September 2016 and the specialist studies have been adequately indicated.
- e) A sufficient public participation process was undertaken and the applicant has satisfied the minimum requirements as prescribed in the EIA Regulations, 2014 for public involvement.

3. Findings

After consideration of the information and factors listed above, the Department made the following findings -

- a) The identification and assessment of impacts are detailed in the BAR dated September 2016 and sufficient assessment of the key identified issues and impacts have been completed.
- b) The procedure followed for impact assessment is adequate for the decision-making process.
- c) The proposed mitigation of impacts identified and assessed adequately curtails the identified impacts.
- d) The information contained in the BAR dated September 2016 is deemed to be accurate and credible.
- e) The mitigation measures for the pre-construction, construction and rehabilitation phases of the development were proposed and included in the BAR and will be implemented to manage the identified environmental impacts during the construction phase.

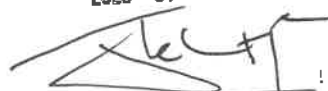
In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the environmental authorisation, the authorised activities will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the authorised activities can be mitigated to acceptable levels. The environmental authorisation is accordingly granted.

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Appendix C: Amended Environmental Authorisation



GAUTENG PROVINCE
AGRICULTURE AND RURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

Reference: GAUT 006/21-22/E0088
Enquiries: Erick Moletsane
Tel: +27 (0)11 240 3390
Erick.Moletsane@gauteng.gov.za

Sibanye Gold (Pty) Ltd
Private Bag X 5
Westonaria
1780

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E-mail: nico.gewers@sibanyegold.co.za

Dear Mr. Nico Gewers,


Commissioner of Oaths

**AMENDMENT GRANTED: APPLICATION FOR AMENDMENT OF THE ENVIRONMENTAL
AUTHORISATION (DEA REFERENCE: 14/12/16/3/3/1/1606) FOR THE PROPOSED 132
KILOVOLT TRANSMISSION POWERLINES TO CONNECT THE 200-MEGAWATT (MW)
SIBANYE GOLD LIMITED PHOTOVOLTAIC ENERGY FACILITY FOR SIBANYE GOLD
LIMITED, GAUTENG PROVINCE.**

The above matter and more specifically your application for an amendment received on 14 December 2021, additional information dated 10 March 2022 and 24 March 2022 has reference.

Please be advised that the Department has, under the powers vested in it as prescribed in Chapter 5 of the Environmental Impact Assessment Regulations, 2014 (as amended), ("the Regulations") decided to amend the Environmental Authorisation (DEA Reference: 14/12/16/3/3/1/1606) issued on 10 January 2017 in respect of the above-mentioned activity.

In terms of Regulation 4 (2) of the Environmental Impact Assessment Regulations, 2014, (as amended), you must notify all registered interested and affected parties, in writing and within 14 days of the date of the Departments decision to amend the Environmental Authorisation (EA) as well as the provisions regarding the making of appeals that are provided in the Regulations.

Your attention is drawn to Chapter 2 of the National Appeals Regulations, 2014 which regulates the appeal process. Should you wish to appeal any aspect of the decision, you must within 20 days of the date of the notification of the decision submit your appeal, including supporting documents, to the appeal administrator by any of the following means:

Postal Address:

The Appeals Administrator
Department of Agriculture and Rural Development
P.O. Box 8769
Johannesburg
2000

GDARD
Office of the HOD

29 MAR 2022

000040

**JOHN KLEINTJES
COMMISSIONER OF OATHS EX OFFICIO
RIVERWALK OFFICE PARK
41 MATROOSBERG ROAD
ASHLEA GARDENS, EXTENSION 6
PRETORIA, 0081
ATTORNEY, SOUTH AFRICA**

Physical Address:

The Appeals Administrator
Department of Agriculture and Rural Development
56 Eloff Street, Umnotho House, 23rd Floor
Johannesburg
2000

Fax No: 011 240 3158/2700

Email Address: appeals@gauteng.gov.za

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Your appeal must be submitted in the prescribed appeal form obtainable from the appeal administrator, Ms. Tsholofelo Mere, at telephone number 011 240 3204 or email address tsholofelo.mere@gauteng.gov.za. The appeal form is also available from our website: www.gauteng.gov.za. Should you have any queries or require additional information regarding the appeal process, you can contact the appeal administrator on any of the mentioned contact details.

Kind regards,



MS. MATILDA GASELA

HEAD OF DEPARTMENT: AGRICULTURE AND RURAL DEVELOPMENT

DATE:

29 MARCH 2022

JOHN KLEINTJES
COMMISSIONER OF OATHS EX OFFICIO
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ADDENDUM TO ENVIRONMENTAL AUTHORISATION

Authorisation Register Number:	DEA Reference: 14/12/16/3/3/1/1606	
Amendment Application Number:	Gaut 006/21-22/E0088	
Holder of Authorisation:	Sibanye Gold (Pty) Ltd	
Coordinates:	Latitude (S)	Longitude (E)
	26° 20' 48.54"	27° 36' 51.00"
	26° 22' 51.28"	27° 30' 47.83"
	26° 23' 14.85"	27° 35' 18.43"
	26° 24' 36.32"	27° 36' 38.84"

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3200V and 3300V transmission powerlines to connect the 200 MW Sibanye Gold Photovoltaic Energy Facility for Sibanye Gold Limited, Gauteng Province

21 Digit SG Number	T01Q00000000028000006
	T01Q00000000035500011
	T01Q00000000035600077
	T01Q00000000035500022
	T01Q00000000034900000
	T01Q00000000034900074
	T01Q00000000034700028
	T01Q00000000035000019
	T01Q00000000035000020

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1. Decision

The Department has decided to amend the Environmental Authorisation DEA Reference: 14/12/16/3/3/1/1606 issued on 10 January 2017.

2. Amendments to the Environmental Authorisation is requested as follows:

2.1 The Validity of the Environmental Authorisation which reads:

"this activity must commence within a period of five (05) years from the date of issue of this environmental authorisation. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.

is hereby amended to read:

"this activity must commence within a period of five (5) years from the date of signature of this amended environmental authorisation. If commencement of the activity does not occur within the period of five (5) years, the authorisation lapses and a new application for environmental authorisation must be lodged with the Department in order for the activity to be undertaken". Please note that after this validity extension, there will be no further amendment extension for time frame.

and

"transfer of authorisations Solar Energy facility (SEF) is transferred

to

Special Purpose Vehicle (Sibanye Solar PV Proprietary Limited) with the following Company details:

Sibanye Solar PV Proprietary Limited

Reg.2015/405712/07

Libanon Business Park

1 Hospital Street (Off Cedar Ave)

Libanon

Westonaria

1779

Private Bag X5

Westonaria

1780

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3. General Conditions

- 1.1 All conditions stipulated in the Environmental Authorisation DEA Reference: 14/12/16/3/3/1/1606 issued on 10 January 2017 must be strictly adhered to.
- 1.2 A copy of this Addendum together with a copy of the initial Environmental Authorisation must be kept at the property where the activities will be undertaken. The authorisations must be produced to any authorised official of the Department who requests to see them and must be made available for inspection by any employee or agent of the holder of the authorisation who works or undertakes work at the property. If it is not possible to keep a copy of this authorisation on site, then it must be kept at the offices of the site manager.
- 1.3 Where any of the applicant's contact details change, including the name of the responsible holder of the authorisation, the physical or postal address and/ or telephonic details, the

applicant must follow an amendment process as prescribed in Chapter 5 of the NEMA Environmental Impact Assessment Regulations, 2014, by submitting an amendment application to the Department for consideration and decision making as soon as the new details become known to the applicant.

- 1.4 The holder of the authorisation must notify the Department, in writing **within 7 (seven) days** if a condition of this Addendum is not adhered to. Any notification in terms of this condition must be accompanied by reasons for the non-compliance.
- 1.5 Non-compliance with a condition of this Addendum may result in criminal prosecution or other actions provided for in NEMA and the Regulations.

Date of the Amendment of Environmental Authorisation:

29 MARCH 2022

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ANNEXURE 1: REASON FOR DECISION

1. Background

The Department issued Environmental Authorisation with DEA Reference: 14/12/16/3/3/1/1606 dated on 10 January 2017 for the proposed 132 Kilovolt transmission powerlines to connect the 200 MW Sibanye Gold Photovoltaic Energy Facility for Sibanye Gold Limited. Gauteng Province.

The applicant appointed Zutari (Pty) Ltd to undertake the Amendment application process.

2. Information Considered in Making the Decision

In reaching its decision, the Department took, inter alia, the following into consideration:

- 2.1 The information contained in the Part 1 Amendment application received by this Department on 14 December 2021 and additional information dated 10 March 2022 and 24 March 2022.
- 2.2 The relevant information contained in the Departmental information base including the Geographical Information System (GIS), Gauteng Conservation Plan Version 3.3 and the Gauteng Provincial Environmental Management Framework (GPEMF), 2015.
- 2.3 The objectives and requirements of relevant legislation, policies and guidelines, including Section 2 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended).

3. Key Factors Considered in Making the Decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

- 3.1 Environmental Authorisation conditions; and
- 3.2 The request of the amendments and reasons provided.

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4. Findings

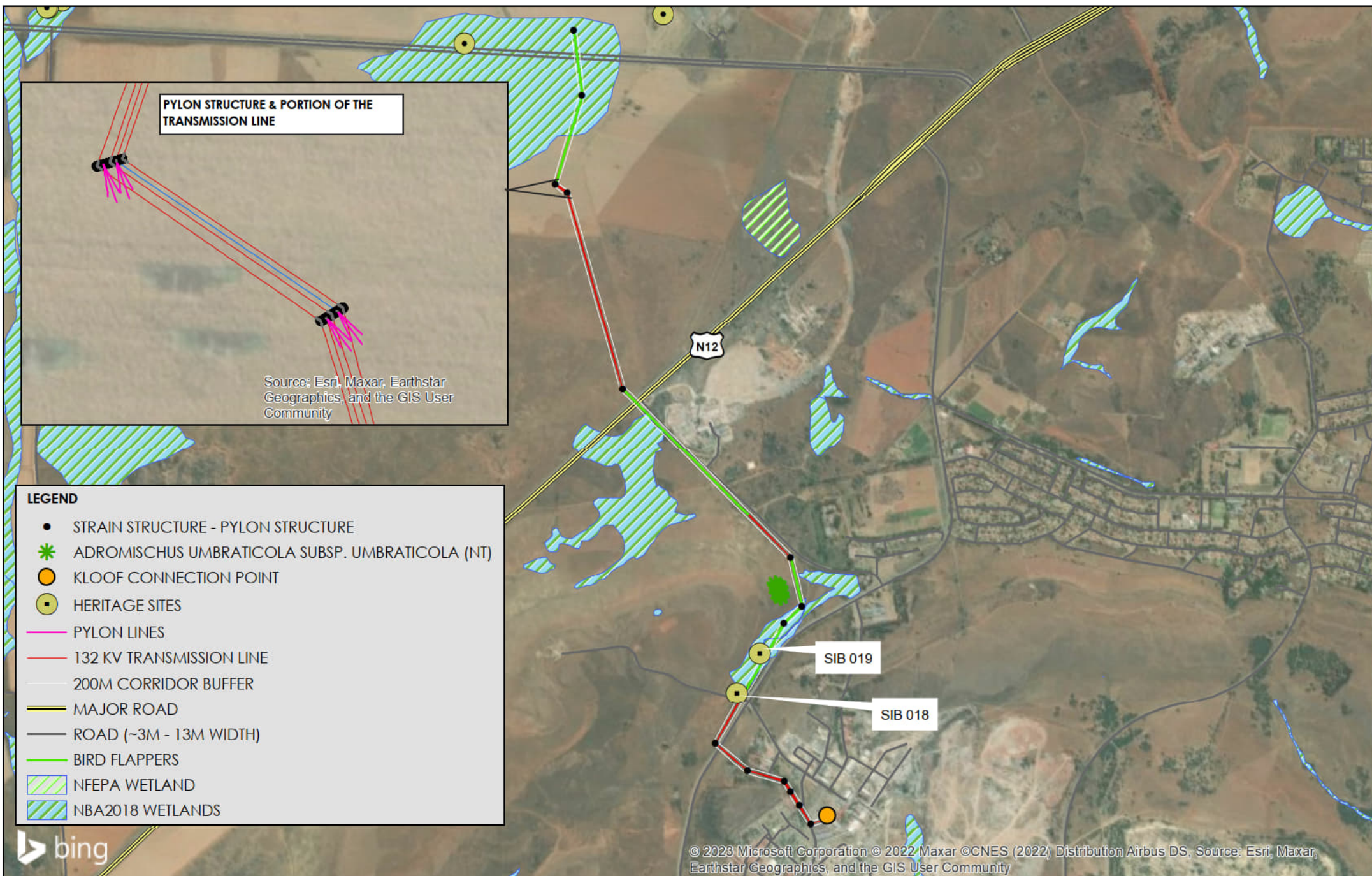
After consideration of the information and factors listed above, the Department made the following findings:

- 4.1 The change will not affect the scope of the Environmental Authorisation and no additional impacts are foreseen as the change is related to administrative changes.
- 4.2 All conditions contained in the initial EA dated 10 January 2017 still applicable and must be adhered to.
- 4.3 The environment as well as the rights of Interested and Affected Parties (I&APs) will not be affected by this amendment.

In view of the above, this Department is of the opinion that the amendment would not result in a negative environmental impact that would conflict with the general objectives and principles of integrated environmental management laid down in Chapter 5 of the NEMA. The environmental authorisation is accordingly amended.

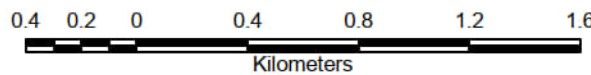
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Appendix D: Drawing



SIBANYE 132 KV TRANSMISSION LINE - Layout Map -

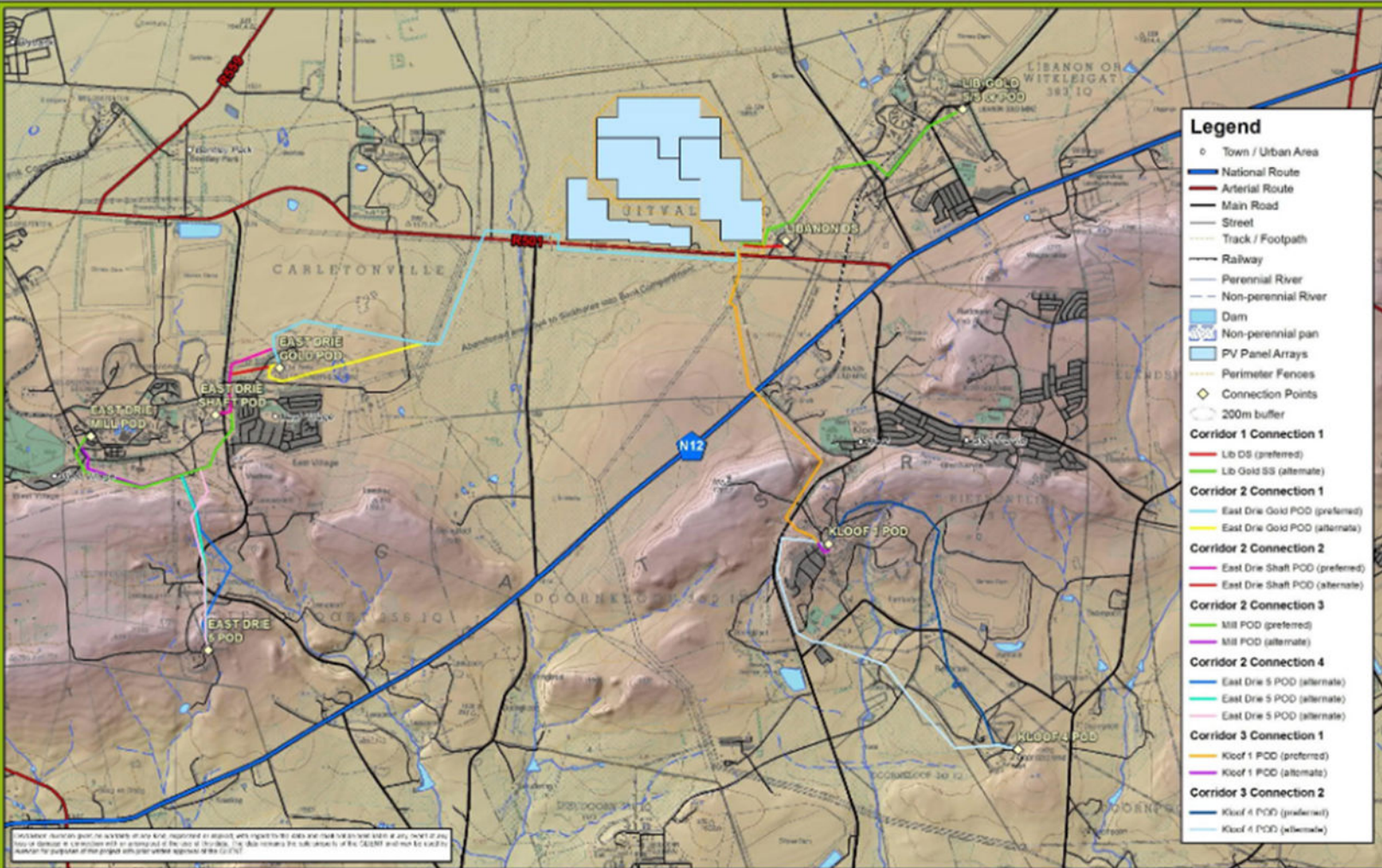
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Datum: WGS84
Projection: Lat / Long
Decimal Degrees

Compiled by: Zinzi Portia Xakayi
Compiled on: 2023/02/07

ZUTARI
IMPACT. ENGINEERED.



Appendix E: Plant Search, Rescue and Relocation, and Habitat Management Plan



SCIENTIFIC TERRESTRIAL SERVICES

PLANT SEARCH, RESCUE AND RELOCATION, AND HABITAT MANAGEMENT PLAN

**FOR THE AUTHORISED 132 KILOVOLT
TRANSMISSION POWERLINES TO CONNECT THE
200 MEGAWATT SIBANYE GOLD PHOTOVOLTAIC
ENERGY FACILITY FOR SIBANYE GOLD LIMITED IN
WESTONARIA, GAUTENG PROVINCE.**

Prepared for: Zutari
Prepared by: Scientific Terrestrial Services (Pty) Ltd.
Report author: C. Steyn (Pr. Sci. Nat)
Report reviewers: N. Cloete (Pr. Sci. Nat)
Report Reference: STS 222029
Date: May 2022
Amended January 2023



Part of the SAS Environmental Group of Companies
Website: <http://www.sasenvironmental.co.za>

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ACRONYM LIST

ARC	Agricultural Research Council
ARC	Agricultural Research Council
CARA	Conservation of Agricultural Resources Act, 1983 [Act No. 43 of 1983]
ECO	Environmental Control Officer
EM	Environmental Manager
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
GDARD	Gauteng Department of Agriculture and Rural Development
GPS	Global Positioning System
IUCN	International Union for Conservation of Nature
KV	kilovolt
MW	megawatt
NEMA	National Environmental Management Act, 1998 [Act No. 107 of 1998]
NEMBA	National Environmental Management: Biodiversity Act, 2004 [Act No. 10 of 2004]
PV	Photovoltaic
SANBI	South African National Biodiversity Institute
STS	Scientific Terrestrial Services CC



1 INTRODUCTION AND BACKGROUND TO THE PROJECT

Scientific Terrestrial Services CC (STS) was appointed to develop a Plant Search, Rescue and Relocation, and Habitat Management Plan for the first phase of the authorised 132-kilovolt (KV) transmission powerlines (Authorisation register number: 14/12/16/3/3/1/1606) to connect the 200-megawatt (MW) Sibanye Gold Photovoltaic (PV) energy facility (Authorisation register number: 14/12/16/3/3/2/919) for Sibanye Gold Limited in Westonaria, Gauteng Province; henceforth collectively referred to as the “**Sibanye PV Energy Facility Phase 1**”. Individually, the 132-KV transmission powerlines (Phase 1) will henceforth be referred to as the “**132-KV Powerline Phase 1**” with the 200-MW Sibanye Gold PV energy facility referred to as the “**Phase 1 PV Facility**” (Figures 1 & 2).

The Sibanye PV Energy Facility Phase 1 is located in the West Rand District Municipality of the Gauteng Province, approximately 8 km southwest of Westonaria near the Sibanye Gold Driefontein and Kloof mining operations. The 132-KV Powerline Phase 1 crosses over three roads, namely the R501 in its northern extent (just before connecting to the Phase 1 PV Facility), the N12 in its central extent, and a small unnamed road to the Sibanye Gold training academy in its southern extent. The 200-MW PV energy facility is entirely on agricultural fields, with the 132-KV Powerline Phase 1 crossing over both agricultural fields as well as large stretches of open veld and a ridge.

During the site walkdown, protected and threatened plants were only encountered along the 132-KV Powerline Phase 1 and, hence, the focus of this Plant Search, Rescue and Relocation, and Habitat Management Plan will be on the 132-KV Powerline Phase 1. No species of concern were recorded in the Phase 1 PV Facility and no further reference to the Phase 1 PV Facility will henceforth be made (refer also to the verification letter (STS 222029, 2022)¹).

¹ **STS 222029, 2022.** Verification of plants listed in the national forest act and species protected in terms of specific provincial legislation within Phase 1 of the proposed 200 megawatts (MW) Sibanye Gold Limited photovoltaic energy facility on portion 1, 2, 4, 5 and 6 of the farm Uitval 280 within the Westonaria local municipality in the Gauteng Province.



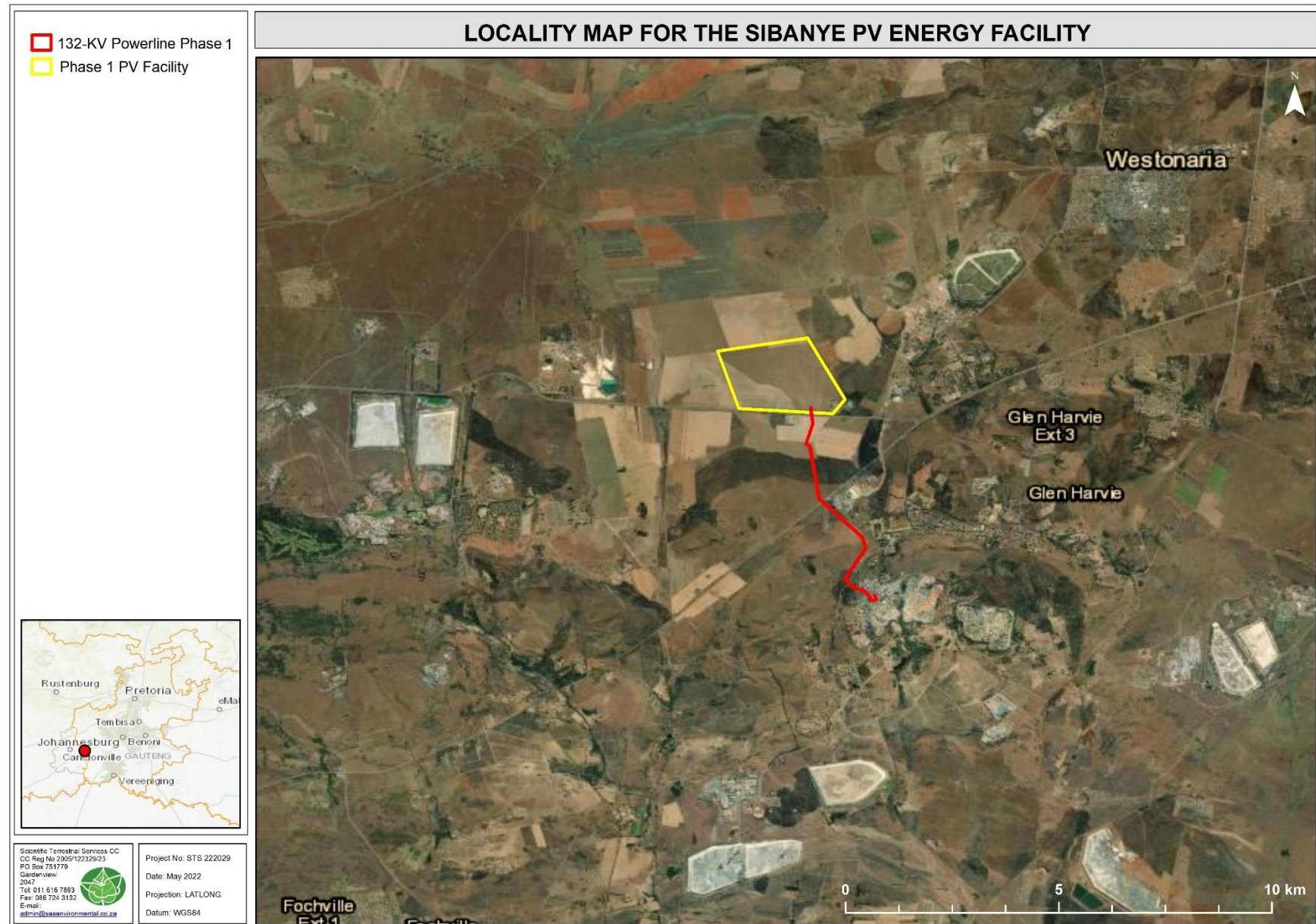


Figure 1: Digital satellite image depicting the Sibanye PV Energy Facility project area (Phase 1) in relation to the surrounding areas.



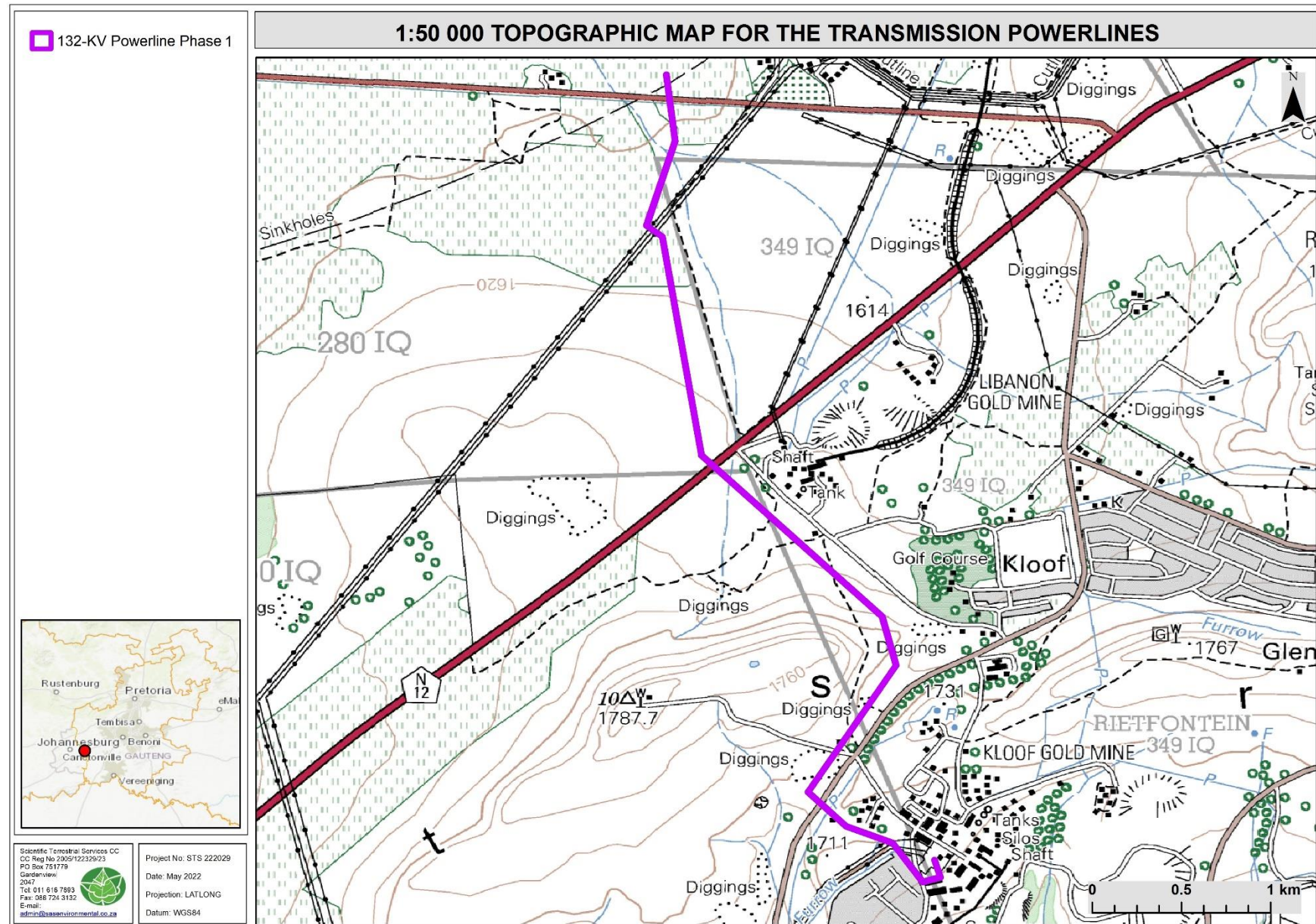


Figure 2: The 132-KV Powerline Phase 1 depicted on a 1:50 000 topographical map in relation to the surrounding area.



1.1 Details of the Environmental Authorisation

“Specific conditions” of the Environmental Authorisation (EA) relevant to this report include:

- Authorisation register number: 14/12/16/3/3/1/1606 (132-KV transmission powerlines)
 - “41. Before the clearing of the site, the appropriate permits must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF)² for the removal of plants listed in the National Forest Act and from the relevant provincial department for the destruction of species protected in terms of the specific provincial legislation. Copies of the permits must be made available to this Department on request.”.

The authorised extent for the 132-KV transmission powerlines included various options within three Powerline Corridors (200 m authorised for each corridor). Table 1 and Figure 3 presents the boundary relevant to this authorisation.

Table 1: Authorised boundary for the 132-KV transmission powerlines (Authorisation register number: 14/12/16/3/3/1/1606).

LABEL	LONGITUDE	LATITUDE	LABEL	LONGITUDE	LATITUDE
Powerline Corridor 1			Powerline Corridor 2		
A	27° 34' 57.5400" E	26° 21' 51.7210" S	A	27° 30' 49.7700" E	26° 22' 42.6200" S
B	27° 35' 52.6800" E	26° 21' 14.5000" S	B	27° 30' 47.8300" E	26° 22' 51.2800" S
C	27° 36' 51.0000" E	26° 20' 48.5400" S	C	27° 30' 26.9200" E	26° 22' 55.0600" S
D	27° 35' 18.9300" E	26° 21' 52.7900" S	D	27° 30' 19.5400" E	26° 23' 14.1000" S
LABEL	LONGITUDE		LATITUDE		
Powerline Corridor 3					
A	27° 35' 46.6100" E		26° 24' 11.7600" S		
B	27° 35' 44.6700" E		26° 24' 16.8300" S		
C	27° 36' 38.3840" E		26° 24' 36.3200" S		
D	27° 35' 54.1100" E		26° 25' 05.8600" S		
E	27° 37' 24.8200" E		26° 25' 52.2400" S		
F	27° 34' 55.8200" E		26° 21' 54.4600" S		
G	27° 35' 18.4300" E		26° 23' 14.8500" S		
H	27° 35' 44.6700" E		26° 24' 16.8300" S		

² DAFF is now known as the Department of Forestry, Fisheries, and the Environment (DFFE).



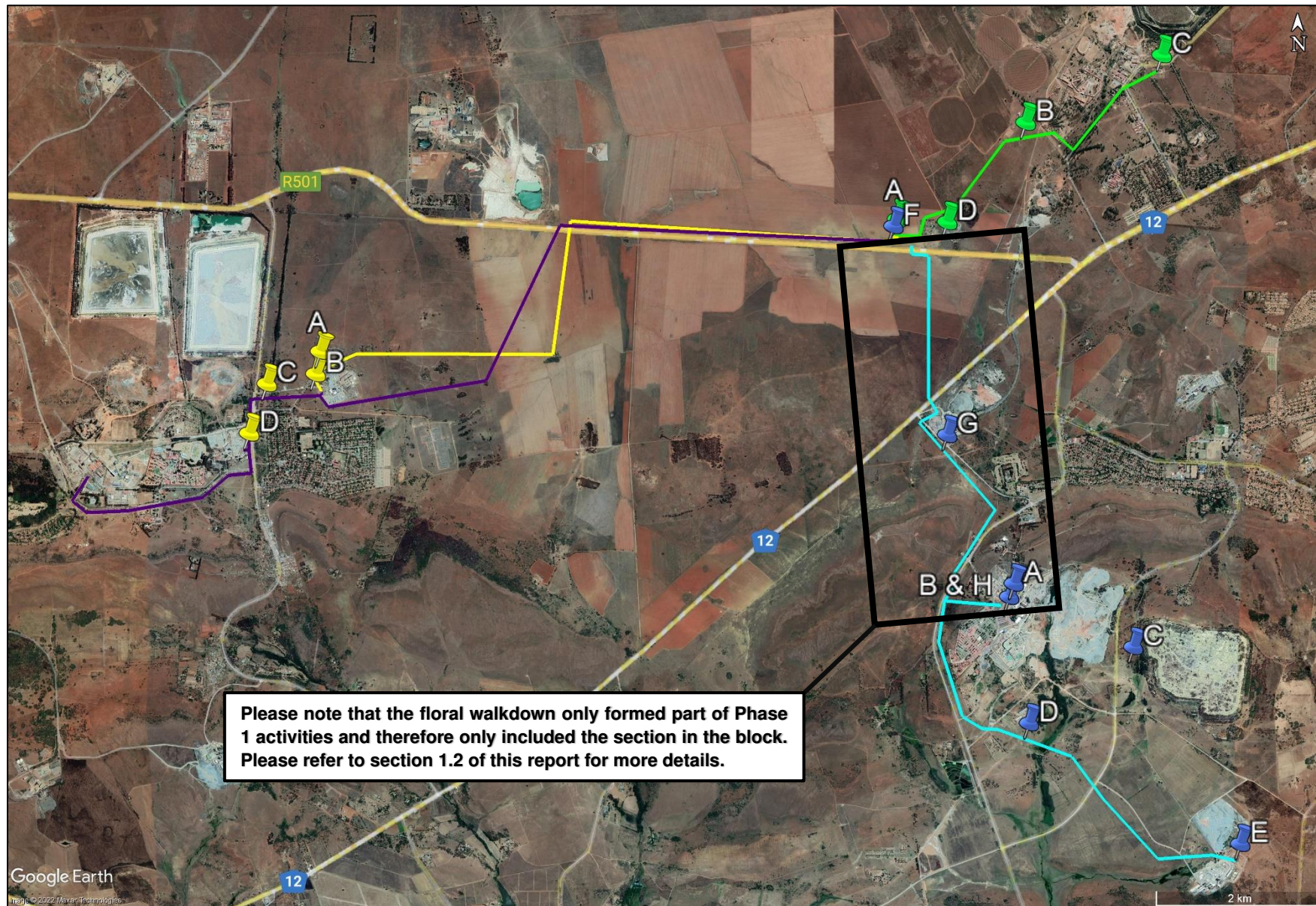


Figure 3: Authorised boundary for the transmission powerlines as per Table 1. Powerline Corridor 1 = green points. Powerline Corridor 2 = yellow points. Powerline Corridor 3 = blue points. The lines represent various options considered for the transmission powerlines.



1.2 Site walkdown details

A site walkdown was restricted to Phase 1 of the Sibanye PV Energy Facility project and was undertaken during May 2022 to take record of all occurring Red Data Listed (RDL)-, provincially- (Orange Listed plants) or nationally protected plant species (henceforth “floral SCC”) (Please refer to Box 1).

BOX 1:
RED DATA LISTED (RDL)-, PROVINCIAL- (ORANGE LISTED PLANTS) OR NATIONALLY PROTECTED PLANT SPECIES

- In terms of Section 56 of the National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004) (NEMBA), **threatened species** are Red Data Listed (RDL) species falling into the Critically Endangered (CR), Endangered (EN), Vulnerable (VU), and Protected (P) categories of ecological status.
- The concept of an **Orange List** was introduced as a way of assessing and recording the conservation importance of taxa that are rare and of special concern but are not on a Red List (Victor and Keith, 2004). For Gauteng, this includes species that are endemic to either South Africa or the province, species that have a limited distribution in the country, species that are overharvested for the medicinal plant trade or species that are losing habitat due to urban expansion, to name a few (GDARD, 2014).
- **Nationally protected species fall in various categories:**
 1. Recognised International Union for Conservation of Nature (IUCN) categories not on the Red List: **Species of conservation concern** are species that have a high conservation importance in terms of preserving South Africa's high floristic diversity and include not only threatened species, but also those classified in the categories Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining and Data Deficient - Insufficient Information (DDD).
 2. Species on the NEMBA Threatened and Protected Species (TOPS) list (with some overlap with threatened species): The Threatened or Protected Species (TOPS) Regulations (R 152 of 2007) under Section 56(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA), were taken into consideration.
 3. Nationally protected tree species: Tree species as per the National Forest Act, 1998 (Act No. 84 of 1998) (NFA).

Assessed areas for the **132-KV Powerline Phase 1** include a subsection of the Powerline Corridor 3 (Table 2 below and Figure 4).

Table 2: Authorised boundary for the 132-KV transmission powerlines (Authorisation register number: 14/12/16/3/3/1/1606). Data in grey did not form part of the verification.

LABEL	LONGITUDE	LATITUDE
A	27° 35' 46.6100" E	26° 24' 11.7600" S
B	27° 35' 44.6700" E	26° 24' 16.8300" S
C	27° 36' 38.3840" E	26° 24' 36.3200" S
D	27° 35' 54.1100" E	26° 25' 05.8600" S
E	27° 37' 24.8200" E	26° 25' 52.2400" S
F	27° 34' 55.8200" E	26° 21' 54.4600" S
G	27° 35' 18.4300" E	26° 23' 14.8500" S
H	27° 35' 44.6700" E	26° 24' 16.8300" S



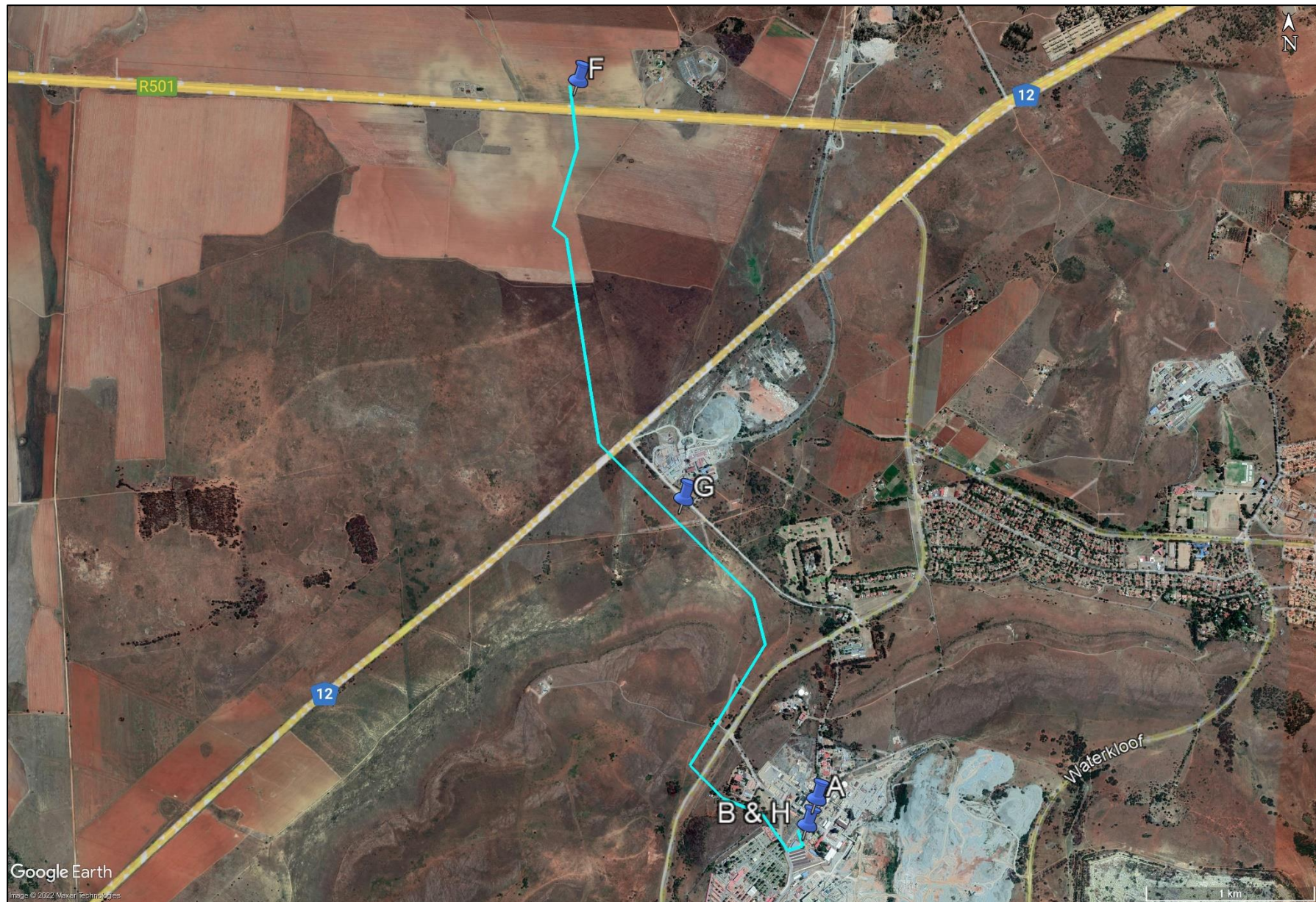


Figure 4: Areas that formed part of the May 2022 site walkdown.



2 PURPOSE AND SCOPE OF WORK

The purpose of the Plant Search, Rescue and Relocation, and Habitat Management Plan (“**Search and Rescue Plan**” hereafter) is to provide management and monitoring guidelines for the relocation process of any **floral SCC** which are present along the 132-KV Powerline Phase 1. The Search and Rescue Plan will form part of the broader Environmental Management Programme (EMPr).

The **key objectives** of the Search and Rescue Plan include to:

- To obtain the number of floral SCC that occur along the 132-KV Powerline Phase 1 by undertaking a detailed walkdown of the footprint provided by the client/proponent, where all floral SCC are marked by means of a hand-held Global Positioning System (GPS);
- Ensure the Search and Rescue Plan meets the requirements of relevant local and regional authorities regarding relocation of floral SCC (especially where species of national importance will be impacted);
- Provide input into the Environmental Management Plan (EMP) regarding the conservation and management of such species;
- Provide recommendations on management and mitigation measures (including opportunities and constraints) with regards to the pre-construction and operation of the proposed activities to lower potential impacts on floral assemblages in the area;
- Provide measures to rehabilitate areas impacted by relocation activities to levels suitable to ensure the ongoing functioning of the ecological resources; and
- Provide measures and expected timeframes to monitor receptor sites (where floral SCC are relocated to) to ensure relocation activities are successful (or to pick up on shortfalls).

The scope for the development and implementation of a Search and Rescue Plan includes:

- The identification of applicable floral SCC (as per Box 1) along the 132-KV Powerline Phase 1. This includes a list of relevant floral SCC, plant size (ranges), recommended planting densities/numbers as well as total areas to be planted (hectares (ha));
- Identification of areas surrounding the 132-KV Powerline Phase 1 where floral SCC can be relocated;
- Development of a monitoring programme to evaluate the success of relocation;
- Development of a record keeping procedure to ensure the location of relocated floral SCC is documented; and



- Compilation of the habitat requirements of all the identified floral SCC that require relocation; and
- Recommendations, action plans, relocation permit requirements (where necessary) and rescue and relocation processes.

3 REFERENCE DOCUMENTATION

This report is to be read in conjunction with the following documentation, which contains the results of the Biodiversity Specialist report and the outcome of the Environmental Authorisation (EA):

- Application for Environmental Authorisation in terms of the National Environmental Management Act, 1998: GNR. 982/983/985 for the proposed 132 kilovolt transmission powerlines to connect the 200-megawatt Sibanye Gold Photovoltaic Energy Facility for Sibanye Gold Limited, Gauteng Province; and
- SAS 215197. 2016. Wetland, faunal, avifaunal and floral ecological assessment as part of the Environmental Impact Assessment for the proposed 200MW solar photovoltaic power plant with associated infrastructure for Sibanye Gold, Carletonville, Gauteng. Prepared for Aurecon (Pty) Ltd. February 2016. Section B: Floral Assessment.

4 LEGISLATIVE REQUIREMENTS

The following legislative requirements are relevant to the development of the Search and Rescue Plan:

- The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA);
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA); and
- The Gauteng Department of Agriculture and Rural Development (GDARD) Requirements for Biodiversity Assessments Version 3 (GDARD, 2014).

The details of each of the above as they pertain to this study are provided in Appendix A of this report.



5 CURRENT STATUS AND ECOLOGICAL CHARACTER OF THE PROJECT AREA

During the initial SAS 215197 (2016) field assessment, three (3) habitat units were identified for the Sibanye PV Energy Facility sections that are applicable for this Search and Rescue Plan.

1. **Transformed Areas;**
2. **Secondary Grasslands; and**
3. **Ridges.**

Transformed areas (Figure 5) associated with crop fields, mining areas and associated infrastructure. Floral sensitivity is low and not representative of the natural vegetation type. No floral SCC were associated with this unit during the SAS 215197 (2016) field assessment, nor were any recorded during the 2022 floral walkdown.



Figure 5: Representative photos of the Transformed Habitat on site.

Secondary grasslands (Figure 6) where edge effects from agriculture and other activities have led to the transformation of natural grassland habitat to a secondary state of ecological succession. Floral SCC were not mentioned for this habitat unit during the SAS 215197 (2016) field assessment; however, several Orange Listed species were recorded during the 2022 floral walkdown.





Figure 6: Representative photos of the Secondary Grassland Habitat on site.

Ridges (Figure 7) associated with Gauteng Shale Mountain Bushveld - according to 2018 Final Vegetation Map of South Africa, Lesotho, and Swaziland (SANBI, 2018a), as well as the 2018 Terrestrial ecosystem threat status and protection level - remaining extent (SANBI, 2018b; Skowno et al., 2019). This habitat unit is associated with rocky ridges and higher elevation areas within the study area. Primary grassland conditions predominate this habitat unit, and the overall habitat integrity and ecological function is high. Floral SCC were associated with this unit during the SAS 215197 (2016) field assessment and were recorded during the 2022 floral walkdown.



Figure 7: Representative photos of the Ridge Habitat on site outlined in green in the bottom photo.



6 RESCUE AND RELOCATION PLAN

This section of the report serves to provide guidelines for the search and rescue of floral species to ensure that the relocation activities associated with the 132-KV Powerline Phase 1 will be sufficient in ensuring minimal mortality of affected species and vegetation communities.

To develop suitable mitigation and rescue and relocation measures for the 132-KV Powerline Phase 1 project, a field assessment was undertaken during May 2022 and previous ecological studies for the area was analysed³. The field assessment was undertaken within a 20 m buffer around the provided 132-KV transmission powerline footprint where a biodiversity specialist (SACNASP registered botanist) walked evenly spaced transects to search for and mark all relevant SCC with a hand-held GPS.

Two Orange Listed plant species were encountered along the 132-KV transmission powerline:

- Seven (7) *Boophone disticha* individuals (least concern (LC) nationally but Declining on the Orange List). All specimens were recorded within the Secondary Grassland. Refer to Section 6.2.1 and Appendix B for more details; and
- 143 *Hypoxis hemerocallidea* individuals (LC nationally, but Declining on the Orange List). Of the 143 individuals recorded, a total of 64 specimens of *Hypoxis hemerocallidea* were recorded in the Secondary Grassland and a total of 79 within the Ridge Habitat. Refer to Section 6.2.2 and Appendix B for more details.

According to the GDARD principles⁴, the Orange Listed species do not require permits for relocation if the species are relocated within the project area.

A population of 87 of the NT *Adromischus umbraticola* subsp. *umbraticola* was encountered within the Ridge Habitat. Protocols regarding the relocation of NT species require special attention and more stringent planning and mitigation measures. As such, the feasibility for the rescue and relocation of the NT *Adromischus umbraticola* subsp. *umbraticola* were guided by GDARD. After a site visit by officials from GDARD, it was determined that relocation of the NT *Adromischus umbraticola* subsp. *umbraticola* population is **not feasible** and **no such attempts must be made**. Refer to Appendix B for locality records of this species as recorded on site.

³ SAS 215197. 2016. Wetland, faunal, avifaunal and floral ecological assessment as part of the Environmental Impact Assessment for the proposed 200MW solar photovoltaic power plant with associated infrastructure for Sibanye Gold, Carletonville, Gauteng. Prepared for Aurecon (Pty) Ltd. February 2016. Section B: Floral Assessment.

⁴ Gauteng Department of Agriculture and Rural Development (GDARD) Biodiversity Directorate's minimum requirements for vegetation assessments of March 2014.



6.1 Project Details and Commitments

The following project details are relevant in determining potential impacts to the floral SCC on site:

- The clearance of vegetation along the 132-KV Powerline Phase 1 will only take place immediately under and around the pylon bases. No vegetation to be cleared along the remaining stretch of the 132-KV Powerline Phase 1. Regarding vegetation clearance, refer also to the last bullet point in this section for details on access roads for maintenance (where vegetation clearance will not be required);
- Pylon foundations will be restricted in size. Where the pylons occur on rockier environments, the foundations will be as narrow as 1 m. Where the pylons occur in softer soil (lower rock presence) it may require a precast foundation with diameter of approximately 6 m;
- Monopole structures to be used; and
- Preferred site access (as per the EA): “Access would be mostly from existing roads and, where this is not possible, the corridors would be accessed via 4x4 vehicles through the veld and/or agricultural land by means of informal single vehicle farm tracks.”.

As per the South African National Biodiversity Institute (SANBI) principles, avoidance should always be the first mitigation when floral SCC are at risk. However, where this is not feasible, search and rescue should be attempted for species that are eligible for such an undertaking (i.e., the Orange Listed plants). The 132-KV Powerline Phase 1 activities will only require the removal of vegetation (and potentially the relocation of Orange Listed species) underneath the pylons and associated foundations (no vegetation clearance along the transmission lines). As such, it is recommended that placement of the pylons be planned in such a way as to limit the need for search and rescue attempts. Where this is not feasible, section 6.2 of this report should be taken into consideration.



6.2 Species-specific details of the species targeted for rescue and relocation.

Practical considerations:

- Rescued plants may not thrive or even survive;
- Various agencies (incl. IUCN and SANBI) are not supportive of the concept of plant search and rescue;
- If the need arises, rescued plants can be used for rehabilitation of affected areas; and
- Plants donated to the Agricultural Research Council (ARC) or national botanical gardens (as a last resort) can provide contribution to public education.

Ecological Principles and Implications:

- SANBI website "Guidelines for Environmental Impact Assessments" (www.redlist.sanbi.org/eiaguidelines.php) states the following: "Translocations are expensive and rarely successful. Even if they are successful, translocated individuals may harm other species within the receiving environment, the translocated individuals may transmit pathogens and/or parasites, and translocation may result in rapid changes in the species itself.";
- As such, species to be relocated (i.e., translocated) must be as close as possible to the source population and should not harm other floral SCC; and
- Rescue must be limited to only those areas where plants will be impacted by the development.

Important concepts:

- Source population: The existing population of species from which floral SCC will be relocated.
- Receptor site: The area identified for the relocation of the floral SCC.

The below tables present species-specific details and recommendations pertaining to the Rescue and Relocation of protected floral species where avoidance of impacts is not deemed possible. Following each table is a series of maps depicting the localities of the Orange Listed plants along the 132-KV transmission powerline.



6.2.1 *Boophone disticha*

REFERENCE PHOTOS	
	
The first two photos were taken on site. The last three are from online resources (iNaturalist – Photo Licence: CCO ⁵).	
SPECIES DETAILS	
Taxonomy	Scientific Name: <i>Boophone disticha</i> (L.f.) Herb. Higher Classification: Monocotyledons Family: Amaryllidaceae Synonyms: <i>Boophone longepedicellata</i> Pax Common Names: Boesmangifbol (a), Bushman Poison Bulb (e), Candelabra Flower (e), Cape Poison Bulb (e), Century Plant (e), Gifbol (a), Gifui (a), Incoto (z), Incoto (nd), Incwadi (x), Kaffir Onion (e), Khutsane Ea Na Ha (ss), Kopseerblom (a), Kxutsana-ya-naha (ss), Leshoma (ss), Lesoma (ss), Malgif (a), Malkopgif (a), Motlatsisa (ss), Perdespook (a), Poison Bulb (e), Red Posy (e), Seeroogblom (a), Sore-eye Flower (e), Tumblehead (e), Veld Fan (e), Wind Ball (e)
Growth form	Succulent geophyte.
Flowering Time	October-January
Literature Description⁶:	Bulb up to 25 cm in diameter, the apex often emergent from the ground. Leaves up to 60 × 1.5-4 cm, greyish-green or glaucous, developing after the flowers. Scape 5-30 cm, with a spherical inflorescence of 50-100 (or more) flowers. Pedicels 3-8 cm at anthesis, elongating to 40 cm in fruit, angular. Flowers pink to dark purple; tube 0.5-2 cm, narrowly funnel-shaped, always shorter than segments; segments 2-3 × 0.2-0.4 cm, recurved towards apex. Capsule up to 3 cm, irregularly dehiscent. Notes: The flowers appear from a large bulb and are very noticeable after veld fires. The dried stalks and fruits of the inflorescence form "tumble weeds", which, rolled by the wind, disperse the seeds. The leaves only appear after the flowers are finished and form a distinct upright fan.
Condition and size class of species within footprint area	All specimens in site were moderately large, healthy individuals. The bulb varied between 8 cm and 15 cm in diameter above ground (below-ground not measured). The fan of the leaves was dying back at the time of assessment, but it could be established that the fans reached approximately 30 cm – 50 cm in height.

⁵ CCO enables scientists, educators, artists and other creators and owners of copyright- or database-protected content to waive those interests in their works and thereby place them as completely as possible in the public domain, so that others may freely build upon, enhance and reuse the works for any purposes without restriction under copyright or database law.

⁶ Hyde, M.A., Wursten, B.T., Ballings, P. & Coates Palgrave, M. (2022). Flora of Zimbabwe: Species information: *Boophone disticha*. https://www.zimabweflora.co.zw/speciesdata/species.php?species_id=114940, retrieved 13 May 2022



	Number of species recorded: Seven (7) individuals.
Classification	LC nationally, but Declining on the Gauteng Orange List
Permit requirements	No permit application required for species relocated within in project area.
Locality Records	Refer to Appendix B
RESCUE AND RELOCATION DETAILS	
Preferred Option (where avoidance is not possible): Translocation / Relocation	
Best results for rescue and relocation will be transplanting, i.e., digging up the mature individual and planting it at a nearby site. This must be carried out by trained personnel (or under the supervision of a horticulturist) and overseen by a suitably qualified expert to ensure the required conditions are met for successful translocation. There is always potential for plant mortality following translocation attempts and as such it is recommended to also plant harvested propagules⁷ at a ratio of 1:3 to decrease the probability of population declines (i.e., residual impacts from the 132-KV transmission powerline project). The propagules must be planted at randomly spaced intervals around the transplanted specimen at a minimum distance of 1 m, and a maximum distance of 5 m from the transplanted specimen. The planting of propagules does not have to take place during the relocation exercise as propagules may not yet be available. During maintenance activities, note must be taken of when the remaining <i>Boophone disticha</i> individuals set seed so that some seed may be harvested for planting in receptor sites. Step 1: Pegging and GPS capturing - Ensure all individuals that will be impacted, and that required relocation, are pegged with colourful flags. Labels can be placed on the pegs to mark the specimen. Corresponding labels to be placed on the pegs used to indicate receptor sites. - The GPS locality must be recorded for each specimen to be relocated. Refer to the recommended field recording sheet in section 6.3. - Easy options for labelling for short-term use would be masking tape (not as sticky as other tapes and can be removed easily). Permanent markers to be used on the labels. - Receptor sites should be pegged before the specimens are dug up and labelled accordingly. - GPS localities of receptor must be recorded. - Receptor sites must be chosen carefully, making sure the new location will cause minimal damage to the receiving environment. Step 2: Removing the bulb (manual process) - Soil around the bulb must first be soften by means of sufficiently soaking the ground. - Measure how much of the bulb is above-ground and take note of this for relocation (the bulb of the <i>Boophone disticha</i> species must not be fully submerged when replanted). - To ensure no damage comes to the bulb, the excavated area around the specimen must include a minimum distance of approximately 40 cm away from the aboveground material. Use of a garden hand-shovel (or similar) should suffice. The plant may not be pulled out of the soil by the leaves as this may result in damage to the roots. - All ventrally located adventitious rooting systems must be carefully avoided. Damage to the root system must be avoided. The 40 cm mentioned above is a guide only and where it is evident that roots grow deeper (or wider), the excavation must also be deeper (or wider). - Careful handling of the excavated specimen must take place at all times. Damage to the bulb and the root systems must be avoided. Excavated specimens can be bagged (though not essential if immediately being relocated) using in-situ soil material. Bags to be labelled accordingly. - The bulb is poisonous and handling the bulb must take place with gloves. Step 3: Relocation of the bulb (manual process):	

⁷ **Propagules:** a vegetative structure that can become detached from a plant and give rise to a new plant, e.g., a seed, bud, sucker, or spore.



- The receptor site must be within 50 m of the original site; however, **the closer the better** as long as the specimen is relocated to a position where:
 - 1) Relocated species will not be affected by the maintenance activities of the transmission powerlines;
 - 2) No loss of other floral SCC will occur or where the relocation activities may cause extensive damage to the receiving environment;
 - 3) Relocated species will not be outcompeted by surrounding vegetation for resources (spots with less dense vegetation should be chosen);
 - 4) Relocated species are not within a watercourse or the 1:100 year floodline of a watercourse (highly unlikely for the site at hand);
 - 5) Soils are well-drained and similar to the source population (again, receptor sites must be as close to the source population as possible to mimic climatic and soil conditions better); and
 - 6) Relocated species will be within the 200 m authorised servitude of the transmission powerlines where no future development is likely to impact on them.
- Ensure a hole is dug of similar size to the one where the *Boophone disticha* specimen has been removed from (as a guide, the hole must be roughly 30 cm wide and 15 cm deep).
- Incorporate a small amount of sufficiently decomposed compost into the bottom of the excavated hole in order to provide sufficient nutrients, organic carbon, and water retention for the recovery of the individual after the relocation process.
- The bottom of the hole must be flattened (by standing in it) to firm the soil so that the plant does not settle in deeper at later stage.
- When the specimen is placed back into the hole, ensure no damage to the roots occur. Make use of the dug-out soil to fill the hole but ensure that the bulb is not entirely underground. As measured before the plant was dug-up, the same portion of the bulb must be above ground when relocating to receptor sites.
- A layer of mulch must be applied around the base of the plants to help hold in moisture and keep out competing plants.
- After the hole has been filled up, the soil must only be slightly patted down in order to avoid compaction and potential damage to the placed individual.
- Photos of the relocated specimens must be taken for monitoring purposes.

Season of relocation:

- Relocated specimens should be planted in protected areas – although the species is drought-resistant, it is frost-sensitive. If the specimen is relocated during the winter months and the area is prone to frost, ensure that specimens are protected by e.g., a horticultural fleece.
- If specimens are relocated during the winter months, ensure that they are **not watered** after relocation as this may result in the bulb to rot. The first watering of the plants may only take place in September (preferably by means of the first natural rains).



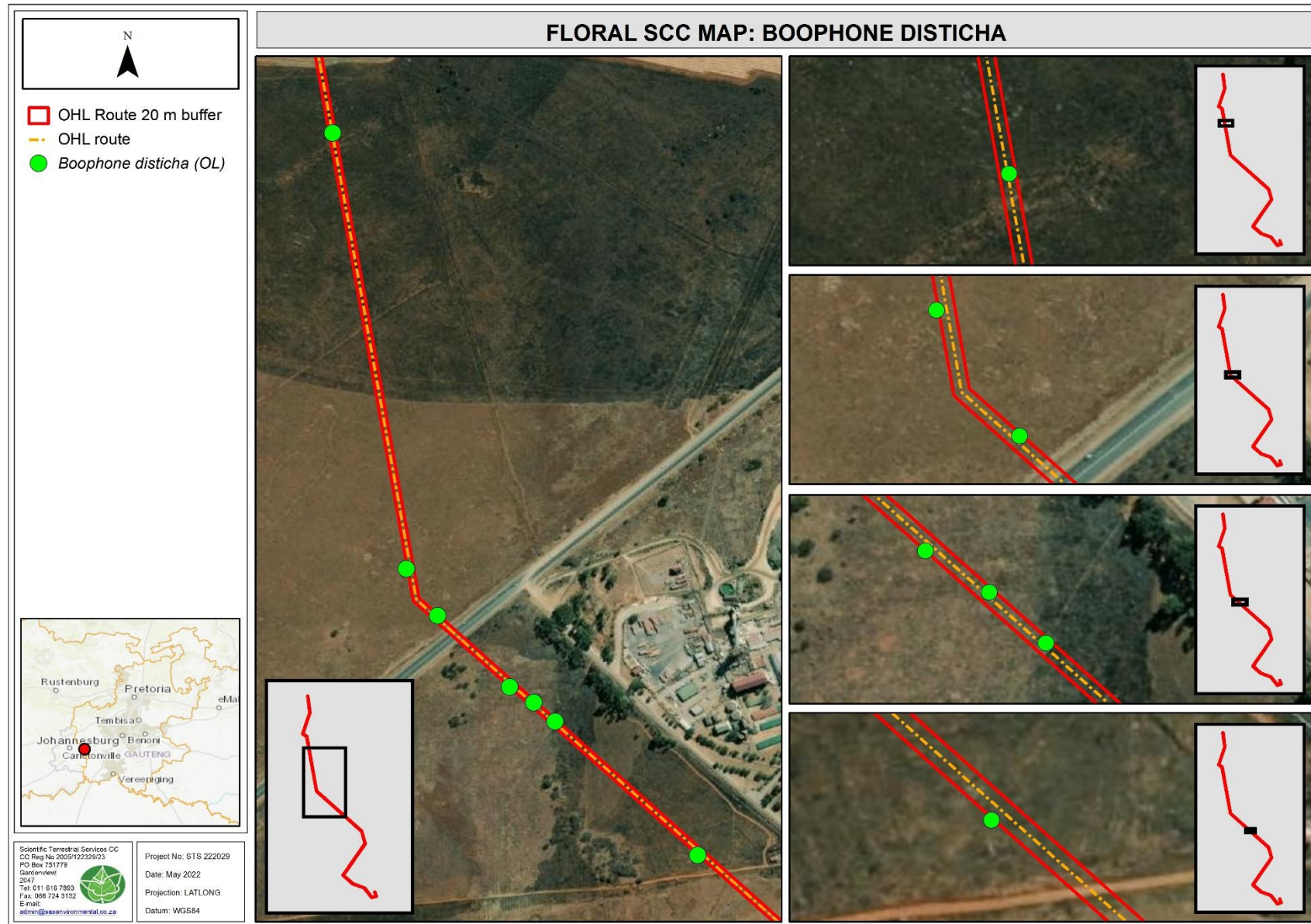


Figure 8: Map depicting the localities of the *Boophone disticha* species along the 132-KV transmission powerline.



6.2.2 *Hypoxis hemerocallidea*

REFERENCE PHOTOS	
	
The first two photos were taken on site. The last three are from online resources (iNaturalist – Photo Licence: CCO ⁸).	
SPECIES DETAILS	
Taxonomy	Scientific Name: <i>Hypoxis hemerocallidea</i> Fisch., C.A.Mey. & Avé-Lall. Higher Classification: Monocotyledons Family: Hypoxidaceae Synonyms: <i>Hypoxis obconica</i> Nel, <i>Hypoxis patula</i> Nel, <i>Hypoxis rooperii</i> T.Moore Common Names: Gifbol (a), Inkomfe (z), Kaffertulp (a), Lotsane (ss), Moli Kharatsa (ss), Star-flower (e), Sterblom (a), Yellow Star (e)
Growth form	Geophyte.
Flowering Time	September-March.
Literature Description⁹:	Robust perennial herb, up to 40 cm tall, growing from a stout vertical rhizome. Leaves 7-16, overlapping at the base, 10-60 cm long, finely many-ribbed, greyish pubescent beneath with mostly 2-armed hairs. Inflorescences 2-14, usually appearing with the leaves, up to 30 cm long. Flowers 2-10 in a raceme-like arrangement 3-10 cm long; bracts linear-lanceolate, 7-30 mm long, densely greyish hairy; tepals up to 2 cm long, yellow, greyish hairy on the outside; outer tepals slightly longer than inner. Capsule 5-8 mm long with black and glossy seeds.
Condition and size class of species within footprint area	All specimens in site were moderately large, healthy individuals. The species were starting to die back for the winter (leaves fall off and the plant will no longer be visible above ground). Number of species recorded: approximately 143 specimens.
Classification	LC nationally, but Declining on the Gauteng Orange List.
Permit requirements	No permit application required for species relocated within in project area.
Locality Records	Refer to Appendix B

⁸ CCO enables scientists, educators, artists and other creators and owners of copyright- or database-protected content to waive those interests in their works and thereby place them as completely as possible in the public domain, so that others may freely build upon, enhance and reuse the works for any purposes without restriction under copyright or database law.

⁹ Hyde, M.A., Wursten, B.T., Ballings, P. & Coates Palgrave, M. (2022). Flora of Zimbabwe: Species information: *Hypoxis hemerocallidea*. https://www.zimbabweflora.co.zw/speciesdata/species.php?species_id=115540, retrieved 13 May 2022



RESCUE AND RELOCATION DETAILS

Preferred Option (where avoidance is not possible): Translocation

Best results for rescue and relocation will be transplanting, i.e., digging up the mature individual and planting it at a nearby site. This must be carried out by trained personnel (or under the supervision of a horticulturist) and overseen by a suitably qualified expert to ensure the required conditions are met for successful translocation.

There is always potential for plant mortality following translocation attempts; however, making use of propagules as a means to substitute relocated individuals is not a feasible option (seed dormancy difficult to break and due to unpredictable seed viability, combinational dormancy, and poor seedling establishment (Mofokeng *et. al.*, 2020)). As such, the relocation activities for *Hypoxis hemerocallidea* must be undertaken with great care.

Step 1: Pegging and GPS capturing

- Ensure all individuals that will be impacted, and that required relocation, are pegged with colourful flags. Labels can be placed on the pegs to mark the specimen. Corresponding labels to be placed on the pegs used to indicate receptor sites.
- The GPS locality must be recorded for each specimen to be relocated. Refer to the recommended field recording sheet in section 6.3.
- Easy options for labelling for short-term use would be masking tape (not as sticky as other tapes and can be removed easily). Permanent markers to be used on the labels.
- Receptor sites should be pegged before the specimens are dug up and labelled accordingly.
- GPS localities of receptor must be recorded.
- Receptor sites must be chosen carefully, making sure the new location will cause minimal damage to the receiving environment.

Step 2: Removing the corm (manual process)

- Soil around the bulb must first be soften by means of sufficiently soaking the ground. This will allow easy extraction and reduce risks of root damage.
- The *Hypoxis hemerocallidea* corms should be extracted carefully and no pulling of the plant by its leaves must be allowed (this will increase risk of damage to the roots). The plant can be pushed up from the rootstock / corm. As much as possible soil should remain around the specimen when relocated so to further buffer against damage to roots and to ensure micro habitat around the roots do not change drastically in receptor sites.
- *Hypoxis hemerocallidea* is a hardy plant but careful handling of the excavated specimen must still take place at all times. Excavated specimens can be bagged (though not essential if immediately being relocated) using in-situ soil material. Bags to be labelled accordingly.

Step 3: Relocation of the corm (manual process):

- The receptor site must be within 50 m of the original site; however, **the closer the better** as long as the specimen is relocated to a position where:
 - 1) Relocated species will not be affected by the maintenance activities of the transmission powerlines;
 - 2) No loss of other floral SCC will occur or where the relocation activities may cause extensive damage to the receiving environment;
 - 3) Relocated species will not be outcompeted by surrounding vegetation for resources (spots with less dense vegetation should be chosen);
 - 4) Relocated species are not within a watercourse or the 1:100 year floodline of a watercourse (highly unlikely for the site at hand);
 - 5) Soils are well-drained and similar to the source population (again, receptor sites must be as close to the source population as possible to mimic climatic and soil conditions better); and
 - 6) Relocated species will be within the 200 m authorised servitude of the transmission powerlines where no future development is likely to impact on them.
- The receptor site must be a minimum of 30 cm x 30 cm (wide and deep).
- Incorporate a small amount of sufficiently decomposed compost into the bottom of the excavated hole in order to provide sufficient nutrients, organic carbon, and water retention for the recovery of the individual after the relocation process. This step is not essential but may be useful.
- The bottom of the hole must be flattened (by standing in it) to firm the soil so that the plant does not settle in deeper at later stage.



- When the specimen is placed back into the hole, ensure no damage to the roots occur. Make use of the dug-out soil to fill the hole. The corm may be fully underground but not too deep.
- A layer of mulch must be applied around the base of the plants to help hold in moisture and keep out competing plants.
- After the hole has been filled up, the soil must only be slightly patted down in order to avoid compaction and potential damage to the placed individual.
- Photos of the relocated specimens must be taken for monitoring purposes.

Season of relocation:

- Relocated specimens should be planted in protected areas.
- Relocation activities must preferably take place before the species go into their dormancy period. In the event that construction occurs when specimens are dormant, it is recommended that excavated topsoil be searched for corms.
- Minimal watering of specimens to take place after relocation to prevent rotting of the corms.



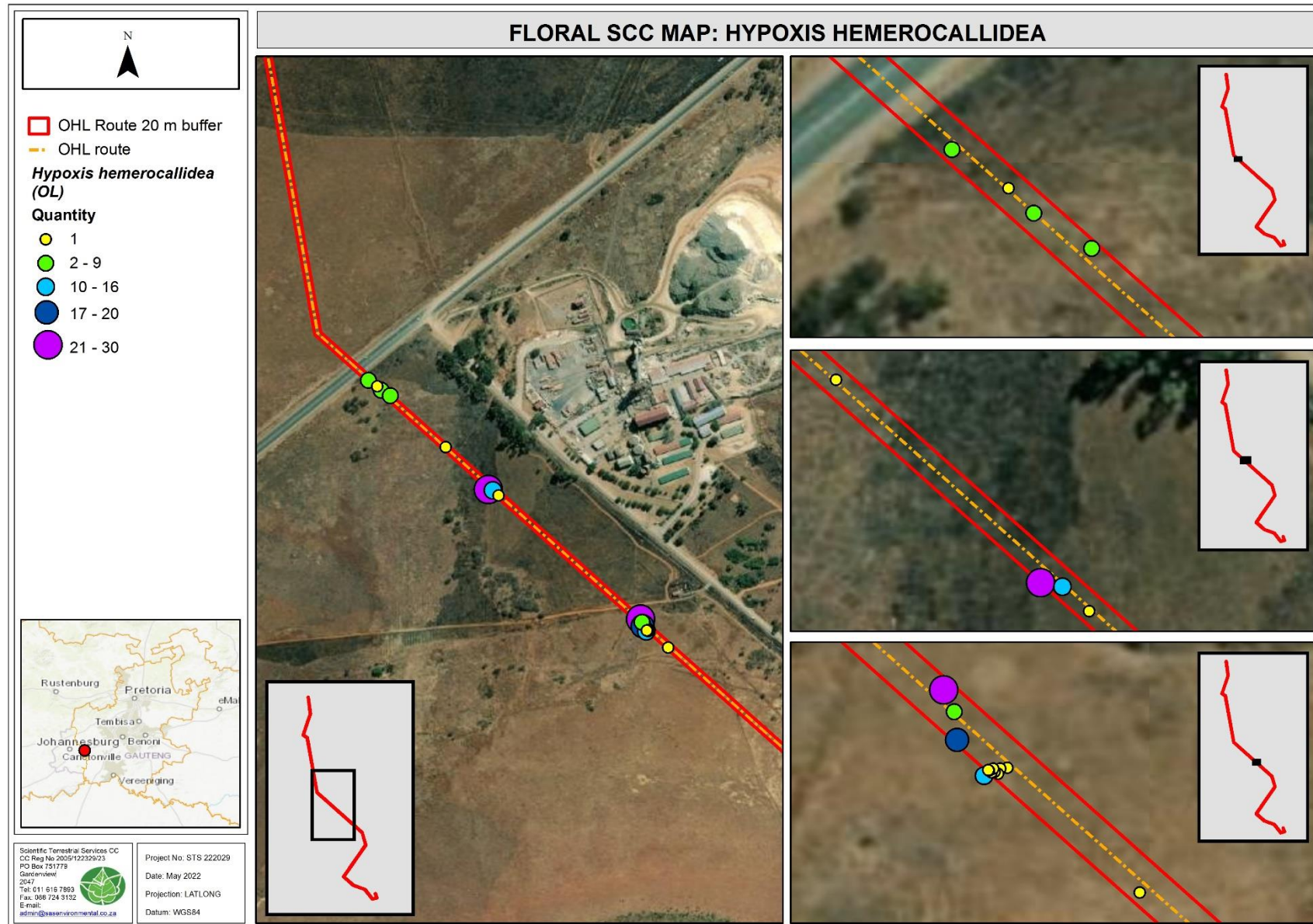


Figure 9: Map depicting the localities of the *Hypoxis hemerocallidea* species along the 132-KV transmission powerline.



6.3 Recommended Field Recording Sheet

FIELD RECORDING SHEET: SIBANYE TRANSMISSION LINE PLANT RESCUE AND RELOCATION					
Date:					
Contractor(s):					
Species / taxon	GPS	Label Name	Bulb size above ground	Bulb size once excavated	Representative Photo
<i>Boophone disticha</i>	1	BD_001	8 cm	10 cm wide; 20 cm long	



6.4 Roles & Responsibilities

Rescue of sensitive plant species during the construction phase of the project will be dependent on several project personnel. These are listed below:

Proponent¹⁰

- The Proponent will be responsible for the appointment of a suitably qualified Environmental Practitioner as an independent Environmental Control Officer (ECO) for the construction phase of the project;
- A management body must be appointed to ensure compliance with the Search and Rescue Plan;
- The Proponent will be responsible for ensuring all contractors receive a copy of this document and understand its contents; and
- Should ownership of the property change, the role and responsibility for compliance with the Search and Rescue Plan must also be transferred.

Environmental Manager (EM)

The EM is the person responsible for the monitoring of the implementation of the Search and Rescue Plan during the implementation of the activities and for reporting on the degree of compliance. The EM should ideally be appointed at the start of the rehabilitation and subsequent rescue and relocation activities and is mandated to do the following:

- Ensure that all contractors/ subcontractors/ employees are fully aware of their environmental responsibilities. This should take the form of an initial environmental awareness-training program in which requirements of this document will be explained;
- Monitor site activities on a regular basis to ensure that there is minimal environmental impact due to construction activities;
- Ensure that a 'hotline' exists for reporting incidents and resolving any problems rapidly;
- The EM has the authority to stop works if, in his/her opinion, there is/may be a serious threat to or impact on the environment caused directly by the construction operations; and
- Conduct a final environmental audit and a review of management and rehabilitation measures.

¹⁰ Any individual, government department, authority, industry, or association proposing an activity (e.g., project, programme or policy).



Contractors

- The contractor/s in this case refers to any contractor/s on site, including the building contractor/s and sub-contractors on any item of infrastructure being erected or demolished;
- Such contractor/s will take full responsibility for each of his/her employees and any penalties imposed; and
- It is the responsibility of the contractor/s to ensure that they adhere to the Rehabilitation Plan.

6.5 Risks considered as part of Rescue and Relocation Activities

Consideration of risks associated with the translocation of indigenous species as per GN 44 of 2015 (NEMBA): Norms and Standards for the translocation of indigenous species in South Africa Gazette No. 38395, are described in BOX 2 below.

BOX 2

NORMS AND STANDARDS FOR THE TRANSLOCATION OF INDIGENOUS SPECIES (GN 44 OF 2015)

“The following risks may be associated with the translocation of indigenous species, including an indigenous species that is also an alien species-

- a) ecological risks, which may include-
 - i. damage to, or destruction of, the habitat into which the indigenous species will be released;
 - ii. competition between an indigenous species to be released in a particular habitat and an indigenous species already occurring in that particular habitat, for living space and/ or resources; or
 - iii. an adverse climatic effect on the translocated indigenous species;
- b) genetic risks, which may result in the loss of the genetic fitness of populations of indigenous species;
- c) pathogenic risks, which may result in the spreading of diseases to livestock or other indigenous species;
- d) social risks, which may result in human-wildlife conflict; and
- e) financial risks, which may arise from remedial action as a result of any damage caused by the translocated species.”

6.6 Recommended Receptor Site(s)

Figure 10 below provides the recommended receptor sites for species that may be impacted by the 132-KV Powerline Phase 1 and was chosen based on the below considerations:

- Area as close as possible to the source population and not in sensitive habitat;
- Area characterised by similar habitat conditions; and
- Area not within sites where future activities are planned.

Important to note is that the recommended area for receptor sites must be within 50 m of the source population; however, where the receptor sites of *Hypoxis hemerocallidea* overlapped with the receptor sites of *Boophone disticha*, a larger area of 100 m from the source population was allowed to ensure no competition between relocated specimens.



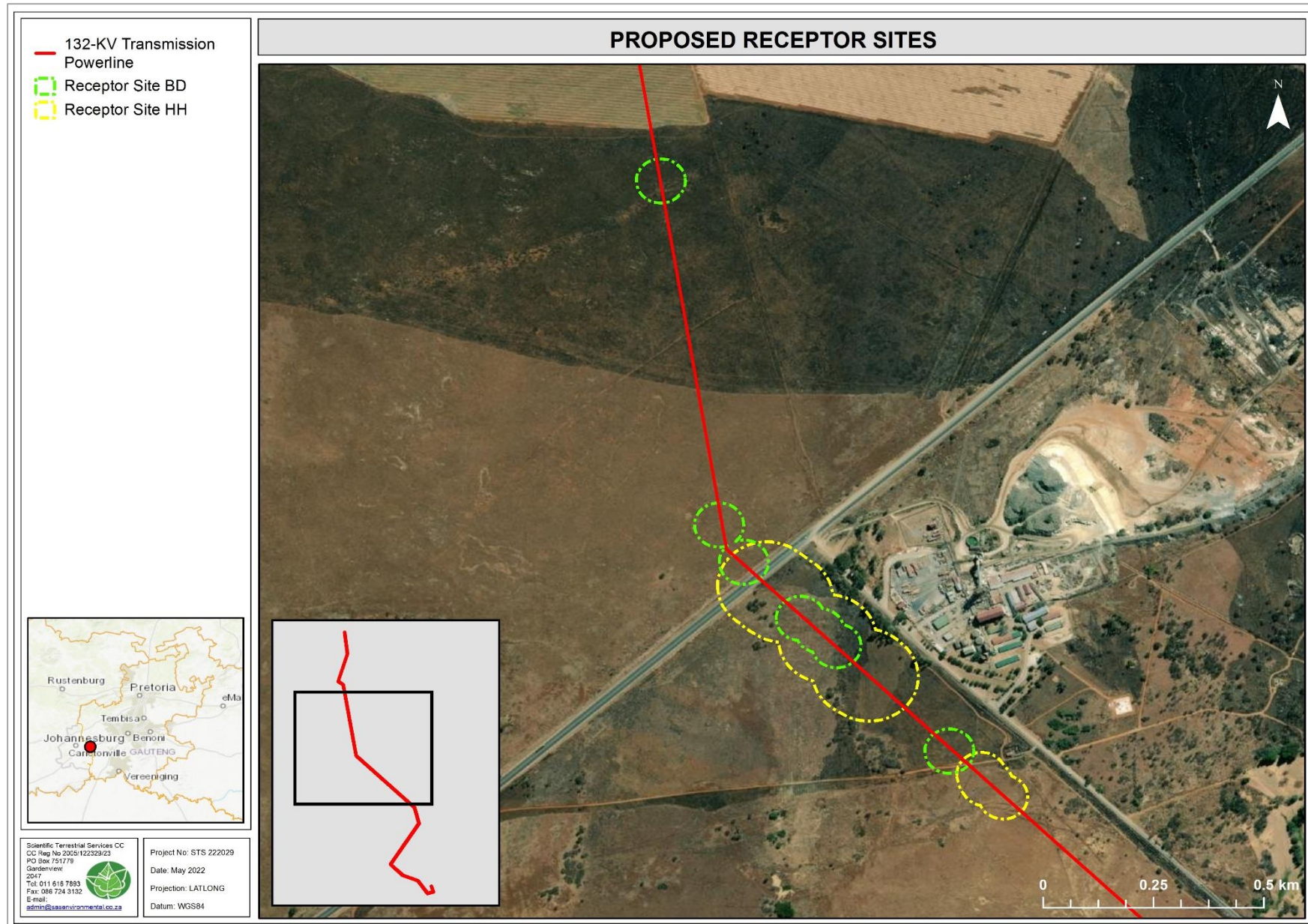


Figure 10: Recommended Receptor sites for *Boophone disticha* and *Hypoxis hemerocallidea*.



7 MONITORING REQUIREMENTS

As well as measuring the well-being and recovery of species, communities and ecosystems, monitoring is needed to document management actions such as rehabilitation practices, and the outcomes of Search and Rescue initiatives. The causes of any problems detected in subsequent monitoring can then be determined, and adaptive management procedures developed and implemented. As such, post-construction monitoring of translocated specimens must be undertaken.

For the sites where rescued and relocated specimens were transplanted to, the monitoring and reporting strategy should be conducted every three months for the first year to ensure that the Search and Rescue Plan is pro-actively managed and to ascertain the efficacy of measures presented in this report. The real value of monitoring, however, lies in the accumulation of information over the longer term and therefore monitoring should continue over a number of years with monitoring and reporting done on an annual basis. General monitoring recommendations include:

- Monitoring methods should be clearly described in the relevant documentation in order to ensure that monitoring is repeatable;
- All data gathered should be measurable (qualitative and quantitative);
- Data should be auditable; and
- Data, when compared to previous sets, should show spatial and temporal trends.

The below table highlights example monitoring approaches along with the required data collection and monitoring frequency.



Table 3: Example approaches for monitoring along with the required data to be collected, monitoring frequency and required equipment.

TASK DESCRIPTION	DATA COLLECTION	EQUIPMENT
Fixed-point Monitoring of all Receptor Sites		
Fixed point monitoring should be applied to all receptor sites. This will ensure that monitoring data is temporally and spatially comparable. Unless otherwise stated, photographs must be taken at a fixed point on a quarterly basis, preferably at the start of each season for the first year. Thereafter, biannual fixed-point monitoring may take place. Monitoring can coincide with maintenance activities,	Refer to below sections	Refer to below sections
Species Descriptions & Information		
Locality Data	<u>Variables to be monitored:</u> *Locality <u>Methods to be used:</u> *GPS data capturing <u>Data storage:</u> *Spreadsheets for easy temporal comparison *Shapefile and/or kmis for mapping and spatial comparisons	1. GPS
Condition of the specimen	<u>Variables to be monitored:</u> *Alive, dead, wilting, rotting, presence of pests etc <u>Methods to be used:</u> *Scientific (written account of noted condition) *Photographic (visual account of the noted condition) <u>Data storage:</u> *Spreadsheets for easy temporal comparison *Photographs for visual comparison	1. Camera 2. Data sheets.
Site Conditions, Concerns & Recommendations		
Site condition and concerns	<u>Variables to be monitored:</u> *Erosion, soil compaction, alien species, fire, mortality of surrounding vegetation etc. <u>Methods to be used:</u> *Scientific (written account of noted condition) *Photographic (visual account of the noted condition)	1. Camera 2. Data sheets.



TASK DESCRIPTION	DATA COLLECTION	EQUIPMENT
	<u>Data storage:</u> *Spreadsheets for easy temporal comparison *Photographs for visual comparison	
Level of SCC recruitment (In population dynamics and community ecology, recruitment is the process by which individuals are added to a population.)	<u>Variables to be monitored:</u> *None, low, moderate, high etc. <u>Methods to be used:</u> *Scientific (written account of noted condition) *Photographic (visual account of the noted condition) <u>Data storage:</u> *Spreadsheets for easy temporal comparison *Photographs for visual comparison	1. Camera 2. Data sheets.
Recommendations / notes	<u>Variables to be monitored:</u> *E.g., alien control required. Or no additional action currently required, etc. <u>Methods to be used:</u> *Scientific (written account of noted condition) <u>Data storage:</u> *Spreadsheets for easy temporal comparison	1. Data sheets.



8 CONCLUSION

STS was appointed to develop a Search and Rescue Plan for the first phase of the authorised 132-KV transmission powerlines (Authorisation register number: 14/12/16/3/3/1/1606) to connect the 200-MW Sibanye Gold PV energy facility (Authorisation register number: 14/12/16/3/3/2/919) for Sibanye Gold Limited.

During the site walkdown, floral SCC were only encountered along the 132-KV Powerline Phase 1. **No Floral SCC were recorded within the Phase 1 PV Facility.** Two Orange Listed plant species were encountered:

- Seven (7) *Boophone disticha* individuals (least concern (LC) nationally, but Declining on the Orange List); and
- 143 *Hypoxis hemerocallidea* individuals (LC nationally, but Declining on the Orange List).

The population of the NT *Adromischus umbraticola* subsp. *umbraticola* was found unsuitable for relocation attempts (determined by GDARD) and avoidance of all impacts to these species is essential.

In line with the SANBI principles, avoidance of impacts to floral SCC is the primary recommendation. The 132-KV Powerline Phase 1 activities will only require the removal of vegetation (and the relocation of Orange Listed species) underneath the pylon structures and associated foundations, i.e., no vegetation clearance is required along the transmission lines. As such, to ensure minimum requirement for relocation initiatives, it is recommended that placement of the pylons be planned in such a way as to limit impacts to floral SCC. Where this is not feasible, section 6.2 of this report should be taken into consideration.

The report further provides brief monitoring guidelines which should be implemented to track the progress and success of relocation activities, but also to identify areas where the relocation plan might need to be amended.

It is the opinion of the consultant that should the activities as presented in this plan be executed in a cogent and well managed fashion that the relocation of Orange Listed species that may be impacted by the proposed 132-KV Powerline Phase 1 will be successful.



9 REFERENCES

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APPENDIX A: LEGAL REQUIREMENTS

THE CONSERVATION OF AGRICULTURAL RESOURCES ACT, 1983 (ACT NO. 43 OF 1983) (CARA)

Removal of the alien and weed species encountered in the application area must take place in order to comply with existing legislation (amendments to the regulations under the CARA, 1983 and Section 28 of the NEMA, 1998). Removal of species should take place throughout the construction and operation, phases.

THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) (NEMA)

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations (GN R326 as amended in 2017 and well as listing notices 1, 2 and 3 (GN R327, R325 and R324 of 2017), state that prior to any development taking place which triggers any activity as listed within the abovementioned regulations, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment process or the Environmental Impact Assessment process depending on the nature of the activity and scale of the impact.

THE NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004) (NEMBA)

The objectives of this act are (within the framework of NEMA) to provide for:

- The management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity;
- The use of indigenous biological resources in a sustainable manner;
- The fair and equitable sharing among stakeholders of the benefits arising from bio prospecting involving indigenous biological resources;
- To give effect to ratify international agreements relating to biodiversity which are binding to the Republic;
- To provide for cooperative governance in biodiversity management and conservation; and
- To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

This act alludes to the fact that management of biodiversity must take place to ensure that the biodiversity of the surrounding areas are not negatively impacted upon, by any activity being undertaken, in order to ensure the fair and equitable sharing among stakeholders of the benefits arising from indigenous biological resources.

Furthermore, a person may not carry out a restricted activity involving either:

- a) A specimen of a listed threatened or protected species;
- b) Specimens of an alien species; or
- c) A specimen of a listed invasive species without a permit.

GDARD REQUIREMENTS FOR BIODIVERSITY ASSESSMENTS VERSION 3

The biodiversity assessment must comply with the minimum requirements as stipulated by GDARD Version 3 of 2014 and must contain the following information:

- A location and description of the application site and proposed activities;
- Photographic record and description of the site characteristics and inventories of the faunal and floral species observed on site, with special mention to Red Listed species;
- Sensitivity map displaying all sensitive areas and associated buffers as listed in the Sensitivity Mapping Rules for Biodiversity Assessments section of GDARD V3 (2014); and
- A list of recommendations and mitigation measures to reduce the potential environmental impacts that the proposed development might have on the terrestrial ecology associated with the site.



APPENDIX B: DETAILS OF THE FLORAL SCC RECORDED ON SITE

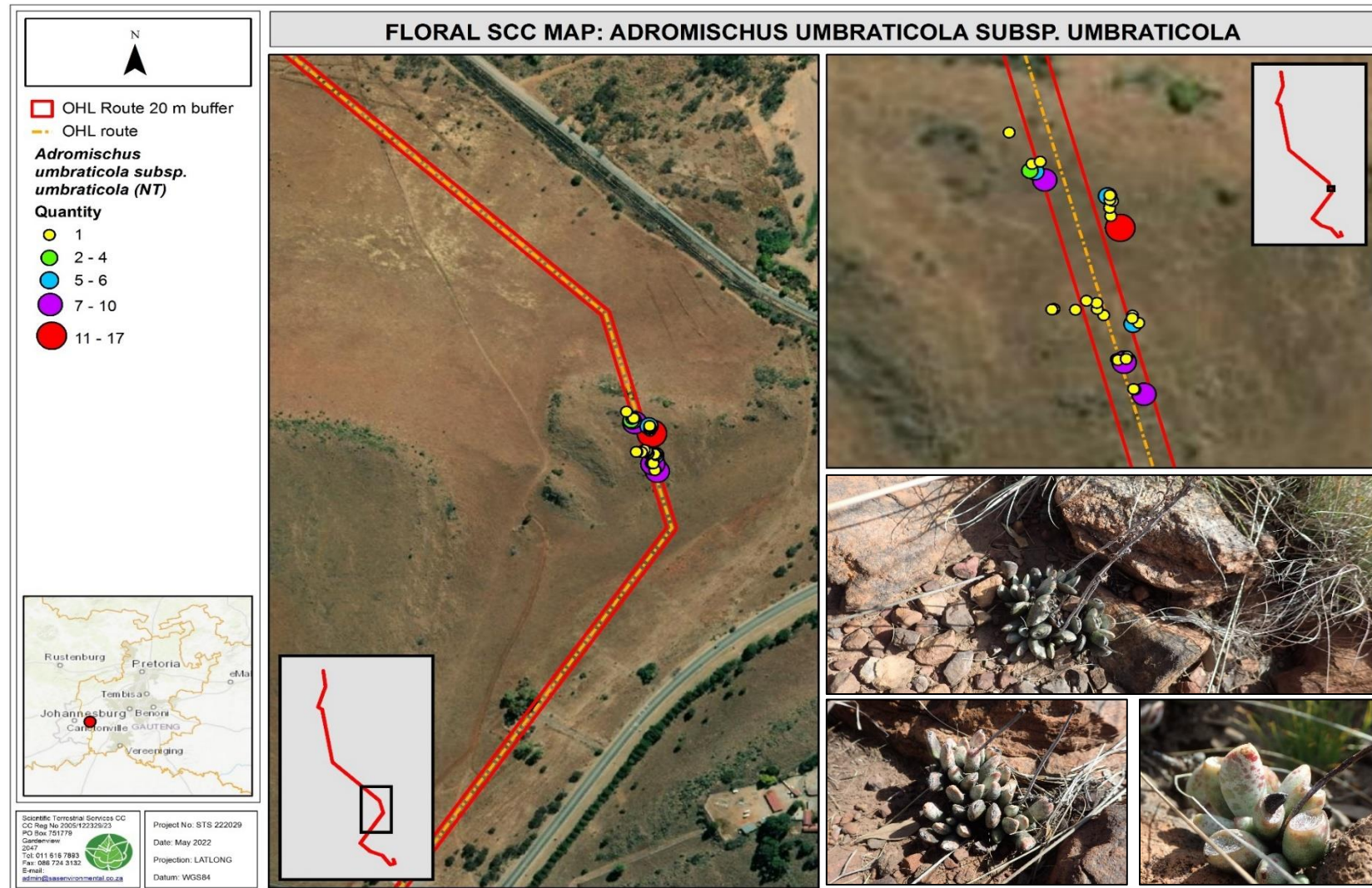


Figure B 1: Depiction of the locality records of *Adromischus umbraticola* subsp. *umbraticola* within the assessed areas. Refer to Table B1 for the coordinates.



Table B 1: Coordinate data for the recorded *Adromischus umbraticola* subsp. *umbraticola* species.

NO.	LONGITUDE	LATITUDE	ELEVATION (m.a.s.l)	NUMBER OF SPECIES AT LOCALITY POINT
1	27° 35' 36.2795" E	26° 23' 37.0501" S	1702.033	10
2	27° 35' 36.2005" E	26° 23' 37.0067" S	1704.158	1
3	27° 35' 36.1896" E	26° 23' 37.0033" S	1704.656	1
4	27° 35' 36.0384" E	26° 23' 36.7224" S	1705.679	1
5	27° 35' 36.0529" E	26° 23' 36.7296" S	1705.678	1
6	27° 35' 36.1320" E	26° 23' 36.6971" S	1706.134	1
7	27° 35' 36.1247" E	26° 23' 36.7188" S	1706.021	1
8	27° 35' 36.1069" E	26° 23' 36.7511" S	1705.721	8
9	27° 35' 36.1824" E	26° 23' 36.3911" S	1706.998	5
10	27° 35' 36.2328" E	26° 23' 36.3805" S	1707.211	1
11	27° 35' 36.1788" E	26° 23' 36.3120" S	1707.328	1
12	27° 35' 36.1751" E	26° 23' 36.3371" S	1706.828	1
13	27° 35' 35.9304" E	26° 23' 36.3084" S	1706.792	1
14	27° 35' 35.8728" E	26° 23' 36.2508" S	1709.003	1
15	27° 35' 35.8692" E	26° 23' 36.1931" S	1709.387	1
16	27° 35' 35.7792" E	26° 23' 36.1717" S	1709.205	1
17	27° 35' 35.6857" E	26° 23' 36.2580" S	1708.727	1
18	27° 35' 35.4983" E	26° 23' 36.2508" S	1708.885	1
19	27° 35' 35.4805" E	26° 23' 36.2544" S	1709.073	1
20	27° 35' 36.0744" E	26° 23' 35.4876" S	1709.636	17
21	27° 35' 35.9917" E	26° 23' 35.3760" S	1710.599	1
22	27° 35' 35.9808" E	26° 23' 35.3003" S	1710.333	1
23	27° 35' 36.0059" E	26° 23' 35.2357" S	1711.061	1
24	27° 35' 35.9844" E	26° 23' 35.2248" S	1711.314	1
25	27° 35' 35.9844" E	26° 23' 35.1817" S	1711.611	1
26	27° 35' 35.9627" E	26° 23' 35.1889" S	1711.48	6
27	27° 35' 35.4193" E	26° 23' 35.0377" S	1711.944	8
28	27° 35' 35.3327" E	26° 23' 34.9584" S	1711.363	5
29	27° 35' 35.2895" E	26° 23' 34.9511" S	1711.634	4
30	27° 35' 35.3076" E	26° 23' 34.8863" S	1711.706	1
31	27° 35' 35.3797" E	26° 23' 34.8648" S	1712.255	1
32	27° 35' 35.1097" E	26° 23' 34.5912" S	1714.971	1



Table B 2: Coordinate data for the recorded *Boophone disticha* species.

NO.	LONGITUDE	LATITUDE	ELEVATION (m.a.s.l)	NUMBER OF SPECIES AT LOCALITY POINT
1	27° 35' 17.8693" E	26° 23' 16.1555" S	1653.777	1
2	27° 35' 09.5929" E	26° 23' 08.4193" S	1643.368	1
3	27° 35' 08.3545" E	26° 23' 07.3140" S	1643.495	1
4	27° 35' 06.9683" E	26° 23' 06.4175" S	1643.031	1
5	27° 35' 02.7852" E	26° 23' 02.2920" S	1643.181	1
6	27° 35' 00.9816" E	26° 22' 59.5633" S	1645.288	1
7	27° 34' 56.7049" E	26° 22' 34.3163" S	1622.34	1

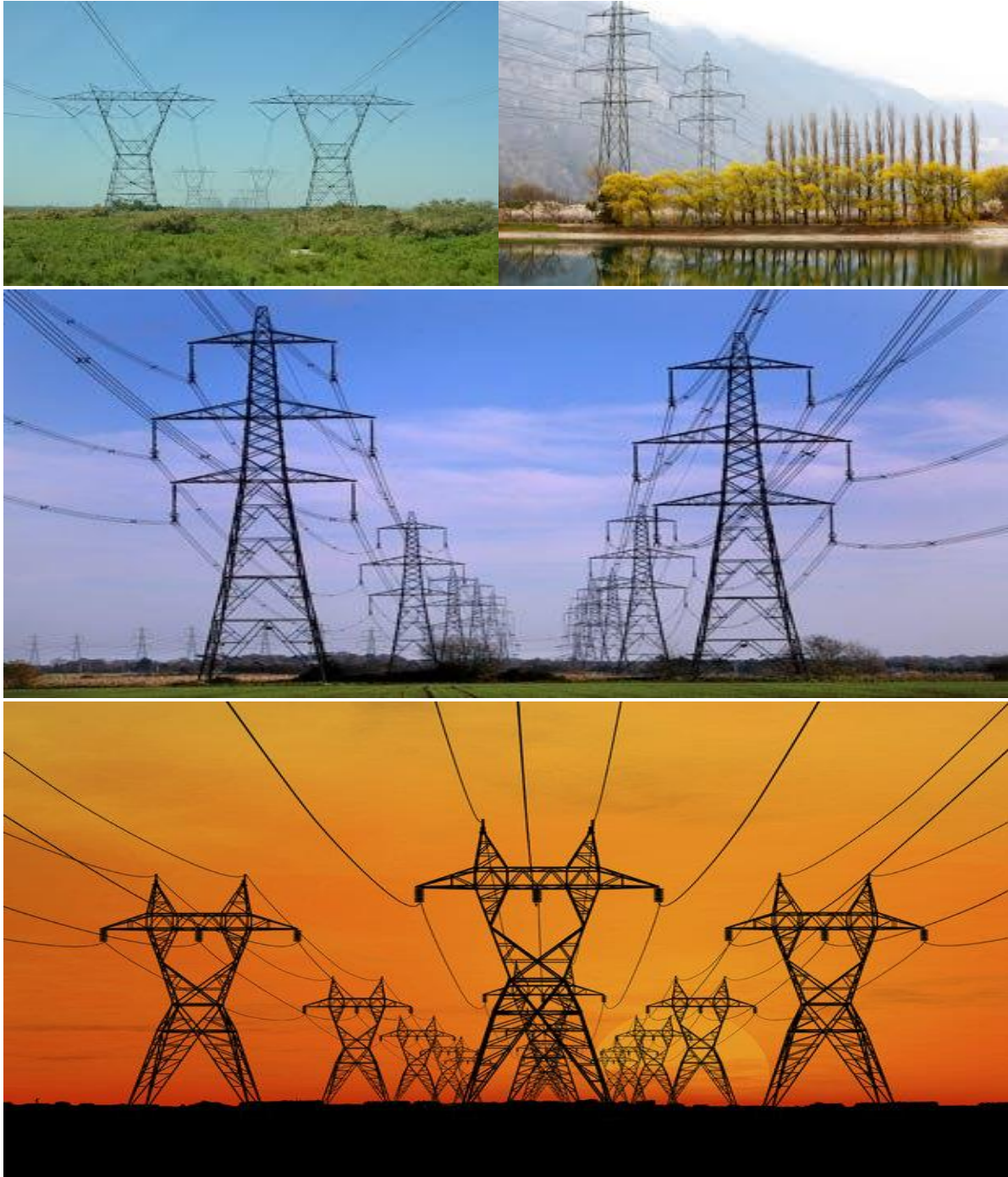
Table B 3: Coordinate data for the recorded *Hypoxis hemerocallidea* species.

NO.	LONGITUDE	LATITUDE	ELEVATION (m.a.s.l)	NUMBER OF SPECIES AT LOCALITY POINT
1	27° 35' 21.8185" E	26° 23' 19.5143" S	1657.653	1
2	27° 35' 20.7419" E	26° 23' 18.4992" S	1654.954	1
3	27° 35' 20.6843" E	26° 23' 18.5064" S	1655.88	1
4	27° 35' 20.6665" E	26° 23' 18.5460" S	1655.955	1
5	27° 35' 20.6375" E	26° 23' 18.5315" S	1656.072	1
6	27° 35' 20.6125" E	26° 23' 18.5351" S	1656.304	1
7	27° 35' 20.6269" E	26° 23' 18.5064" S	1656.582	1
8	27° 35' 20.5907" E	26° 23' 18.5209" S	1656.745	1
9	27° 35' 20.5871" E	26° 23' 18.5173" S	1656.64	1
10	27° 35' 20.5512" E	26° 23' 18.5641" S	1656.265	16
11	27° 35' 20.3315" E	26° 23' 18.2723" S	1656.31	20
12	27° 35' 20.3101" E	26° 23' 18.0421" S	1656.372	9
13	27° 35' 20.2235" E	26° 23' 17.8655" S	1656.202	26
14	27° 35' 11.9975" E	26° 23' 10.7087" S	1645.56	1
15	27° 35' 11.6771" E	26° 23' 10.4136" S	1645.41	15
16	27° 35' 11.4109" E	26° 23' 10.3668" S	1644.755	30
17	27° 35' 08.9339" E	26° 23' 07.9081" S	1644.167	1
18	27° 35' 05.7263" E	26° 23' 04.9344" S	1644.366	5
19	27° 35' 05.2043" E	26° 23' 04.6176" S	1642.768	6
20	27° 35' 04.9740" E	26° 23' 04.3907" S	1643.97	1
21	27° 35' 04.4629" E	26° 23' 04.0415" S	1644.067	4



Appendix F: Eskom Generic Transmission Lines EMPr

GENERIC ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR THE DEVELOPMENT AND EXPANSION FOR OVERHEAD ELECTRICITY TRANSMISSION AND DISTRIBUTION INFRASTRUCTURE



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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INTRODUCTION

1. Background

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requires that an environmental management programme (EMPr) be submitted where an environmental impact assessment (EIA) has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation (EA). The content of an EMPr must either contain the information set out in Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended, (EIA Regulations) or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice, that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including, but not limited to, the applicant and the competent authority (CA).

2. Purpose

This document constitutes a generic EMPr relevant to applications for the development or expansion of overhead electricity transmission and distribution infrastructure, and all listed and specified activities necessary for the realisation of such infrastructure.

3. Objective

The objective of this generic EMPr is to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of overhead electricity transmission and distribution infrastructure. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature.

4. Scope

The scope of this generic EMPr applies to the development or expansion of overhead electricity transmission and distribution infrastructure requiring EA in terms of NEMA, i.e. with a capacity of 33 kilovolts or more. This generic EMPr applies to activities requiring EA, mainly activity 11 and 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and activity 9 of the Environmental Impact Assessment Regulations Listing Notice 2 of 2014, as amended, and all associated listed or specified activities necessary for the realisation of such infrastructure.

5. Structure of this document

This document is structured in three parts with an Appendix as indicated in the table below:

Part	Section	Heading	Content
A		Provides general guidance and information and is not legally binding	Definitions, acronyms, roles & responsibilities and documentation and reporting.
B	1	Pre-approved generic EMPr template	Contains generally accepted impact management outcomes and impact management actions required for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of overhead electricity

Part	Section	Heading	Content
			transmission and distribution infrastructure, which are presented in the form of a template that has been pre-approved. The template in this section is to be completed by the contractor, with each completed page signed and dated by the holder of the EA prior to commencement of the activity. Where an impact management outcome is not relevant, the words “not applicable” can be inserted in the template under the “responsible persons” column. Once completed and signed, the template represents the EMPr for the activity approved by the CA and is legally binding. The template is not required to be submitted to the CA as once the generic EMPr is gazetted for implementation, it has been approved by the CA. To allow interested and affected parties access to the pre-approved EMPr template for consideration through the decision-making process, the EAP on behalf of the applicant /proponent must make the hard copy of this EMPr available at a public location and where the applicant has a website, the EMPr should also be made available on such publicly accessible website.
	2	Site-specific information	Contains preliminary infrastructure layout and a declaration that the applicant/holder of the EA will comply with the pre-approved generic EMPr template contained in <u>Part B: Section 1</u>, and understands that the impact management outcomes and impact management actions are legally binding. The preliminary infrastructure layout must be finalized to inform the final EMPr that is to be submitted with the basic assessment report (BAR) or environmental impact assessment report (EIAR), ensuring that all impact management outcomes and actions have been either pre-approved or approved in terms of <u>Part C</u>. This section must be submitted to the CA together with the final BAR or EIAR. The information submitted to the CA will be considered to be incomplete should a signed copy of <u>Part B: section 2</u> not be submitted. Once approved, this Section forms part of the EMPr for the development and is legally binding.
C		Site-specific sensitivities/ attributes	If any specific environmental sensitivities/ attributes are present on the site which require site specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr, to manage impacts, these specific impact management outcomes and impact management actions must be included in this section. These specific environmental attributes must be referenced spatially and impact management outcomes and impact management actions must be provided. These specific impact management outcomes and impact

Part	Section	Heading	Content
			management actions must be presented in the format of the pre-approved EMPr template (Part B: section 1) This section will not be required should the site contain no specific environmental sensitivities or attributes. However, if Part C is applicable to the site, it is required to be submitted together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP, and must contain his/her name and expertise including a curriculum vitae. Once approved, Part C forms part of the EMPr for the site and is legally binding. This section applies only to additional impact management outcomes and impact management actions that are necessary for the avoidance, management and mitigation of impacts and risks associated with the specific development or expansion and which are not already included in Part B: section 1.
Appendix 1			Contains the method statements to be prepared prior to commencement of the activity. The method statements are not required to be submitted to the competent authority.

6. Completion of part B: section 1: the pre-approved generic EMPr template

The template is to be completed prior to commencement of the activity, by providing the following information for each environmental impact management action:

- For implementation
 - a 'responsible person',
 - a method for implementation, and
 - a timeframe for implementation
- For monitoring
 - a responsible person,
 - frequency, and
 - evidence of compliance.

The completed template must be signed and dated by the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as [Appendix 1](#). Each method statement must be signed and dated on each page by the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

7. Amendments of the impact management outcomes and impact management actions

Once the activity has commenced, a holder of an EA may make amendments to the impact management outcomes and impact management actions in the following manner:

- Amendment of the impact management outcomes: in line with the process contemplated in regulation 37 of the EIA Regulations; and

- Amendment of the impact management actions: in line with the process contemplated in regulation 36 of the EIA Regulations.

8. Documents to be submitted as part of part B: section 2 site specific information and declaration

Part B: Section 2 has three distinct sub-sections. The first and third sub-sections are in a template format. Sub-section two requires a map to be produced.

Sub-section 1 contains the project name, the applicant's name and contact details, the site information, which includes coordinates of the corridor in which the proposed overhead electricity transmission and distribution infrastructure is proposed as well as the 21-digit Surveyor General code of each cadastral land parcel and, where available, the farm name.

Sub-section 2 is to be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout using the national web based environmental screening tool, when available for compulsory use at: <https://screening.environment.gov.za/screeningtool>. The sensitivity map shall identify the nature of each sensitive feature e.g. raptor nest, threatened plant species, archaeological site, etc. Sensitivity maps must identify features both within the planned working area and any known sensitive features in the surrounding landscape within 50m from the development footprint. The overhead transmission and distribution profile must be illustrated at an appropriate resolution to enable fine scale interrogation. It is recommended that <20 km of overhead transmission and distribution length is illustrated per page in A3 landscape format. Where considered appropriate, photographs of sensitive features in the context of tower positions must be used.

Sub-section 3 is the declaration that the applicant/proponent or holder of the EA in the case of a change of ownership must complete, which confirms that the applicant/EA holder will comply with the pre-approved generic EMPr template in Section 1 and understands that the impact management outcomes and actions are legally binding.

(a) Amendments to Part B: Section 2 – site specific information and declaration

Should the EA be transferred, Part B: Section 2 must be completed by the new applicant/proponent and submitted with the application for an amendment of the EA in terms of Regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted as part of such an application for an amendment to an EA will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

PART A – GENERAL INFORMATION

1. DEFINITIONS

In this EMPr any word or expression to which a meaning has been assigned in the NEMA or EIA Regulations has that meaning, and unless the context requires otherwise –

”clearing” means the clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified;

”construction camp” is the area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management;

”contractor” - The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described.

”hazardous substance” is a substance governed by the Hazardous Substances Act, 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995;

”method statement” means a written submission by the Contractor to the Project Manager in response to this EMPr or a request by the Project Manager and ECO. The method statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager and ECO is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification;

The method statement must cover applicable details with regard to:

- (i) Construction procedures;
- (ii) Plant, materials and equipment to be used;
- (iii) Transporting the equipment to and from site;
- (iv) How the plant/ material/ equipment will be moved while on site;
- (v) How and where the plant/ material/ equipment will be stored;
- (vi) The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- (vii) Timing and location of activities;
- (viii) Compliance/ non-compliance; and
- (ix) Any other information deemed necessary by the Project Manager.

”slope” means the inclination of a surface expressed as one unit of rise or fall for so many horizontal units;

”solid waste” means all solid waste, including construction debris, hazardous waste, excess cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers);

“spoil” means excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works;

“topsoil” means a varying depth (up to 300 mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility and composition of the soil; and

“works” means the works to be executed in terms of the Contract

2. ACRONYMS and ABBREVIATIONS

CA	Competent Authority
cEO	Contractors Environmental Officer
dEO	Developer Environmental Officer
DPM	Developer Project Manager
DSS	Developer Site Supervisor
EAR	Environmental Audit Report
ECA	Environmental Conservation Act No. 73 of 1989
ECO	Environmental Control Officer
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
ERAP	Emergency Response Action Plan
EMPr	Environmental Management Programme Report
EAP	Environmental Assessment Practitioner
FPA	Fire Protection Agency
HCS	Hazardous chemical Substance
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
MSDS	Material Safety Data Sheet
RI&AP's	Registered interested and affected parties

3. ROLES AND RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) IMPLEMENTATION

The effective implementation of this generic EMPr is dependent on established and clear roles, responsibilities and reporting lines within an institutional framework. This section of the EMPr gives guidance to the various environmental roles and reporting lines, however, project specific requirements will ultimately determine the need for the appointment of specific person(s) to undertake specific roles and or responsibilities. As such, it must be noted that in the event that no specific person, for example, an environmental control officer (ECO) is appointed, the holder of the EA remains responsible for ensuring that the duties indicated in this document for action by the ECO are undertaken.

Table 1: *Guide to roles and responsibilities for implementation of an EMPr*

Responsible Person (s)	Role and Responsibilities
Developer's Project Manager (DPM)	<u>Role</u> The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. <u>Responsibilities</u> - Be fully conversant with the conditions of the EA; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); - Issuing of site instructions to the Contractor for corrective actions required; - Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and - Ensure that periodic environmental performance audits are undertaken on the project implementation.
Developer Site Supervisor (DSS)	<u>Role</u> The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. <u>Responsibilities</u> - Ensure that all contractors identify a contractor's Environmental Officer (cEO); - Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; - Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO;

Responsible Person (s)	Role and Responsibilities
	- Issuing of site instructions to the Contractor for corrective actions required; - Will issue all non-compliances to contractors; and - Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO)	<u>Role</u> The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non- compliance with the Performance Specifications as set out in the EA and EMPr. The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required. <u>Responsibilities</u> The responsibilities of the ECO will include the following: - Be aware of the findings and conclusions of all EA related to the development; - Be familiar with the recommendations and mitigation measures of this EMPr; - Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; - Undertake regular and comprehensive site inspections / audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; - Educate the construction team about the management measures contained in the EMPr and environmental licenses; - Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; - Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements; - In consultation with the Developer Site Supervisor order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; - Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns;

Responsible Person (s)	Role and Responsibilities
	- Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; - Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO); - Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc) as well as corrective and preventive actions taken; - Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken; - Assisting in the resolution of conflicts; - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor; - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; - Maintenance, update and review of the EMPr; - Communication of all modifications to the EMPr to the relevant stakeholders.
developer Environmental Officer (dEO)	<u>Role</u> The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities. <u>Responsibilities</u> - Be fully conversant with the EMPr; - Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) ; - Confine the development site to the demarcated area; - Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO); - Assist the contractors in addressing environmental challenges on site; - Assist in incident management: - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; - Assist the contractor in investigating environmental incidents and compile investigation reports; - Follow-up on pre-warnings, defects, non-conformance reports; - Measure and communicate environmental performance to the Contractor; - Conduct environmental awareness training on site together with ECO and cEO;

Responsible Person (s)	Role and Responsibilities
	- Ensure that the necessary legal permits and / or licenses are in place and up to date; - Acting as Developer's Environmental Representative on site and work together with the ECO and contractor;
Contractor	<u>Role</u> The Contractor appoints the cEO and has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that Method Statements are implemented as described. External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the Project Developer. The contractors are required, where specified, to provide Method Statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion for overhead electricity transmission and distribution infrastructure activities. <u>Responsibilities</u> - project delivery and quality control for the development services as per appointment; - employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; - ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; - attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; - ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.
contractor Environmental Officer (cEO)	<u>Role</u> Each Contractor affected by the EMPr should appoint a cEO, who is responsible for the on-site implementation of the EMPr (or relevant sections of the EMPr). The Contractor's representative can be the site agent; site engineer; a dedicated environmental officer; or an independent consultant. The Contractor must ensure that the Contractor's Representative is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site Contractors, labourers, the Environmental Control Officer and the public. As a minimum the cEO shall meet the following criteria: <u>Responsibilities</u> - Be on site throughout the duration of the project and be dedicated to the project; - Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; - Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements;

Responsible Person (s)	Role and Responsibilities
	- Attend the Environmental Site Meeting; - Undertaking corrective actions where non-compliances are registered within the stipulated timeframes; - Report back formally on the completion of corrective actions; - Assist the ECO in maintaining all the site documentation; - Prepare the site inspection reports and corrective action reports for submission to the ECO; - Assist the ECO with the preparing of the monthly report; and - Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company.

4. ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE

To ensure accountable and demonstrated implementation of the EMPr, a number of reporting systems, documentation controls and compliance mechanisms must be in place for all overhead electricity transmission and distribution infrastructure projects as a minimum requirement.

4.1 Document control/Filing system

The holder of the EA is solely responsible for the upkeep and management of the EMPr file. At a minimum, all documentation detailed below will be stored in the EMPr file. A hard copy of all documentation shall be filed, while an electronic copy may be kept where relevant. A duplicate file will be maintained in the office of the DSS (where applicable). This duplicate file must remain current and up-to-date. The filing system must be updated and relevant documents added as required. The EMPr file must be made available at all times on request by the CA or other relevant authorities. The EMPr file will form part of any environmental audits undertaken as prescribed in the EIA Regulations.

4.2 Documentation to be available

At the outset of the project the following preliminary list of documents shall be placed in the filing system and be accessible at all times:

- Full copy of the signed EA from the CA in terms of NEMA, granting approval for the development or expansion;
- Copy of the generic and site specific EMPr as well as any amendments thereof;
- Copy of declaration of implementing generic EMPr and subsequent approval of site specific EMPr and amendments thereof;
- All method statements;
- Completed environmental checklists;
- Minutes and attendance register of environmental site meetings;
- An up-to-date environmental incident log;
- A copy of all instructions or directives issued;
- A copy of all corrective actions signed off. The corrective actions must be filed in such a way that a clear reference is made to the non-compliance record;
- Complaints register.

4.3 Weekly Environmental Checklist

The ECOs are required to complete a Weekly Environmental Checklist, the format of which is to be agreed prior to commencement of the activity. The ECOs are required to sign and date the checklist, retain a copy in the EMPr file and submit a copy of the completed checklist to the DSS on a weekly basis.

The checklists will form the basis for the Monthly Environmental Reports. Copies of all completed checklists will be attached as Annexures to the Environmental Audit Report as required in terms of the EIA Regulations.

4.4 Environmental site meetings

Minutes of the environmental site meetings shall be kept. The minutes must include an attendance register and will be attached to the Monthly Report that is distributed to attendees. Each set of minutes must clearly record "Matters for Attention" that will be reviewed at the next meeting.

4.5 Required Method Statements

The method statement will be done in such detail that the ECOs are enabled to assess whether the contractor's proposal is in accordance with the EMPr.

The method statement must cover applicable details with regard to:

- development procedures;
- materials and equipment to be used;
- getting the equipment to and from site;
- how the equipment/ material will be moved while on site;
- how and where material will be stored;
- 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;
- compliance/ non-compliance with the EMPr; and
- any other information deemed necessary by the ECOs.

Unless indicated otherwise by the Project Manager, the Contractor shall provide the following method statements to the Project Manager no less than 14 days prior to the commencement date of the activity:

- Site establishment – Camps, Lay-down or storage areas, satellite camps, infrastructure;
- Batch plants;
- Workshop or plant servicing;
- Handling, transport and storage of Hazardous Chemical Substance's;
- Vegetation management – Protected, clearing, aliens, felling;
- Access management – Roads, gates, crossings etc.;
- Fire plan;
- Waste management – transport, storage, segregation, classification, disposal (all waste streams);
- Social interaction – complaints management, compensation claims, access to properties etc.;
- Water – use (source, abstraction and disposal), access and all related information, crossings and mitigation;
- Emergency preparedness – Spills, training, other environmental emergencies;
- Dust and noise management methodologies;
- Fauna interaction and risk management – only if the risk was identified – wildlife interaction especially on game farms; and
- Heritage and palaeontology management.

The ECOs shall monitor and ensure that the contractors perform in accordance with these method statements. Completed and agreed method statements between the holder of the EA and the contractor shall be captured in Appendix 1.

4.6 Environmental Incident Log (Diary)

The ECOs are required to maintain an up-to-date and current Environmental Incident Log (environmental diary). The Environmental Incident Log is a means to record all environmental incidents and/or all non-compliance notice would not be issued. An environmental incident is defined as:

- Any deviation from the listed impact management actions (listed in this EMPr) that may be addressed immediately by the ECOs. (For example a contractor's staff member littering or a drip tray that has not been emptied);
- Any environmental impact resulting from an action or activity by a contractor in contravention of the environmental stipulations and guidelines listed in the EMPr which as a single event would have a minor impact but which if cumulative and continuous would have a significant effect (for example no toilet paper available in the ablutions for an afternoon); and
- General environmental information such as road kills or injured wildlife.

The ECOs are to record all environmental incidents in the Environmental Incident Log. All incidents regardless of severity must be reported to the Developer. The Log is to be kept in the EMPr file and at a minimum the following will be recorded for each environmental incident:

- The date and time of the incident;
- Description of the incident;
- The name of the Contractor responsible;
- The incident must be listed as significant or minor;
- If the incident is listed as significant, a non-compliance notice must be issued, and recorded in the log;
- Remedial or corrective action taken to mitigate the incident; and
- Record of repeat minor offences by the same contractor or staff member.

The Environmental Incident Log will be captured in the EAR.

4.7 Non-compliance

A non-compliance notice will be issued to the responsible contractor by the ECOs via the DSS or Project Manager. The non-compliance notice will be issued in writing; a copy filed in the EMPr file and will at a minimum include the following:

- Time and date of the non-compliance;
- Name of the contractor responsible;
- Nature and description of the non-compliance;
- Recommended / required corrective action; and
- Date by which the corrective action to be completed.
- The contractors shall act immediately when a notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received regarding activities on the development site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant CA for them to deal with the transgression, as it deems fit. The contractor is deemed not to have complied with the EMPr if, inter alia, There is a deviation from the environmental conditions, impact management outcomes and impact management actions, as approved in generic and site specific EMPr as relevant as set out in the EMPr, which deviation has, or may cause, an environmental impact.

4.8 Corrective action records

For each non-compliance notice issued, a documented corrective action must be recorded. On receiving a non-compliance notice from the DSS, the contractor's cEO will ensure that the corrective actions required take place within the stipulated timeframe. On completion of the corrective action the cEO is

to issue a Corrective Action Report in writing to the ECOs. If satisfied that the corrective action has been completed, the ECOs are to sign-off on the Corrective Action Report, and attach the report to the non-compliance notice in the EMPr file. A corrective action is considered complete once the report has signed off by the ECOs.

4.9 Photographic record

A digital photographic record will be kept. The photographic record will be used to show before, during and post rehabilitation evidence of the project as well used in cases of damages claims if they arise. Each image must be dated and a brief description note attached.

The Contractor shall:

1. Allow the ECOs access to take photographs of all areas, activities and actions.

The ECOs shall keep an electronic database of photographic records which will include:

1. Pictures of all areas designated as work areas, camp areas, development sites and storage areas taken before these areas are set up;
2. All bunding and fencing;
3. Road conditions and road verges;
4. Condition of all farm fences;
5. Topsoil storage areas;
6. All areas to be cordoned off during construction;
7. Waste management sites;
8. Ablution facilities (inside and out);
9. Any non-conformances deemed to be "significant";
10. All completed corrective actions for non-compliances;
11. All required signage;
12. Photographic recordings of incidents;
13. All areas before, during and post rehabilitation; and
14. Include relevant photographs in the Final Environmental Audit Report.

4.10 Complaints register

The ECOs shall keep a current and up-to-date complaints register. The complaints register is to be a record of all complaints received from communities, stakeholders and individuals. The Complaints Record shall:

1. Record the name and contact details of the complainant;
2. Record the time and date of the complaint;
3. Contain a detailed description of the complaint;
4. Where relevant and appropriate, contain photographic evidence of the complaint or damage (ECOs to take relevant photographs); and
5. Contain a copy of the ECOs written response to each complaint received and keep a record of any further correspondence with the complainant. The ECO's written response will include a description of any corrective action to be taken and must be signed by the Contractor, ECO and affected party. Where a damage claim is issued by the complainant, the ECOs shall respond as described in (**section 4.11**) below.

4.11 Claims for damages

In the event that a Claim for Damages is submitted by a community, landowner or individual, the ECOs shall:

1. Record the full detail of the complaint as described in (**section 4.10**) above;
2. The DPM will evaluate the claim and associated damage and submit the evaluation to the Senior Site Representative for approval;
3. Following consideration by the DPM, the claim is to be resolved and settled immediately, or the reason for not accepting the claim communicated in writing to the claimant. Should the claimant not accept this, the ECO shall, in writing report the incident to the Developer's negotiator and legal department; and
4. A formal record of the response by the ECOs to the claimant as well as the rectification of the method of making payments not amount will be recorded in the EMPr file.

4.12 Interactions with affected parties

Open, transparent and good relations with affected landowners, communities and regional staff are an essential aspect to the successful management and mitigation of environmental impacts.

The ECOs shall:

1. Ensure that all queries, complaints and claims are dealt within an agreed timeframe;
2. Ensure that any or all agreements are documented, signed by all parties and a record of the agreement kept in the EMPr file;
3. Ensure that a complaints telephone numbers are made available to all landowners and affected parties; and
4. Ensure that contact with affected parties is courteous at all times;

4.13 Environmental audits

Internal environmental audits of the activity and implementation of the EMPr must be undertaken. The findings and outcomes must be included in the EMPr file and be submitted to the CA at intervals as indicated in the EA.

An Environmental Audit Report must be prepared monthly. The report will be tabled as the key point on the agenda of the Environmental Site Meeting. The Report is submitted for acceptance at the meeting and the final report will be circulated to the Project Manager and filed in the EMPr file. At a frequency determined by the EA, the ECOs shall submit the monthly reports to the CA. At a minimum the monthly report is to cover the following:

- Weekly Environmental Checklists;
- Deviations and non-compliances with the checklists;
- Non-compliances issued;
- Completed and reported corrective actions;
- Environmental Monitoring;
- General environmental findings and actions; and
- Minutes of the Bi-monthly Environmental Site Meetings.

4.14 Final environmental audits

On final completion of the rehabilitation and/or requirements of the EA a final EAR is to be prepared and submitted to the CA. The EAR must comply with Appendix 7 of the EIA Regulations.

PART B: SECTION 1: Pre-approved generic EMPr template

5. IMPACT MANAGEMENT OUTCOMES AND IMPACT MANAGEMENT ACTIONS

This section provides a pre-approved generic EMPr template with aspects that are common to the development of overhead electricity transmission and distribution infrastructure. There is a list of aspects identified for the development or expansion of overhead electricity transmission and distribution infrastructure, and for each aspect a set of prescribed impact management outcomes and associated impact management actions have been identified. Holders of EAs are responsible to ensure the implementation of these outcomes and actions for all projects as a minimum requirement, in order to mitigate the impact of such aspects identified for the development or expansion of overhead electricity transmission and distribution infrastructure.

The template provided below is to be completed by providing the information under each heading for each environmental impact management action.

The completed template must be signed and dated on each page by both the contractor and the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must also be duly signed and dated on each page by the contractor and the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

5.1 Environmental awareness training

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All staff must receive environmental awareness training prior to commencement of the activities; – The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; – Refresher environmental awareness training is available as and when required; – All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr; – The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: a) Safety notifications; and b) No littering. – Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts, actual or potential, related to their work activities; b) Mitigation measures to be implemented when carrying out specific activities;	cEO	• Induction presentation • Toolbox talks	• Start of construction and when a new employee starts work • Weekly	dEO ECO	Weekly	• Signed attendance register • Employee interviews • Contents of induction presentation and toolbox talks • Poster displays

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
c) Emergency preparedness and response procedures; d) Emergency procedures; e) Procedures to be followed when working near or within sensitive areas; f) Wastewater management procedures; g) Water usage and conservation; h) Solid waste management procedures; i) Sanitation procedures; j) Fire prevention; and k) Disease prevention. – A record of all environmental awareness training courses undertaken as part of the EMP must be available; – Educate workers on the dangers of open and/or unattended fires; – A staff attendance register of all staff to have received environmental awareness training must be available. – Course material must be available and presented in appropriate languages that all staff can understand.						

5.2 Site Establishment development

Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; – Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; – Sites must be located where possible on previously disturbed areas; – The camp must be fenced in accordance with Section 5.5: Fencing and gate installation; and – The use of existing accommodation for contractor staff, where possible, is encouraged.	DSS cEO	Method statement with layout plan of the construction camp / laydown area	Prior to site establishment	dEO ECO	Once-off	• Approved method statements • Approved construction camp and laydown area layout plan

5.3 Access restricted areas

Impact management outcome: Access to restricted areas prevented.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development; – Erect, demarcate and maintain a temporary barrier with clear signage around the perimeter of any access restricted area, colour coding could be used if appropriate; and – Unauthorised access and development related activity inside access restricted areas is prohibited.	DSS cEO	Weather-proof barrier signage at boundaries of no-go areas	Prior to site establishment	dEO ECO	Weekly	• Barriers and signage maintained in good condition

5.4 Access roads

Impact management outcome: Minimise impact to the environment through the planned and restricted movement of vehicles on site.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Access to the servitude and tower positions must be negotiated with the relevant landowner and must fall within the assessed and authorised area;	DPM, Contractor	Written access agreement	Prior to site establishment	dEO ECO	Weekly	• Access roads used as agreed

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities; – The access roads to tower positions must be signposted after access has been negotiated and before the commencement of the activities; – All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition – All contractors must be made aware of all these access routes. – Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense; – Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads; – In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with section 4.9: photographic record; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor; – Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands – Access roads must only be developed on pre-planned and approved roads.						• No complaints from 3rd parties about inappropriate access

5.5 Fencing and Gate installation

Impact management outcome: Minimise impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Use existing gates provided to gain access to all parts of the area authorised for development, where possible; – Existing and new gates to be recorded and documented in accordance with section 4.9: photographic record; – All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; – At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner; – Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground; – Where gates are installed in jackal proof fencing, a suitable reinforced concrete seal must be provided beneath the gate; – Original tension must be maintained in the fence wires; – All gates installed in electrified fencing must be re-electrified; – All demarcation fencing and barriers must be maintained in good working order for the duration of overhead transmission and distribution electricity infrastructure development activities;	DSS cEO	Access measures implemented	Throughout construction	dEO ECO	Weekly	• Evidence of access control (e.g. locks used as prescribed)

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where appropriate and would not cause harm to the sensitive flora; – Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the land owner. – All fencing must be developed of high quality material bearing the SABS mark; – The use of razor wire as fencing must be avoided; – Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. Site security will be required at all times; – On completion of the development phase all temporary fences are to be removed; – The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.						

5.6 Water Supply Management

Impact management outcome: Undertake responsible water usage.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All abstraction points or bore holes must be registered with the DWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis; – The Contractor must ensure the following: a. The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river; b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and c. All reasonable measures to limit pollution or sedimentation of the downstream watercourse are implemented. – Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged.	DSS cEO	Monitoring of levels of water sources (if water is obtained from the natural environment)	Weekly	dEO ECO	Weekly	• Monitoring records • Water use audit reports • Water conservation covered in toolbox talks

5.7 Storm and waste water management

Impact management outcome: Impacts to the environment caused by storm water and wastewater discharges during construction are avoided.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager; – All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility; – Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO; – Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO.	DSS cEO	• Installation and maintenance of silt traps • Use of absorbent materials at concrete mixing areas • Disposal of contaminated water at suitable facility	Ongoing	dEO ECO	Weekly	• Waste disposal records • No evidence of soil and water contamination • Silt trap maintained and in use • No evidence of water contamination from sources on site

5.8 Solid and hazardous waste management

Impact management outcome: Waste is appropriately stored, handled and safely disposed of at a recognised waste facility.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All measures regarding waste management must be undertaken using an integrated waste management approach; – Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; – A suitably positioned and clearly demarcated waste collection site must be identified and provided; – The waste collection site must be maintained in a clean and orderly manner; – Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal; – Staff must be trained in waste segregation; – Bins must be emptied regularly; – General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company; – Hazardous waste must be disposed of at a registered waste disposal site; – Certificates of safe disposal for general, hazardous and recycled waste must be maintained.	DSS cEO	• Segregated disposal bins • All waste containers have lids • Waste contractor appointed • Daily to weekly site cleanups	Ongoing	dEO ECO	Weekly	• Contract with waste contractor • Safe disposal certificates • Employee knowledge and practice of waste segregation • No overflowing bins on site

5.9 Protection of watercourses and estuaries

Impact management outcome: Pollution and contamination of the watercourse environment and or estuary erosion are prevented.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities; – In the event of a spill, prompt action must be taken to clear the polluted or affected areas; – Where possible, no development equipment must traverse any seasonal or permanent wetland – No return flow into the estuaries must be allowed and no disturbance of the Estuarine Functional Zone should occur; – Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available; – There must not be any impact on the long term morphological dynamics of watercourses or estuaries; – Existing crossing points must be favored over the creation of new crossings (including temporary access) – When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken: a) Water levels during the period of construction; No altering of the bed, banks, course or characteristics of a watercourse b) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; c) Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable	DSS cEO	• Spill control kits available on site and operators trained to use them • Spills cleaned promptly to prevent water contamination • Designated and limited crossing points for watercourses • Watercourses to be off-limits for construction	Ongoing	dEO ECO	Weekly	• Spills controlled • Evidence of operators trained in spill prevention • No evidence of water contamination from site activities • Watercourse crossing points maintained and respected

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and d) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabiliz<u>e</u>d as soon as development allows.						

5.10 Vegetation clearing

Impact management outcome: Vegetation clearing is restricted to the authorised development footprint of the proposed infrastructure.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
General: - Indigenous vegetation which does not interfere with the development must be left undisturbed; - Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species; - Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any development or clearing;	DSS cEO	- Areas of natural vegetation not to be disturbed clearly demarcated and protected - Wood removed from the site provided to communities	Prior to site establishment	dEO ECO	Weekly	- Transplanted rare and medicinal plants - Permits for transplanting protected species - Community access to wood removed from the site - No access to protected areas of the site

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- Permits for removal must be obtained from the Department of Agriculture, Forestry and Fisheries prior to the cutting or clearing of the affected species, and they must be filed; - The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals; - Trees felled due to construction must be documented and form part of the Environmental Audit Report; - Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris; - Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained; - A daily register must be kept of all relevant details of herbicide usage; - No herbicides must be used in estuaries; - All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to Section 5.3: Access restricted areas. Servitude: - Vegetation that does not grow high enough to cause interference with overhead transmission and distribution infrastructures, or cause a fire hazard to any plantation, must not be cut or trimmed unless it is growing in the road access area, and then only at the discretion of the Project Manager;		- Plant rescue plan submitted and implemented - On-site area for transplanted species of conservation concern and medicinal plants				- No evidence of introduction of alien plants - Alien plants controlled

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- Where clearing for access purposes is essential, the maximum width to be cleared within the servitude must be in accordance to distance as agreed between the land owner and the EA holder - Alien invasive vegetation must be removed according to a plan (in line with relevant municipal and provincial procedures, guidelines and recommendations) and disposed of at a recognized waste disposal facility; - Vegetation must be trimmed where it is likely to intrude on the minimum vegetation clearance distance (MVCD) or will intrude on this distance before the next scheduled clearance. MVCD is determined from SANS 10280; - Debris resulting from clearing and pruning must be disposed of at a recognized waste disposal facility, unless the landowners wish to retain the cut vegetation; - In the case of the development of new overhead transmission and distribution infrastructures, a one meter "trace-line" must be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along the "trace-line". Alternative methods of stringing which limit impact to the environment must always be considered.						

5.11 Protection of fauna

Impact management outcome: Minimise disturbance to fauna.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present; – The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the development programme; – Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present; – Nesting sites on existing parallel lines must be documented; – Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; – Bird guards and diverters must be installed on the new line as per the recommendations of the specialist; – No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas; – No deliberate or intentional killing of fauna is allowed; – In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages; and – No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits.	DSS cEO	• Areas of natural vegetation that provide habitat for animals not to be disturbed clearly demarcated and protected • Implementation of training to prohibit hunting	Through Construction	dEO ECO	Weekly	• No evidence of hunting or trapping animals on site • Training records available w.r.t. hunting prohibition

5.12 Protection of heritage resources

Impact management outcome: Minimise impact to heritage resources.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No-Go procedure in Section 5.3: Access restricted areas; - Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance; - All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences.	DSS cEO	- Implement chance finds procedure immediately upon uncovering heritage material - Training in chance finds for all employees	Throughout construction	dEO ECO	Weekly	- Chance finds records - Training records w.r.t. chance finds

5.13 Safety of the public

Impact management outcome: All precautions are taken to minimise the risk of injury, harm or complaints.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance

– Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.; – All unattended open excavations must be adequately fenced or demarcated; – Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding; – Ensure structures vulnerable to high winds are secured; – Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.	DSS cEO	• Maintain access control • Site hazards are clearly demarcated • Barriers at deep excavations • Incidents and complaints register accessible at site entrance	Throughout construction	dEO ECO	Weekly	• Access control is effective – no unauthorised access obtained • Site hazards signage installed and maintained • Excavations fenced
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5.14 Sanitation

Impact management outcome: Clean and well maintained toilet facilities are available to all staff in an effort to minimise the risk of disease and impact to the environment.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Mobile chemical toilets are installed onsite if no other ablution facilities are available; – The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances;	DSS cEO	• Sufficient toilets provided for the number of employees	Throughout construction	dEO ECO	Weekly	• Disposal certificates available for effluent disposal • No evidence of ablution in the veld

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- Where mobile chemical toilets are required, the following must be ensured: a) Toilets are located no closer than 100 m to any watercourse or water body; b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMP;; d) Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out; e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; f) Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards; - A copy of the waste disposal certificates must be maintained.		Toilets within easy access to all work areas				- Records of toolbox talks w.r.t. sanitation - No evidence of overflowing toilets

5.15 Prevention of disease

Impact Management outcome: All necessary precautions linked to the spread of disease are taken.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance

– Undertake environmentally-friendly pest control in the camp area; – Ensure that the workforce is <u>sensitized</u> to the effects of sexually transmitted diseases, especially HIV AIDS; – The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area; – Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; – Free condoms must be made available to all staff on site at central points; – Medical support must be made available; – Provide access to Voluntary HIV Testing and Counselling Services.	DSS cEO	• Environmentally friendly pest control methods employed • Hand sanitizer available at site entry points and eating areas • Covid temperature and symptom screening for all entries to site. • Implement isolation and testing protocol for any employees suspected of having Covid.	Throughout construction	dEO ECO	Weekly	• Pest control methods are owl-friendly and scavenger friendly • Records of toolbox talks w.r.t. STDs and Covid • Condoms available in toilets • Posters re STDs and Covid are displayed • Records of Covid screening
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5.16 Emergency procedures

Impact management outcome: Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project; – The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation; – All staff must be made aware of emergency procedures as part of environmental awareness training; – The relevant local authority must be made aware of a fire as soon as it starts; – In the event of emergency necessary mitigation measures to contain the spill or leak must be implemented (see Hazardous Substances section 5.17).	DSS cEO	• Emergency Response and Action Plan: training provided to responders and plant tested • Display of authority emergency response numbers.	Throughout construction	dEO ECO	Weekly	• Records of ERAP drill testing • Evidence of ERAP training • Emergency response numbers displayed

5.17 Hazardous substances

Impact management outcome: Safe storage, handling, use and disposal of hazardous substances.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The use and storage of hazardous substances to be <u>minimized</u> and non-hazardous and non-toxic alternatives substituted where possible;	DSS cEO	• Hazardous chemical store aligned with	Throughout construction	dEO ECO	Weekly	• MSDSs for all hazardous chemicals available

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All hazardous substances must be stored in suitable containers as defined in the Method Statement; – Containers must be clearly marked to indicate contents, quantities and safety requirements; – All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers; – Bunded areas to be suitably lined with a SABS approved liner; – An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis; – All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS); – All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet; – Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available; – The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowzers; – The tanks/ bowzers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 130% of the total capacity of all the storage tanks/ bowzers (110% statutory requirement plus an allowance for rainfall); – The floor of the bund must be sloped, draining to an oil separator;		• relevant legal requirements • Bulk chemical containers bunded to 110% • Hazardous chemicals control sheet maintained • Legally compliant signage for all chemical hazards				• Bunding for bulk containers in good condition • Training records and knowledge of employees • Hazardous chemicals control sheet for all chemicals on site • All chemical containers labelled. • No evidence of leakages or spills • Response / cleanup records available for all spillages • Evidence of spill response training and spill response drills • Spill kits available at risk areas and maintained

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained; – All empty externally dirty drums must be stored on a drip tray or within a bunded area; – No unauthorised access into the hazardous substances storage areas must be permitted; – No smoking must be allowed within the vicinity of the hazardous storage areas; – Adequate fire-fighting equipment must be made available at all hazardous storage areas; – Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used; – An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times; – The responsible operator must have the required training to make use of the spill kit in emergency situations; – An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken; – In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to Section 5.7 for procedures concerning storm and waste water management and 5.8 for solid and hazardous waste management.						

5.18 Workshop, equipment maintenance and storage

Impact management outcome: Soil, surface water and groundwater contamination is minimised.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area; - During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. The relevant local authority must be made aware of a fire as soon as it starts; - Leaking equipment must be repaired immediately or be removed from site to facilitate repair; - Workshop areas must be monitored for oil and fuel spills; - Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available; - The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil / water separator where maintenance work on vehicles and equipment can be performed; - Water drainage from the workshop must be contained and managed in accordance Section 5.7: storm and waste water management.	DSS cEO	- Dedicated vehicle servicing facility with impermeable floor - Drip trays - Spill kits	Throughout construction	dEO ECO	Weekly	- Drip trays used when needed - No evidence of oil and fuel spillages - Training records and knowledge of employees w.r.t. vehicle maintenance - Response / cleanup records available for all spillages - Vehicles are well-maintained and do not show evidence of leakages

5.19 Batching plants

Impact management outcome: Minimise spillages and contamination of soil, surface water and groundwater.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- Concrete mixing must be carried out on an impermeable surface; - Batching plants areas must be fitted with a containment facility for the collection of cement laden water. - Dirty water from the batching plant must be contained to prevent soil and groundwater contamination - Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains; - A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted; - Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licensed disposal facility; - Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site; - Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to Section 5.20: Dust emissions) - Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility; - Temporary fencing must be erected around batching plants in accordance with Section 5.5: Fencing and gate installation.						

5.20 Dust emissions

Impact management outcome: Dust prevention measures are applied to minimise the generation of dust.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the ECO; – Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re-vegetated or <u>stabilized</u> as soon as is practically possible; – Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; – During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; – Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind; – Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; – Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas; – Straw <u>stabilization</u> must be applied at a rate of one bale/10 m² and harrowed into the top 100 mm of top material, for all completed earthworks;	DSS cEO	• Dust suppression methods as directed by the ECO and cEO • Separate topsoil and subsoil during site clearance and stockpile separately • Spread topsoil on the surface after final shaping • Adherence to speed limits by vehicles • Straw stabilization for completed earthworks	Throughout construction	dEO ECO	Weekly	• No evidence of excessive dust generation due to construction • Dust control measures implemented • Vehicles do not speed on site

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.						

5.21 Blasting

Impact management outcome: Impact to the environment is minimised through a safe blasting practice.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- Any blasting activity must be conducted by a suitably licensed blasting contractor; and - Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.	DSS cEO	- Method statement by blasting contractor - Use only low impact blasting methods e.g. blasting blankets, micro-charges covering with soil - Inform surrounding	Throughout construction	dEO ECO	Weekly	- No evidence of damage from flyrock - No complaints from neighboring residents about blasting noise or flyrock

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
		communities about planned blasting activities				

5.22 Noise

Impact Management outcome: Unnecessary noise is prevented by ensuring that noise from construction activities is mitigated.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only; – All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained; – Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers; – Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered to during the development phase. Where not defined, it must be ensured that	DSS cEO	• Work only during daylight hours • Maintain vehicles in good condition • Staff code of conduct developed and communicated	Throughout construction	dEO ECO	Weekly	• Records of staff code of conduct training • Staff knowledge of code of conduct and evidence in their behaviour • No evidence of noise complaints in complaints register

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
development activities must still meet the impact management outcome related to noise management.						

5.23 Fire prevention

Impact management outcome: Prevention of uncontrollable fires.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- Designate smoking areas where the fire hazard could be regarded as insignificant; - Firefighting equipment must be available on all vehicles located on site; - The local Fire Protection Agency (FPA) must be informed of construction activities; - Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; - Two way swop of contact details between ECO and FPA.	DSS cEO	- Designated smoking areas - Services fire-fighting equipment - Emergency numbers for Fire Protection Association displayed	Throughout construction	dEO ECO	Weekly	- Pressure gauges on extinguishers indicate it is - Servicing records for extinguishers show it has been serviced in the past year - Records of fire-fighting training and drills - Emergency numbers for Fire Protection Association displayed

5.24 Stockpiling and stockpile areas

Impact management outcome: Erosion and sedimentation as a result of stockpiling are reduced.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All material that is excavated during the project development phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses, watercourses and water bodies; – All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods; – Topsoil stockpiles must not exceed 2 m in height; – During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.); – Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.	DSS cEO	• Soil stockpiles maintained and protected to prevent erosion • Covering materials placed on stockpiles to prevent erosion when necessary	Throughout construction	dEO ECO	Weekly	• Minimal evidence of erosion from soil stockpiles • Evidence of clearance of exotic vegetation • Stockpiles <2m high

5.25 Finalising tower positions

Impact management outcome: No environmental degradation occurs as a result of the survey and pegging operations.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– No vegetation clearing must occur during survey and pegging operations; – No new access roads must be developed to facilitate access for survey and pegging purposes; – Project manager, botanical specialist, heritage specialist and contractor to agree on final tower positions based on survey within assessed and approved areas; – The surveyor is to demarcate (peg) access roads/tracks in consultation with ECO. No deviations will be allowed without the prior written consent from the ECO.	DSS cEO	• Walkdown assessment of proposed pylon positions by biodiversity specialist and heritage specialist • Walkdown assessment to take place on foot or in 4x4 vehicle, without scarping a road • Produce walkdown assessment report that documents walkdown findings and agreed positions of pylons.	Prior to construction	dEO ECO	Once-off	• Clearance of vegetation only at confirmed tower positions • Tower positions pegged by heritage specialist and biodiversity specialist • Walkdown assessment report

5.26 Excavation and Installation of foundations

Impact management outcome: No environmental degradation occurs as a result of excavation or installation of foundations.

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Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All excess spoil generated during foundation excavation must be disposed of in an appropriate manner and at a recognized disposal site, if not used for backfilling purposes; – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes; – Management of equipment for excavation purposes must be undertaken in accordance with Section 5.18: Workshop equipment maintenance and storage; and – Hazardous substances spills from equipment must be managed in accordance with Section 5.17: Hazardous substances. – Batching of cement to be undertaken in accordance with Section 5.19 : Batching plants; – Residual cement must be disposed of in accordance with Section 5.8: Solid and hazardous waste management.	DSS cEO	• Spread soil excavated from pylon foundations over surrounding area or use it as fill elsewhere	During construction	dEO ECO	Once-ff	• Soil excavated from pylon foundations spread over surrounding area or used as fill elsewhere.

5.27 Assembly and erecting towers

Impact management outcome: No environmental degradation occurs as a result of assembly and erecting of towers.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Prior to erection, assembled towers and tower sections must be stored on elevated surface (suggest wooden blocks) to minimise damage to the underlying vegetation; – In sensitive areas, tower assembly must take place off-site or away from sensitive positions; – The crane used for tower assembly must be operated in a manner which minimises impact to the environment; – The number of crane trips to each site must be minimised; – Wheeled cranes must be utilised in preference to tracked cranes; – Consideration must be given to erecting towers by helicopter or by hand where it is warranted to limit the extent of environmental impact; – Access to tower positions to be undertaken in accordance with access requirements in specified in Section 8.4: Access Roads; – Vegetation clearance to be undertaken in accordance with general vegetation clearance requirements specified in Section 8.10: Vegetation clearing; – No levelling at tower sites must be permitted unless approved by the Development Project Manager or Developer Site Supervisor; – Topsoil must be removed separately from subsoil material and stored for later use during rehabilitation of such tower sites; – Topsoil must be stored in heaps not higher than 1m to prevent destruction of the seed bank within the topsoil; – Excavated slopes must be no greater than 1:3, but where this is unavoidable, appropriate measures must be undertaken to stabilise the slopes; – Fly rock from blasting activity must be minimised and any pieces greater than 150 mm falling beyond the Working Area, must be collected and removed;	DSS cEO	• Lowest impact construction methods appropriate to the site conditions based on topography, proximity to existing transmission lines, availability of existing access roads and degree of existing disturbance.	During and immediately after construction	dEO ECO	Once-off	• Site inspection during construction confirms that the lowest impact methods appropriate for site conditions are used. • Site inspection after construction confirms that the extent of damage has been limited to the immediate footprint of the powerline.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Only existing disturbed areas are utilised as spoil areas; – Drainage is provided to control groundwater exit gradient with the spill areas such that migration of fines is kept to a minimum; – Surface water runoff is appropriately channeled through or around spoil areas; – During backfilling operations, care must be taken not to dump the topsoil at the bottom of the foundation and then put spoil on top of that; – The surface of the spoil is appropriately rehabilitated in accordance with the requirements specified in Section 5.29: Landscaping and rehabilitation; – The retained topsoil must be spread evenly over areas to be rehabilitated and suitably compacted to effect re-vegetation of such areas to prevent erosion as soon as construction activities on the site is complete. Spreading of topsoil must not be undertaken at the beginning of the dry season.						

5.28 Stringing

Impact management outcome: No environmental degradation occurs as a result of stringing.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- Where possible, previously disturbed areas must be used for the siting of winch and tensioner stations. In all other instances, the siting of the winch and tensioner must avoid Access restricted areas and other sensitive areas; - The winch and tensioner station must be equipped with drip trays in order to contain any fuel, hydraulic fuel or oil spills and leaks; - Refueling of the winch and tensioner stations must be undertaken in accordance with Section 5.17: Hazardous substances; - In the case of the development of overhead transmission and distribution infrastructure, a one meter "trace-line" may be cut through the vegetation for stringing purposes only and no vehicle access must be cleared along "trace-lines". Vegetation clearing must be undertaken by hand, using chainsaws and hand held implements, with vegetation being cut off at ground level. No tracked or wheeled mechanised equipment must be used; - Alternative methods of stringing which limit impact to the environment must always be considered e.g. by hand or by using a helicopter; - Where the stringing operation crosses a public or private road or railway line, the necessary scaffolding/ protection measures must be installed to facilitate access. If, for any reason, such access has to be closed for any period(s) during development, the persons affected must be given reasonable notice, in writing; - No services (electrical distribution lines, telephone lines, roads, railways lines, pipelines fences etc.) must be damaged because of stringing operations. Where disruption to services is unavoidable, persons affected must be given reasonable notice, in writing;	DSS cEO	Lowest impact construction methods appropriate to the site conditions based on topography, proximity to existing transmission lines, availability of existing access roads and degree of existing disturbance.	During and immediately after construction	dEO ECO	Once-off	- Site inspection during construction confirms that the lowest impact methods appropriate for site conditions are used. - Site inspection after construction confirms that the extent of damage has been limited to the immediate footprint of the powerline. - No damage to existing services and cultivated areas is evident.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- Where stringing operations cross cultivated land, damage to crops is restricted to the minimum required to conduct stringing operations, and reasonable notice (10 work days minimum), in writing, must be provided to the landowner; - Necessary scaffolding protection measures must be installed to prevent damage to the structures supporting certain high value agricultural areas such as vineyards, orchards, nurseries.						

5.29 Socio-economic

Impact management outcome: Socio-economic development is enhanced.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- Develop and implement communication strategies to facilitate public participation; - Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process; - Sustain continuous communication and liaison with neighboring owners and residents - Create work and training opportunities for local stakeholders; and - Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-night on the site. This would reduce the risk to local farmers.	DSS cEO	- Weekly communication on construction progress through established community communication channels - Grievance record	6 months prior to the start of construction and throughout construction	dEO ECO	Weekly	- Recorded grievances / informal complaints - Records of community engagements (minutes, correspondence, social media posts, etc.)

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
		available at site entrance - Communicate expected number of local jobs and application procedure prior to construction - Integrate project-related training in existing community development and training programmes - No accommodation on site, except for security personnel.				

5.30 Temporary closure of site

Impact management outcome: Minimise the risk of environmental impact during periods of site closure greater than five days.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in sections 5.17: management of hazardous substances and 5.18 workshop, equipment maintenance and storage; – Hazardous storage areas must be well ventilated; – Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service; – Emergency and contact details displayed must be displayed; – Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel; – Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; – Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.; – Structures vulnerable to high winds must be secured; – Wind and dust mitigation must be implemented; – Cement and materials stores must have been secured; – Toilets must have been emptied and secured; – Refuse bins must have been emptied and secured; – Drip trays must have been emptied and secured.	DSS cEO	Implement impact management actions as specified	Upon temporary closure	dEO ECO	Once-off	Site conditions indicate compliance

5.31 Landscaping and rehabilitation

Impact management outcome: Areas disturbed during the development phase are returned to a state that approximates the original condition.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All areas disturbed by construction activities must be subject to landscaping and rehabilitation; All spoil and waste must be disposed to a registered waste site and certificates of disposal provided; – All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983 – All slopes must be assessed for terracing, and to terrace only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – Berms that have been created must have a slope of 1:4 and be replanted with indigenous species and grasses that approximates the original condition; – Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping which must be agreed to by the holder of the EA and the landowners; – Rehabilitation of tower sites and access roads outside of farmland; – Indigenous species must be used for with species and/grasses to where it compliments or approximates the original condition; – Stockpiled topsoil must be used for rehabilitation (refer to Section 5.24: Stockpiling and stockpiled areas); – Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion; – Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed; – Subsoil must be ripped before topsoil is placed; – The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment;	DSS cEO	• Embankments vegetated by topsoil placement and erosion protection, with exception of those kept free of vegetation for fire control • Install gabions around pylon bases as necessary where there is an erosion risk • Embankments that cannot be vegetated otherwise protected e.g. by stone pitching • All disturbed areas to be revegetated by placing topsoil and seeded, if necessary	Throughout construction	dEO ECO	Weekly	• Embankments vegetated or otherwise protected • Disturbed areas revegetated and topsoil spread • At least 90% coverage with no bare areas more than 5m² a year after completion of construction • Stormwater diversion strips constructed on steep access roads in the transmission line corridor.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- Where impacted through construction related activity, all sloped areas must be <u>stabilized</u> to ensure proper rehabilitation is effected and erosion is controlled ; - Sloped areas <u>stabilized</u> using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; - Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil. - Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following: a) Annual and perennial plants are chosen; b) Pioneer species are included; c) Species chosen must be indigenous to the area with the seeds used coming from the area; d) Root systems must have a binding effect on the soil; e) The final product must not cause an ecological imbalance in the area		- Use seed mixture as specified where necessary - Install raised strips diverting stormwater off the transmission line access roads on steep slopes to prevent erosion				

6 ACCESS TO THE GENERIC EMPr

Once completed and signed, to allow the public access to the generic EMPr, the holder of the EA must make the EMPr available to the public in accordance with the requirements of regulation 26(h) of the EIA Regulations.

PART B: SECTION 2

7 SITE SPECIFIC INFORMATION AND DECLARATION

7.1 Sub-section 1: contact details and description of the project

7.1.1 Details of the applicant:

Name of applicant: **Sibanye Solar PV (Pty) Ltd**

Tel No: **073 495 2089**

Fax No: **N/A**

Postal Address: **Private Bag X5, Westonaria, 1780**

Physical Address: **Private Bag X5, Westonaria**

7.1.2 Details and expertise of the EAP:

Name of EAP: **Reuben Heydenrych**

Tel No: **+27 12 427 2136**

Fax No: **+27 82 556 0521**

E-mail address: **Reuben.Heydenrych@zutari.com**

Expertise of the EAP (Curriculum Vitae included): **Appended**

7.1.3 Project name:

Proposed 132 Kilovolt Transmission Lines for the 200-Megawatt Photovoltaic Energy Facility for Sibanye Gold Limited, Gauteng

7.1.4 Description of the project:

Sibanye Solar PV (Pty) Ltd (Sibanye) obtained authorisation to develop a number of 132 kilovolt (kV) overhead transmission lines inside three 200 m wide corridors between its proposed solar PV plant and its mines near Westonaria, in the Gauteng Province (Figure 2).

The proposed transmission lines are required to evacuate the electricity generated at the proposed Sibanye Gold 200-Megawatt (MW) Photovoltaic (PV) energy facility¹ and connect via an on-site substation to the **existing Sibanye Gold substations and Points of Distribution (POD)** at the Kloof mining operations.

In order to connect the proposed transmission lines to either of the Point of Distribution (POD), it may be required to add an additional feeder bay to each of these existing substations. The substations would most likely be expanded by approximately 24 m² outside the existing substation fence line for each substation, however the throughput of each substation would remain the same. **This EMP deals only with the transmission line to the Kloof POD** (Figure 1). Should Sibanye want to

¹ The proposed PV Facility has been assessed under a separate Environmental Impact Assessment (EIA) Process (DEA Ref No.: 14/12/16/3/3/2/919).

developed transmission lines to the Libanon or Driefontein PODs at a later stage, similar EMPs would need to be compiled for these lines.

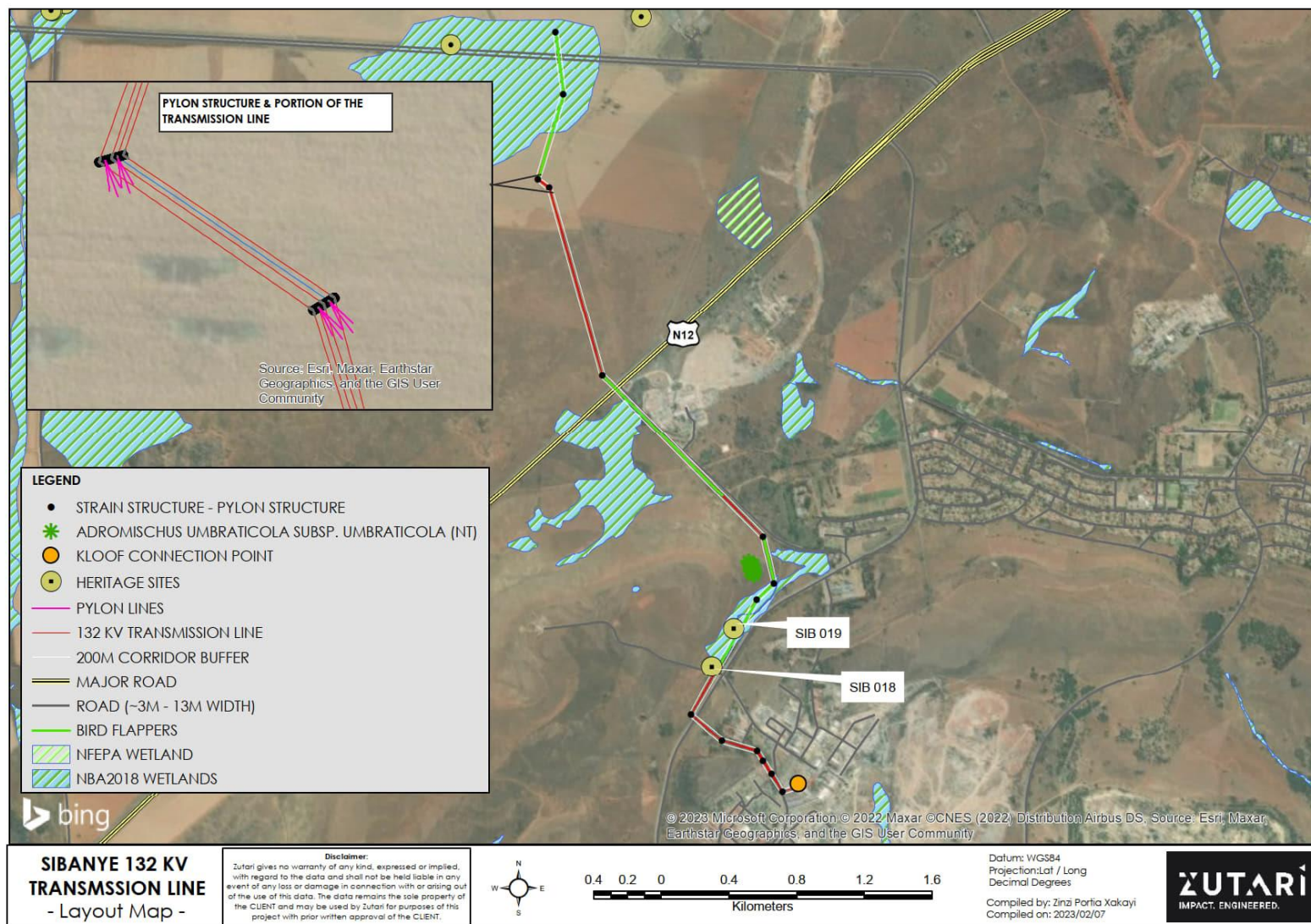


Figure 1: Locality Map

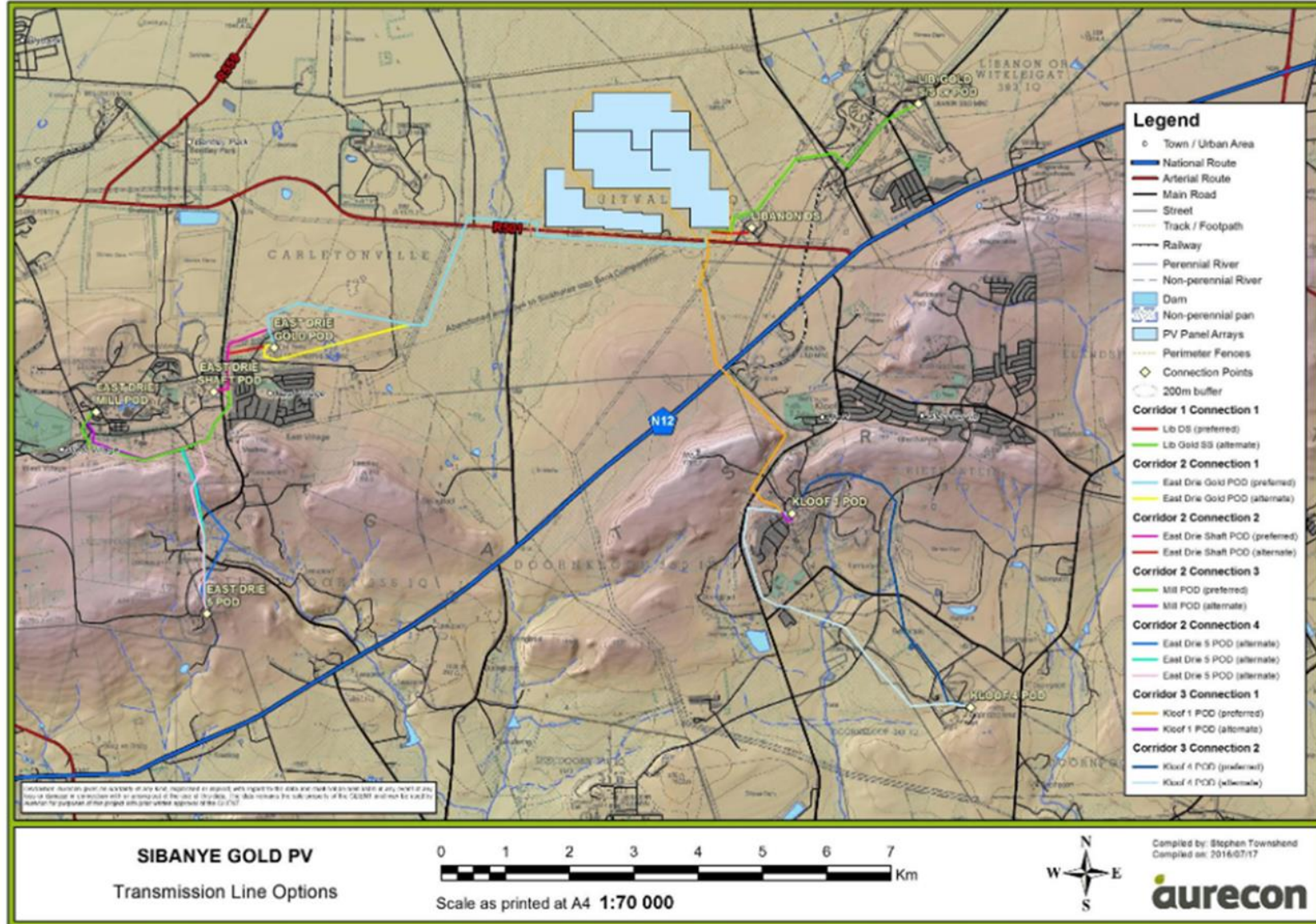


Figure 2: A map combining the alignments of all authorised transmission line corridors

Project location

The proposed 132 Kilovolt (kV) overhead transmission lines for the proposed 200 Megawatt (MW) photovoltaic (PV) energy facility for Sibanye is situated close to Sibanye Gold's Driefontein and Kloof mining operations near Westonaria, Gauteng.

The 132 kV Powerline crosses over three roads, namely the R501 in its northern extent (just before connecting to the Phase 1 PV Facility), the N12 in its central extent, and a small unnamed road to the Sibanye Gold training academy in its southern extent. The 132 kV Powerline crosses over both agricultural fields as well as large stretches of open veld and a ridge.

The below table indicates the properties for the entire project.

FARM NAME (if applicable)	FARM NUMBER (if applicable)	PORTION NAME	LATITUDE	LONGITUDE
RIETFontein	349	0	26°23'55.64S	27°36'39.26E
DOORNKLOOF	350	0	26°24'51.56S	27°34'19.05E
UITVAL	280	0	26°21'42.04S	27°34'24.47E
DOORNKLOOF	350	2	26°24'19.2S	27°35'19.44E
DOORNKLOOF	265350	31	26°24'18.16S	27°35'30.76E
UITVAL	280	9	26°22'5.75S	27°34'20.45E
RIETFontein	349	12	26°24'6.31S	27°35'51.91E
RIETFontein	349	0	26°23'43S	27°35'35.82E
UITVAL	280	11	26°22'42.28S	27°34'28.93E
UITVAL	280	6	26°21'29.04S	27°34'51.8E
RIETFontein	349	2	26°22'37.64S	27°35'40.55E
RIETFontein	349	47	26°23'30.59S	27°35'45.76E

7.1.6 Preliminary technical specification of the overhead transmission and distribution **(PLEASE NOTE THAT THE PROPOSED DESIGN OF THE TRANSMISSION LINES IS NOT FINAL AND IS SUBJECT TO CHANGE DURING THE FINAL STAGES OF THE DESIGN PROCESS):**

- **Length:** transmission lines would not exceed a total combined approximate length of 33 km.
- Tower parameters
 - **Number and types of towers:** Refer to the layout map for pylon positions
 - **Tower spacing:** Pylons are typically spaced at 200m – 250m intervals in a straightaway, on level ground but could be greater or lesser depending on alignment and topography.
 - **Tower height:** up to 24m tall
 - **Conductor attachment height:** as per Eskom-approved pylons
 - **Minimum ground clearance:** as per Eskom-approved requirements

7.2 Sub-section 2: Development footprint site map

This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout. The sensitivity map must be prepared from the national web based environmental screening tool, when available for compulsory use at: <https://screening.environment.gov.za/screeningtool>. The sensitivity map shall identify the nature of each sensitive feature e.g. raptor nest, threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features in the surrounding landscape. The overhead transmission and distribution profile shall be illustrated at an appropriate resolution to enable fine scale interrogation. It is recommended that <20 km of overhead transmission and distribution length is illustrated per page in A3 landscape format. Where considered appropriate, photographs of sensitive features in the context of tower positions shall be used.

Note the development footprint shown in this case includes three 200m wide corridors with 132 kV transmission lines that would vary in length within each corridor.

Table 7.2: Screened Environmental Sensitivity According to the DFFE Screening Tool

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Palaeontology Theme	X			
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

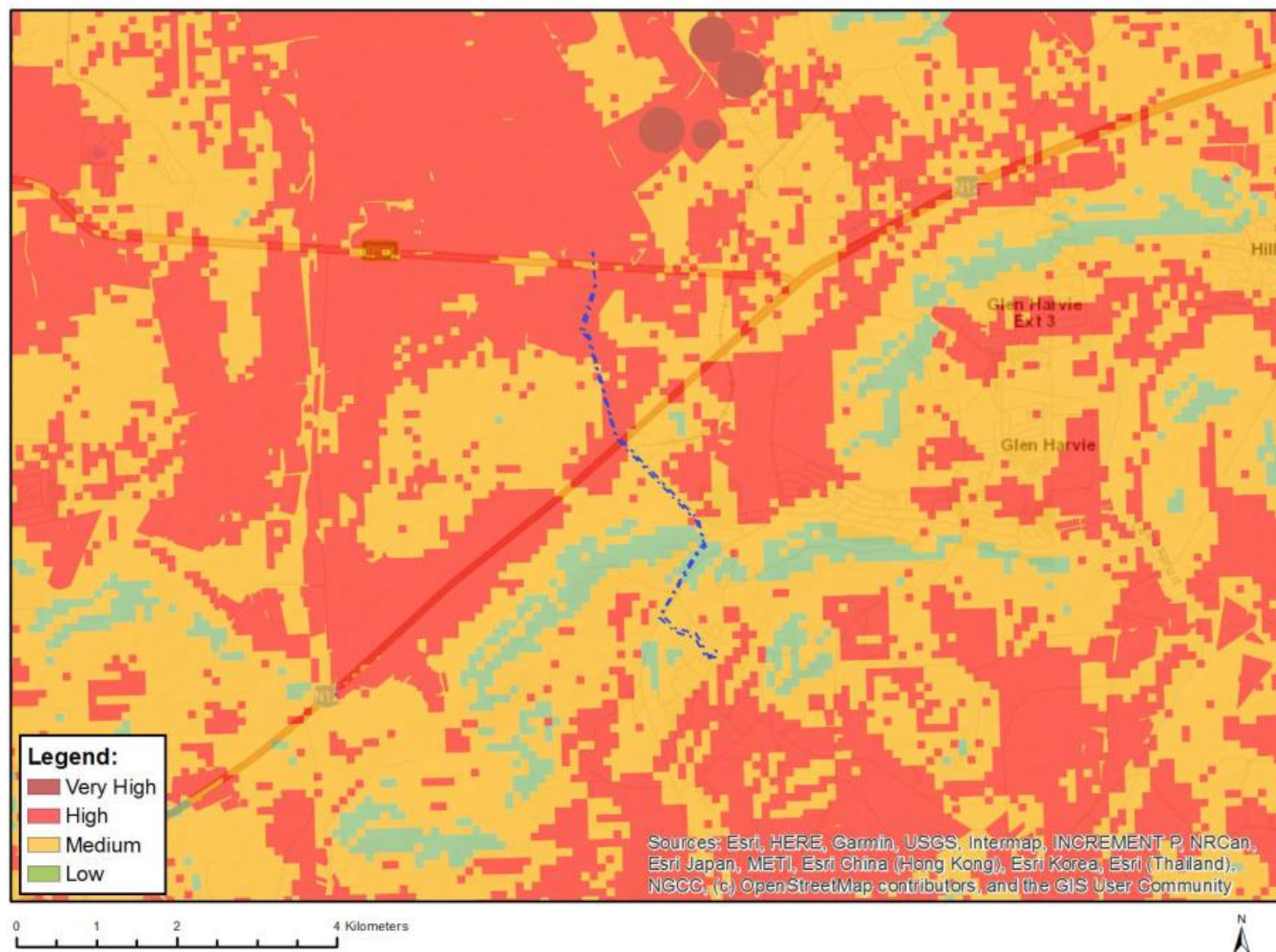


Figure 3: Agriculture theme sensitivity according to the DFE national web-based screening tool

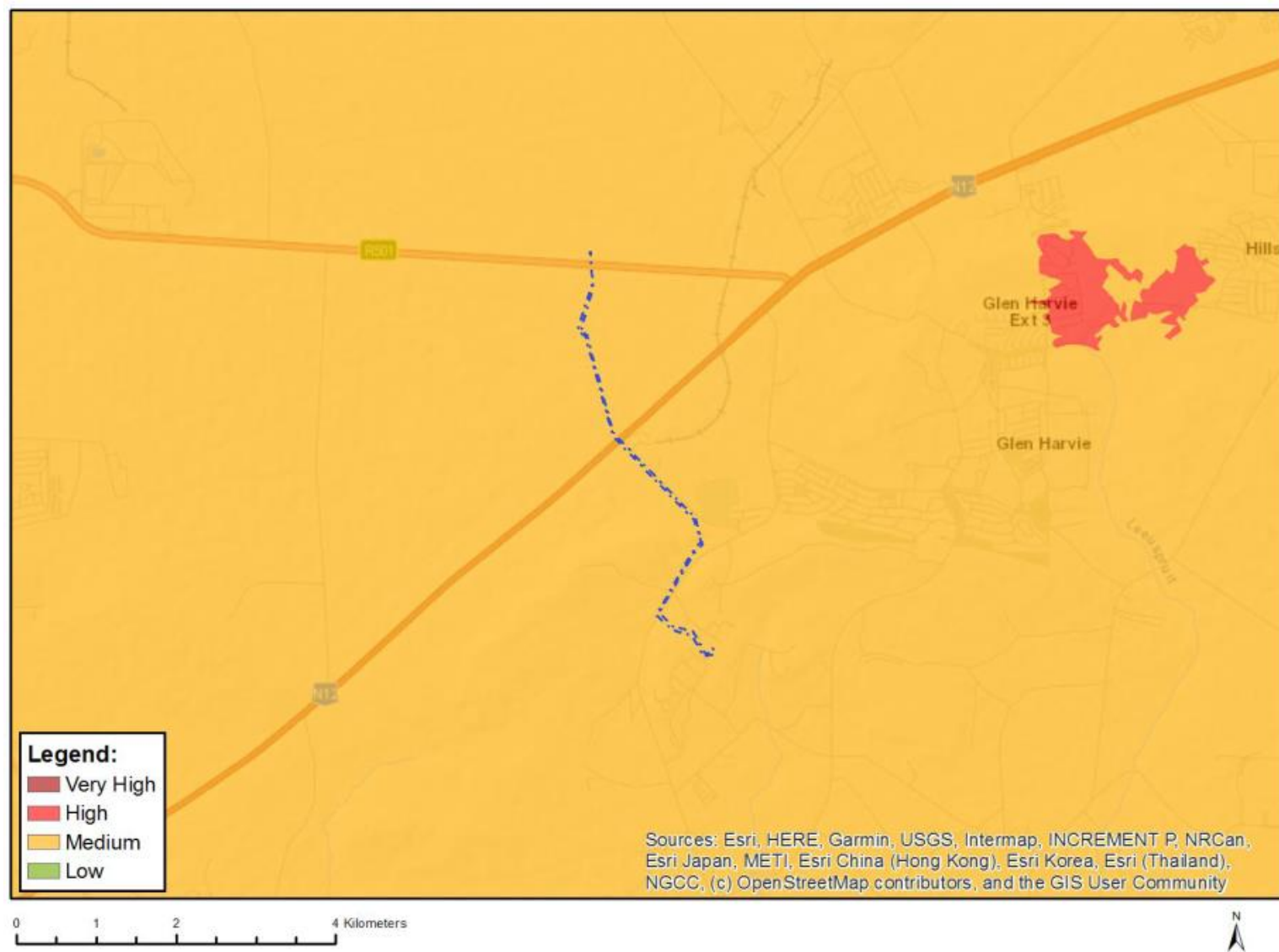


Figure 4: Animal species theme sensitivity according to the DFFE national web-based screening tool

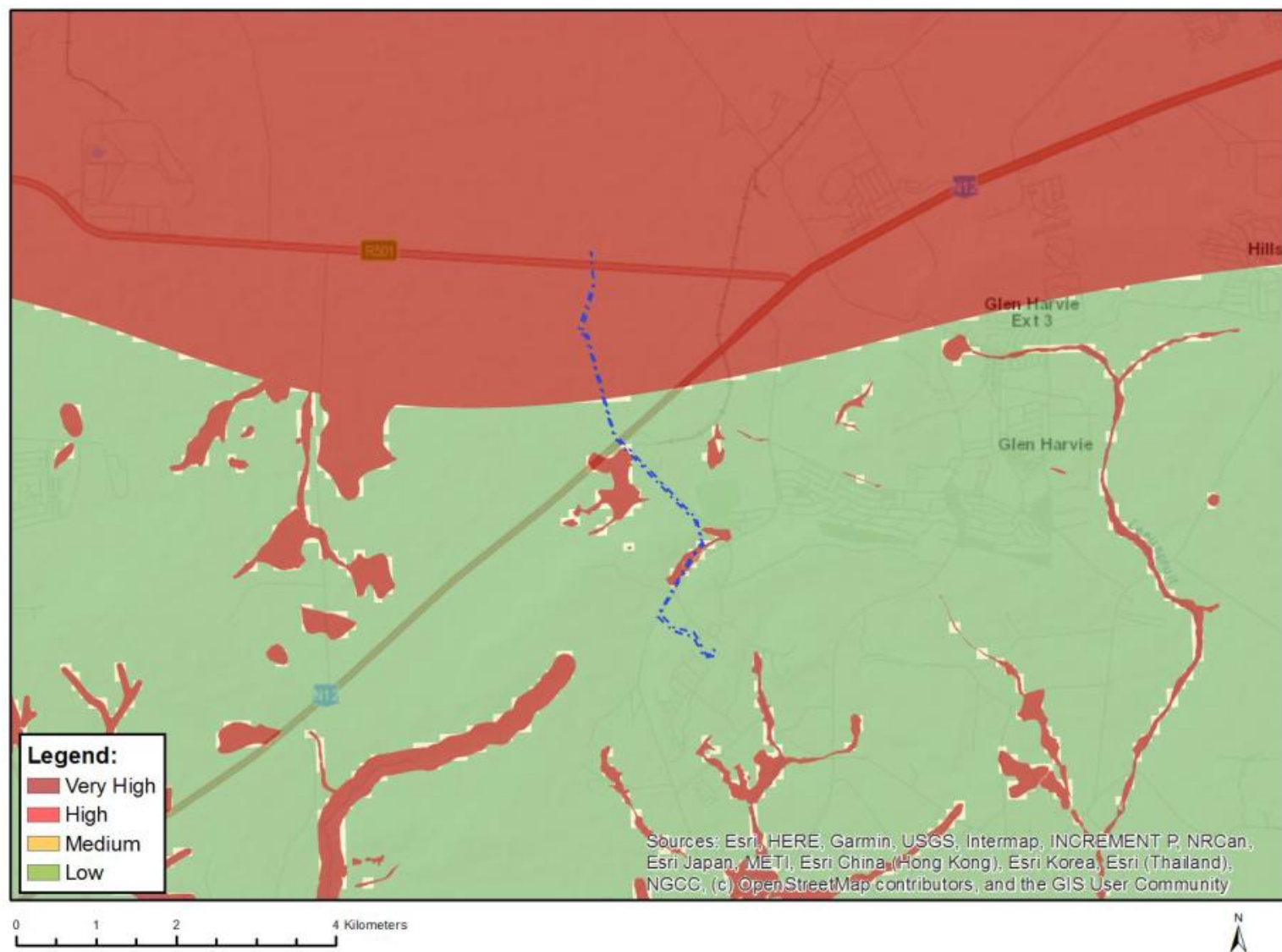


Figure 5: Aquatic Biodiversity theme sensitivity according to the DFFE national web-based screening tool

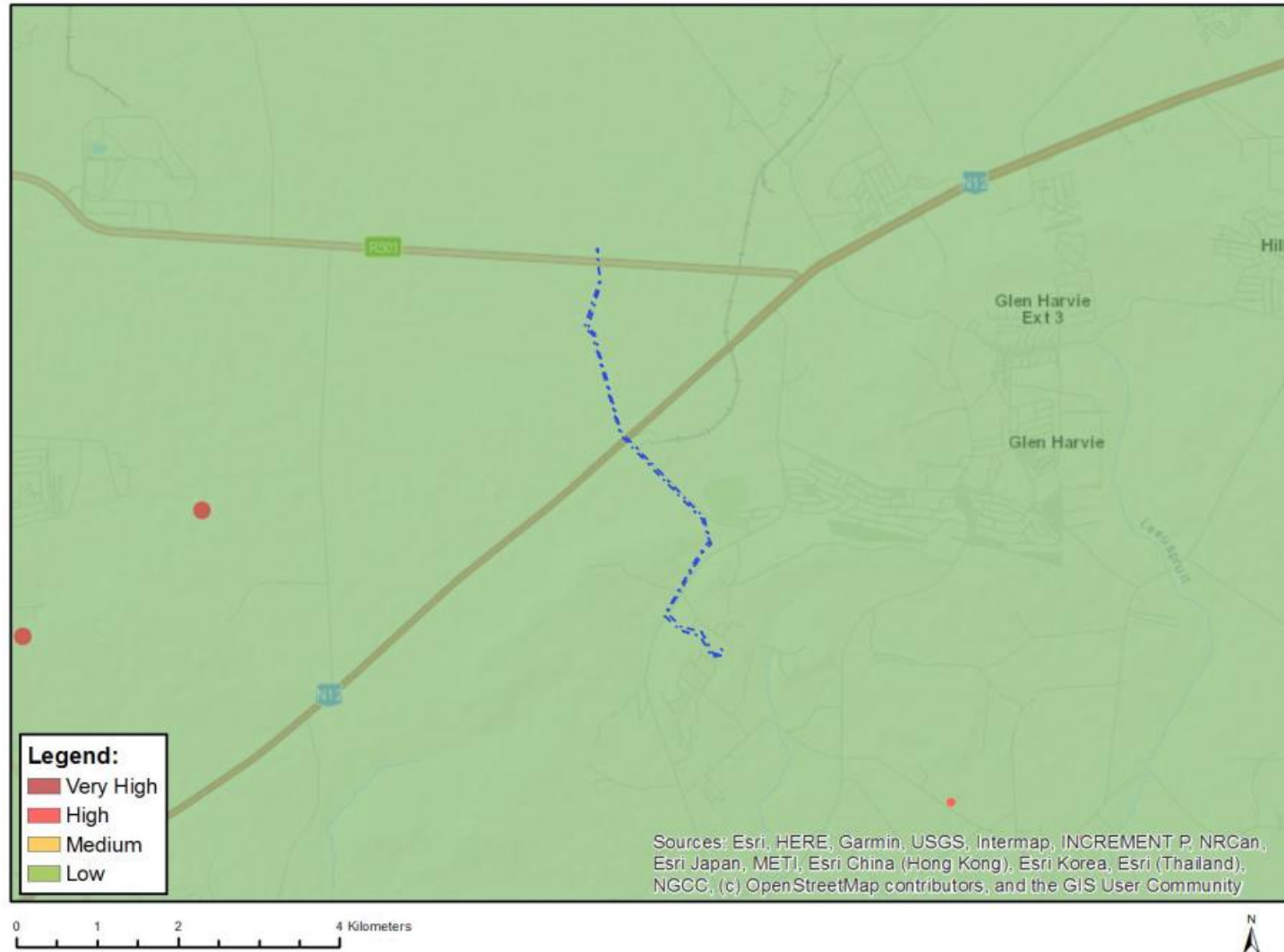


Figure 6: Archaeological and cultural heritage theme sensitivity according to the DFFE national web-based screening tool

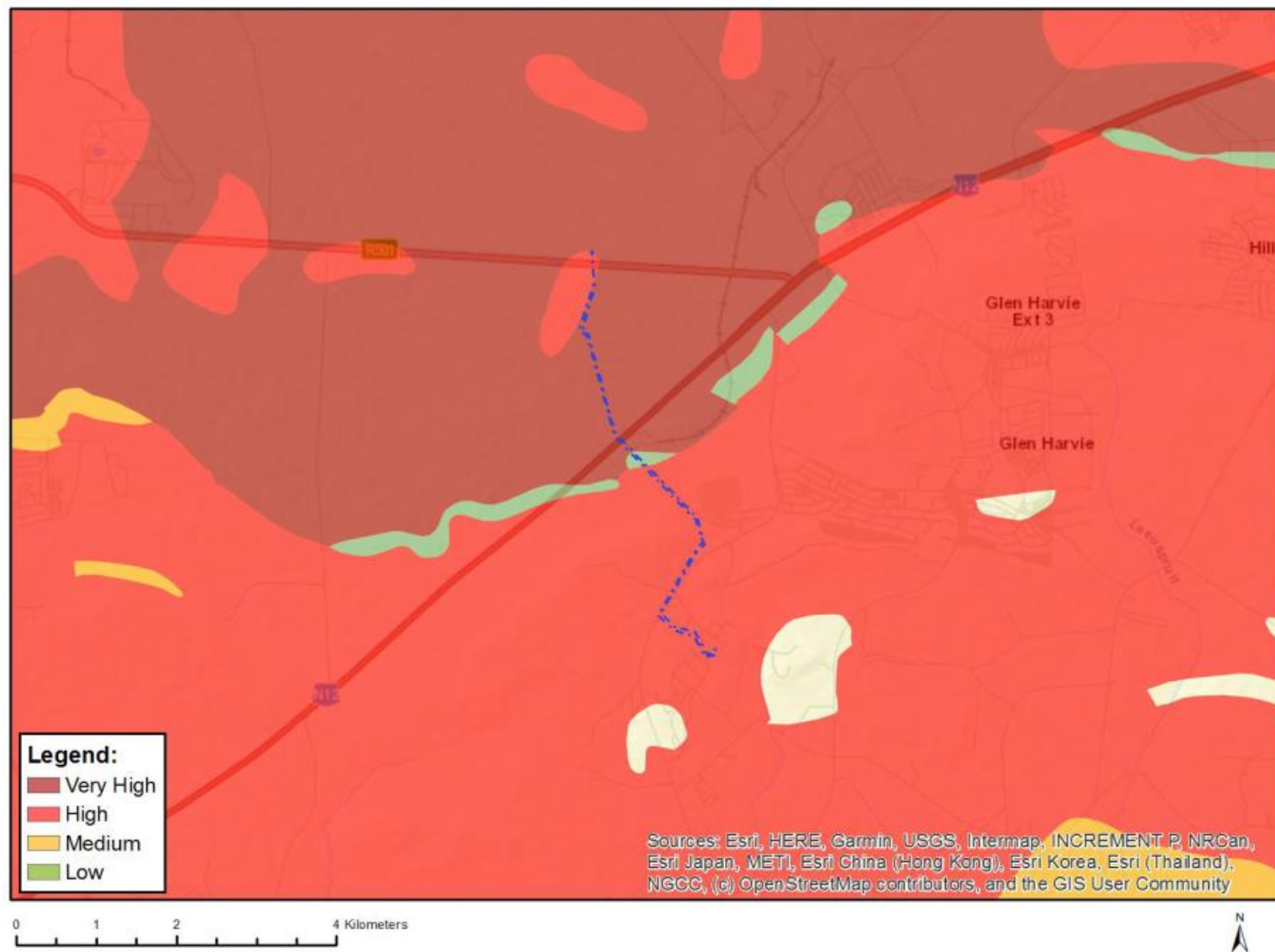


Figure 7: Palaeontology theme sensitivity according to the DFFE national web-based screening tool

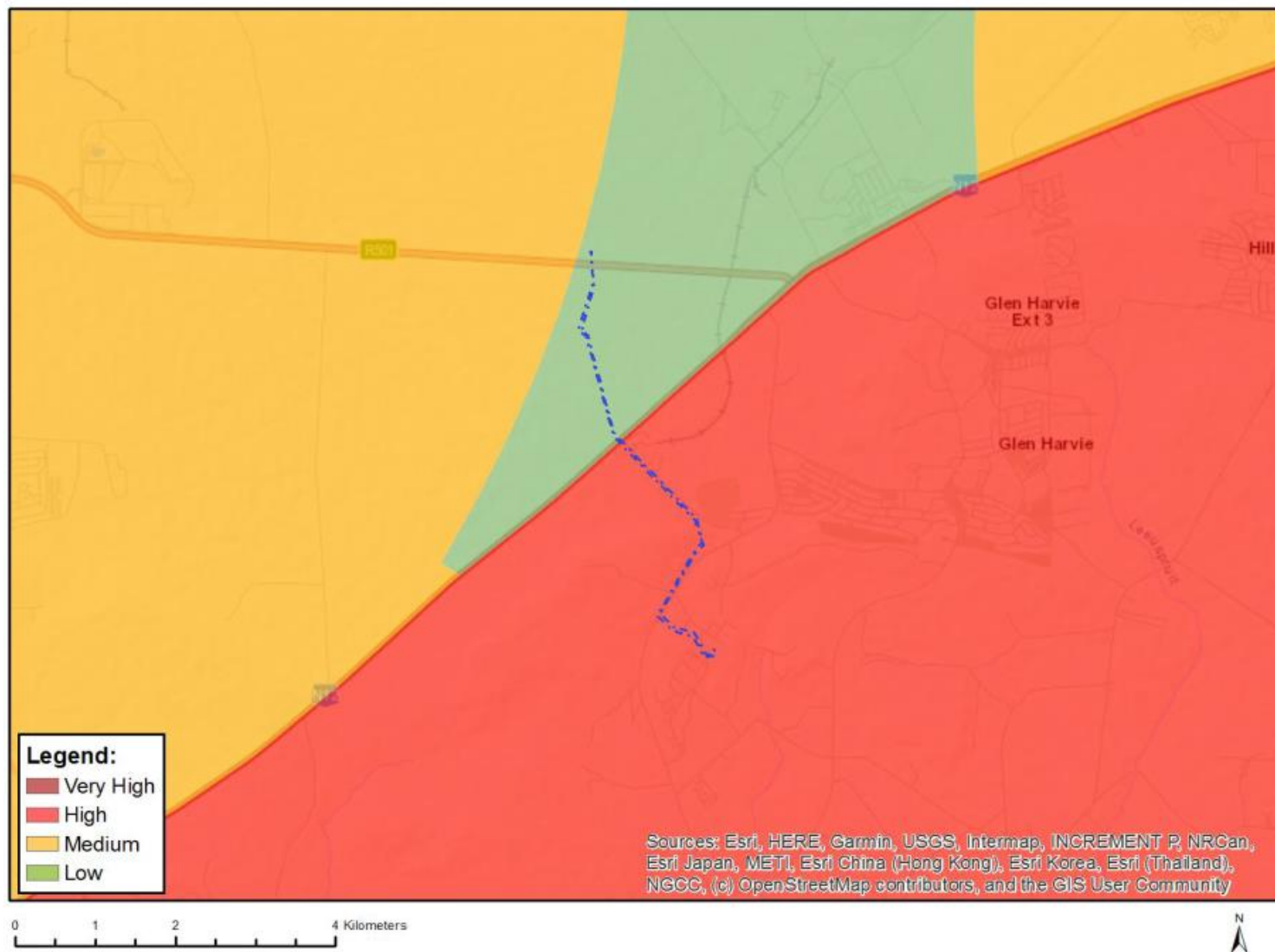


Figure 8: Civil aviation theme sensitivity according to the DFFE national web-based screening tool



Figure 9: Defence theme sensitivity according to the DFFE national web-based screening tool

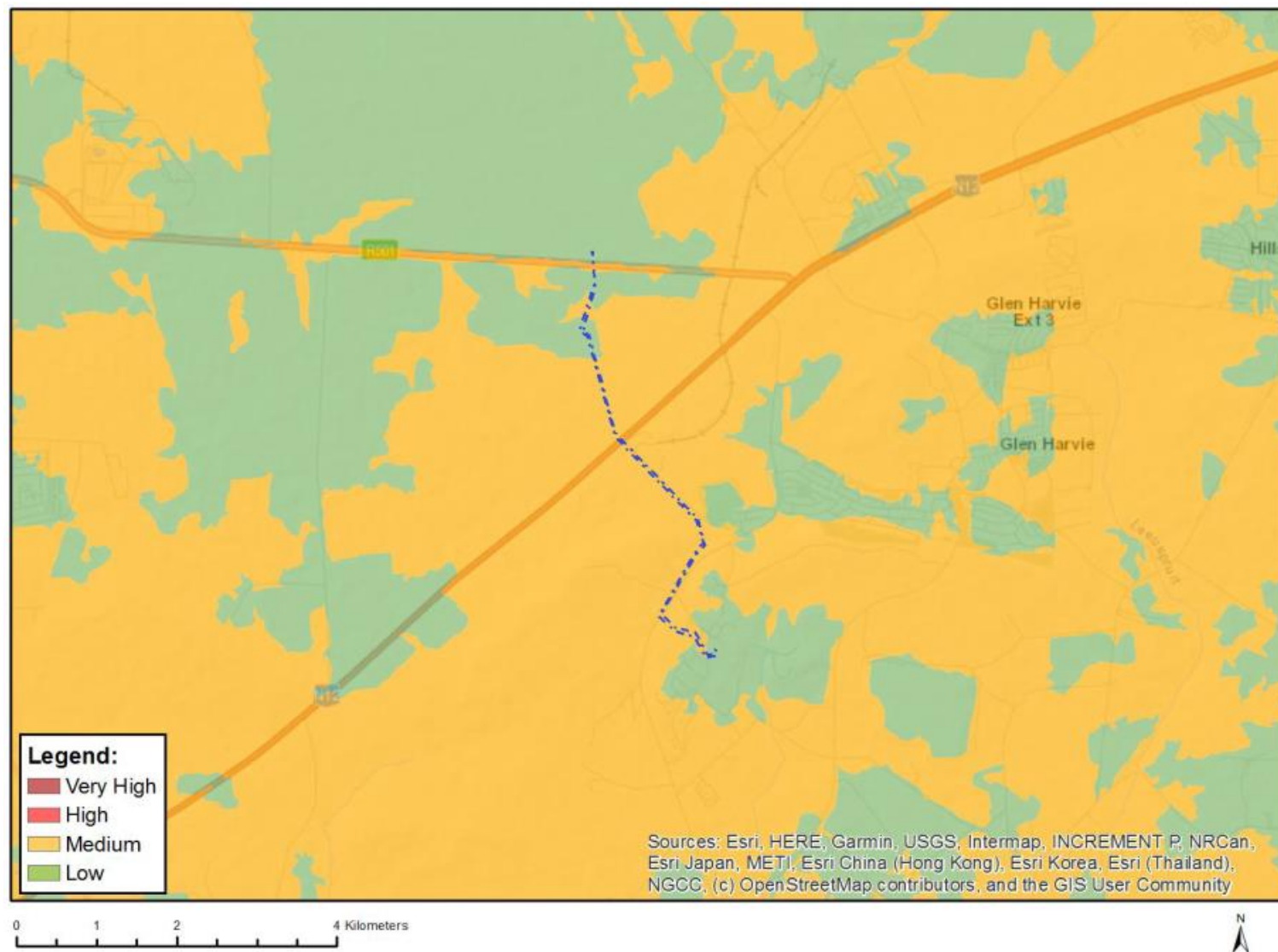


Figure 10: Plant species theme sensitivity according to the DFFE national web-based screening tool



Figure 11: Terrestrial biodiversity theme sensitivity according to the DFFE national web-based screening tool

7.3 Sub-section 3: Declaration

The proponent/applicant or holder of the EA affirms that he/she will abide and comply with the prescribed impact management outcomes and impact management actions as stipulated in part B: section 1 of the generic EMPr and have the understanding that the impact management outcomes and impact management actions are legally binding. The proponent/applicant or holder of the EA affirms that he/she will provide written notice to the CA 14 days prior to the date on which the activity will commence of commencement of construction to facilitate compliance inspections.

Signature Proponent/applicant/ holder of EA

Date:

Signed by: Jevon John Martin
Signed at: 2023-02-09 15:22:01 +02:00
Reason: I approve this document



09/02/23

7.4 Sub-section 4: amendments to site specific information (Part B; section 2)

Should the EA be transferred to a new holder, Part B: Section 2 must be completed by the new holder and submitted with the application for an amendment of the EA in terms of Regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted for an amendment to an environmental authorisation will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

PART C

8 SITE-SPECIFIC ENVIRONMENTAL ATTRIBUTES

If any specific environmental sensitivities/attributes are present on the site which require more specific impact management outcomes and impact management actions, not included in the pre-approved generic EMP template, to manage impacts, those impact management outcomes and actions must be included in this section. These specific management controls must be referenced spatially, and must include impact management outcomes and impact management actions. The management controls including impact management outcomes and impact management actions must be presented in the format of the pre-approved generic EMP template. This applies only to additional impact management outcomes and impact management actions that are necessary.

If Part C is applicable to the development as authorised in the EA, it is required to be submitted to the CA together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP and the name and expertise of the EAP, including the curriculum vitae are to be included. Once approved, Part C forms part of the EMP for the site and is legally binding.

This section will **not be required** should the site contain no specific environmental sensitivities or attributes.

During the site walkdown, protected and threatened plants were only encountered along the 132 kV Powerline Phase 1². Assessed areas for the 132 kV Powerline Phase 1 include a subsection of the Powerline Corridor 3.

Two Orange Listed plant species were encountered along the 132 kV transmission powerline:

- **Seven (7) *Boophone disticha* individuals (least concern (LC) nationally but declining on the Orange List) were recorded within Secondary Grassland. Refer to Section 6.2.1 and Appendix B of the Plant Search, Rescue and Relocation, and Habitat Management Plan for more details; and**
- **One hundred and forty-three (143) *Hypoxis hemerocallidea* individuals (LC nationally, but declining on the Orange List). Of the 143 individuals recorded, a total of 64 specimens of *Hypoxis hemerocallidea* were recorded in the Secondary Grassland and a total of 79 within the Ridge Habitat. Refer to Section 6.2.2 and Appendix B of the Plant Search, Rescue and Relocation, and Habitat Management Plan for more details.**

According to the Gauteng Department of Agriculture and Rural Development (GDARD) (now known as Gauteng Department of Agriculture, Rural Development and Environment (GDARDE)) principles³, Orange Listed species do not require permits for relocation if the species are relocated within the project area.

A population of 87 of the near-threatened (NT) *Adromischus umbraticola subsp. umbraticola* was encountered within the Ridge Habitat. Protocols regarding the relocation of NT species require special attention and stringent planning and mitigation measures. As such, the feasibility for the rescue and relocation of the NT *Adromischus umbraticola subsp. umbraticola* were guided by GDARDE. After a site visit by officials from GDARDE, it was determined that relocation of the NT *Adromischus umbraticola subsp. umbraticola* population is not feasible and no such

² Transmission lines infrastructure that connects to the Kloof mining operations.

³ Gauteng Department of Agriculture and Rural Development (GDARD) (now GDARDE) Biodiversity Directorate's minimum requirements for vegetation assessments of March 2014.

attempts must be made. Refer to Appendix B of the Plant Search, Rescue and Relocation, and Habitat Management Plan for locality records of this species as recorded on site.

The 132 kV Powerline Phase 1 activities will only require the removal of vegetation (and the relocation of Orange Listed species) underneath the pylon structures and associated foundations, i.e., no vegetation clearance is required along the transmission lines. As such, to ensure minimum requirement for relocation initiatives, it is recommended that placement of the pylons be planned in such a way as to limit impacts to floral SCC. Where this is not feasible, section 6.2 of the Plant Search, Rescue and Relocation, and Habitat Management Plan report should be taken into consideration.

APPENDIX 1: METHOD STATEMENTS

To be prepared by the contractor prior to commencement of the activity. The method statements are **not required** to be submitted to the CA.

APPENDIX 2: CV OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER



Reuben Heydenrych

Environmental Practitioner

Summary

Reuben is employed as an environmental assessment practitioner at Zutari. He has extensive experience in the project management of various small and large-scale infrastructural and environmental projects.

He has been involved in environmental impact assessment (EIA) and planning processes in South Africa, Botswana, Kenya, Lesotho, Mozambique, Namibia, Nigeria, Rwanda, Tanzania, Uganda, Zambia, Zimbabwe, Zambia and Antarctica, as required by relevant national legislation, financial institution performance standards and in terms of international requirements as EIA team leader and team member. These projects have included environmental assessments for projects as diverse as fuel storage facilities, mines, industrial developments, telecommunications, power generation (solar, wind, hydro, coal and nuclear), power transmission/distribution, water and sewage infrastructure, transport (airports, rail and roads), residential developments and game lodges. Many of these were completed to lender safeguard requirements, including the European Investment Bank, IFC, AfDB and Equator Principles.

Reuben also has experience in environmental advisory services and strategic environmental management, including strategic environmental assessments (SEAs), environmental scans, environmental feasibility studies and environmental management frameworks (EMFs); environmental management programmes (EMPRs) for construction and operation and environmental auditing, due diligence assessments, ISO 14001 systems development and auditing, legal compliance and waste and water use license audits.

Relevant experience

SKA-Mid Infrastructure Activity Management , South Africa, SKA Observatory HQ UK, 09/2021 - 02/2027, Environmental Specialist

Square Kilometre Array (SKA) is an international project to build the world's largest radio telescope. The project comprises of two main sites covering two components of the Square Kilometre Array, one being mid-frequency array (SKA-Mid) in the Karoo, South Africa. Zutari provides services of project manager (NEC4) including tender process facilitation, supervisor role (NEC4), construction management between infrastructure contracts, assembly integration and verification (AIV) services for combined SKA-mid infrastructure products, training and warranties management. The project management and supervision involve all electrical, fibre, structural and civil works. Responsible for review of contractor proposals against environmental criteria; review of contractor environmental management plans; as well as development of the environmental components of an ISO 14001-based environmental, health and safety management system.

ACED Harmony Gold technical and environmental due diligence for three solar photovoltaic projects (Eland, Tsepong and Nyala), South Africa, African Clean Energy Developments (ACED), 02/2022 - 12/2022, Environmental Specialist

Zutari performed environmental and social due diligence (ESSD) on the three solar PV projects. Responsible for writing of an Environmental and Social Due Diligence chapter of the due diligence report.

Nairobi-Nakuru-Mau Summit Highway Public Private Partnership (PPP) in Kenya, Kenya, CPCS Transcom Canada, 09/2021 - 12/2022, Environmental Specialist

Zutari performed Technical, Environmental and Social Due Diligence (ESSD) on the proposed Nairobi-Nakuru-Mau Summit (NMM) Highway, a proposed toll road between Nairobi and Mau Summit. Responsible for writing of an Environmental and Social Due Diligence chapter of the due diligence report.

Virginia Wilfred Private Hospital, South Africa, Development Bank of Southern Africa (DBSA), 06/2021 - 12/2022, Environmental Specialist

Qualifications

MPhil Environmental Management
BL Landscape Architecture

Professional registrations

Environmental Assessment Practitioner (EAP), Environmental Assessment Practitioners Association of South Africa (EAPASA)
Professional Landscape Architect, South African Council for the Landscape Architectural Profession (SACLAP)
Member, International Association for Impact Assessment, South Africa (IAIASa)

Specialisation

Environmental management

Years in industry

29

The Sponsors were granted approval by the KwaZulu Natal Department of Health to develop an 80-bed private hospital in Ixopo, Ubuhlebezwe Local Municipality in KwaZulu-Natal. Zutari was appointed for a lenders technical advisor review for the 80-bed Virginia Wilfred Hospital. Responsible for writing of an environmental and social due diligence report.

Project Umoyilanga environmental and social due diligence (ESSD), South Africa, EDF Renewables (Pty) Ltd, 04/2021 - 12/2022, Environmental Specialist

Zutari performed environmental and social due diligence (ESSD) on the Umoyilanga energy project, consisting of wind energy facilities (WEF), powerlines ("grid") and hybrid energy facilities (solar and battery storage). Responsible for writing of an environmental and social due diligence report.

Exxaro photovoltaic (PV) Owner's Engineer and project management, South Africa, Exxaro, 04/2021 - 12/2022, Environmental Specialist

Exxaro Energy has identified an opportunity for the development of a solar photovoltaic system for Grootegeluk and Belfast Coal Operations respectively. It contributes to building a renewable energy offering as part of Exxaro Energy's business strategy. Responsible for advice regarding permitting and independent review of another environmental assessment practitioner's scoping and environmental impact reports for the projects.

Anglo American prefeasibility studies, South Africa, Botswana, Namibia and Zimbabwe, Anglo Corporate Services SA, 07/2021 - 12/2022, Environmental Specialist

Anglo American has the objective to become carbon neutral by 2040 and appointed Zutari to provide technical advisory services in the development of an energy strategy for all its sites in South Africa, Botswana, Namibia, and Zimbabwe. This strategy need to provide a procurement perspective per site, in consideration on certain scenarios and criteria to be taken into account, among others: capacity and energy availability, finance, reliability, changing energy landscape, etc. based on taking all the criteria into account. Responsible for environmental screening (including a site visit and development of a screening report) for a solar PV project at Amandelbult Mine. Also responsible for desktop environmental screening for a wind farm at Oranjemund, as well as a desktop environmental screening for wind and solar generation facilities for Debswana Mines in Botswana.

Sibanye photovoltaic plant: amendment of Environmental Authorisation (EA), South Africa, Sibanye Gold Limited, 08/2021 - 12/2022, Environmental Assessment Practitioner

Zutari was appointed to amend conditions of the Environmental Authorisations (EAs) for the Sibanye Gold solar PV plant and associated powerlines that were issued in 2017. These processes include ecological walkdown assessments of the solar PV plant and powerlines, revision of the environmental management plans for both components, and an application for a basic assessment to authorise an additional EIA "listed activity". Responsible for the management of the environmental impact assessment process (EIA), including report writing and the public participation process, and review of all specialist reports; project management; authority liaison and communication.

Confidential green hydrogen project, South Africa, Sasol South Africa, 05/2022 - 11/2022, Environmental Specialist

Zutari was appointed to assist Sasol with environmental pre-feasibility planning for a green hydrogen production facility and associated renewable energy generation infrastructure for a large project in the Northern Cape. Responsible as secondment to Sasol's environmental team to manage Sasol's environmental screening consultant and to contribute to a number of Sasol deliverables, including environmental screening, internal discussion documents, and strategies for environmental permitting.

Mpumalanga Bamboo Project, South Africa, Terragr SA (Pty) Ltd, 04/2022 - 10/2022, Environmental Specialist

The project proposes the establishment of bamboo plantations on farmland in Mpumalanga. Zutari was appointed to compile an environmental screening report based on desktop information and a site visit, and a environmental legal screening to identify necessary legal authorisations. Responsible for site visit data collection, coordination of desktop environmental data, and compilation of a legal screening report.

Simba CM Projects, South Africa, Simba (Pty) Ltd, 05/2021 - 09/2022, Environmental Assessment Practitioner

The project entailed an environmental scoping for the proposed Simba Isando biogas plant. Zutari was appointed to undertake an impact assessment process is to identify, assess and report on any potential impacts that the proposed project may have on the receiving environment, if implemented. The investigation outcome described how impacts on the biophysical and socio-economic environment can be, as far as possible, enhanced or mitigated and managed as the case may be. Responsible for environmental screening and compilation of a basic assessment report.

Herolim Private Hospital technical review, South Africa, Herolim (Pty) Ltd, 05/2021 - 09/2022, Environmental Specialist

Technical review for the development of the 130-bed private hospital licence that was issued to Dr Mashiyi by the Eastern Cape Department of Health. The development has been split into two phases, with the phase one being

approximately 76 beds and phase two 60 beds. Responsible for writing of an environmental and social due diligence report.

Anglo American pumped hydro studies, South Africa, Anglo Corporate Services SA, 02/2021 - 08/2022, Environmental Specialist

The Mototolo Mine is a Platinum Group Metal mine in the Limpopo Province of South Africa where several iterations were considered for developing a pumped hydro storage scheme near the mine. A hydrological assessment of the catchment upstream of the proposed abstraction site needs to be performed in order to inform the client about the hydrological characteristics of the site and the catchment upstream. Responsible for data collection, identification of environmental and social risks, and generation of the environmental permitting chapter of the pre-feasibility reports.

Displacement Screening LADAR Bolana, South Africa, North West, Rustenburg Platinum Mines, 03/2022 - 07/2022, Environmental Specialist

Anglo American Platinum Pty Ltd appointed Zutari to undertake a detailed screening assessment aimed at determining whether an operation of the company is having displacement impacts on a local community. An Anglo operation received a letter of complaints from the community, raising several concerns, including, health and safety conditions, environmental conditions, provision of services, and high unemployment within the community. The community requested a meeting with Anglo to "address and redress the challenges and frustrations faced". Subsequent to this letter, the Bolana community and Anglo-American representatives met with the Member of the Mayoral Committee (MMC) for Intergovernmental Relations (IGR) and Special Projects at the Local Municipality (LM) to request assistance with the provision of basic services. As a result, the Monitoring and Evaluation Department of the RLM undertook a high-level survey of the community to better understand the challenges and how best to address them. Responsible for writing of the environmental chapter.

Lesego Private Clinic, South Africa, RH Managers (Pty) Ltd, 07/2021 - 07/2022, Environmental Specialist

A 50-bed hospital is being developed in Mogwase in the North West Province. Zutari undertook the technical due diligence review in relation to the equipment and working capital. Responsible for writing of an Environmental and Social Due Diligence Report.

Technical due diligence of the 50 MW Namanve Thermal Power Plant (NTPP), Uganda, KPMG Uganda, 02/2021 - 07/2022, Environmental Specialist

Zutari was appointed to advise the 50 MW Namanve Thermal Power Plant (NTPP) of its current condition through a technical due diligence study. Responsible for writing of environmental due diligence chapter for the due diligence report.

Project Oya environmental and social due diligence (ESSD), South Africa, G7 Renewable Energies (Pty) Ltd, 04/2021 - 06/2022, Environmental Specialist

Zutari performed environmental and social due diligence (ESSD) on the Project Oya energy project, consisting of wind energy facilities (WEF), powerlines ("grid") and hybrid energy facilities (solar and battery storage). Responsible for writing of an environmental and social due diligence report review of the client's environmental and social management system against IFC PS 1 and ISO 14001.

Peakers conversion pre-feasibility study (PFS), South Africa, Avon Peaking Power (RF) (Pty) Ltd, 06/2020 - 03/2022, Environmental Specialist

Avon and Peakers investigated the conversion of its existing diesel-fired Open Cycle Gas Turbine peaking power stations at Avon (in KZN) and Dedisa, in the Eastern Cape, to operate on LNG, which is proposed to be supplied via FSRU from Richards Bay. The possibility to utilise methane rich gas (MRG) from the Sasol Lilly pipeline for Avon peaking operation was also considered. Zutari was appointed to deliver the techno-economic feasibility study for the conversion of the Avon and Dedisa power plant and associated infrastructure. Zutari undertook a technical review and assessment of all documentation, including the NERSA licence application documentation pack, servitude applications, environmental impact assessment (EIA), environmental risk assessment (ERA) authorisation, as well as pipeline storage and design. Responsible for writing of environmental due diligence chapter for the due diligence report, including review of the project against national legal requirements, IFC environmental and social performance standards and Equator Principles.

North-South Corridor rail pre-feasibility study, South Africa, Zimbabwe, Zambia and Eswatini, World Bank Group USA, 09/2020 - 02/2022, Environmental Specialist

The overall aim of the project is to support the NEPAD Business Foundation in assessing and testing various options for private sector participation for a functioning block train service between the ports of Durban/Richards Bay in South Africa to Ndola in Zambia (eventually Kolwezi in DRC). This would include a robust analysis of all possible alternatives (alternatives in alignments, in selection of standards, etc.) and comparison with international experience and good practice among a variety of countries. Responsible for environmental screening study – identification of environmental permitting requirements in each affected country; and identification of environmentally and socially sensitive features along the corridor.

Wartsila - South African design basis , South Africa, Wärtsilä Southern Africa Pty.Ltd, 11/2020 - 01/2022, Environmental Specialist

Zutari was contracted by Wartsila, an engineering, procurement, and construction (EPC) contractor who provides power generation solutions worldwide and across Africa, to develop design basis and philosophies applicable to South Africa for electrical, civil and mechanical engineering. The scope also included the infrastructure approval process, necessary environmental approvals as well as the socioeconomical requirements. Responsible for defining environmental permitting requirements.

Weba, Weco Muzi Hydropower Project feasibility study, Zambia, Frontier Energy Hydro Power Zambia, 10/2019 - 03/2021, Environmental Practitioner

Zutari was appointed to undertake technical, environmental and social feasibility studies for three small (up to 20 MW) hydropower projects on small rivers along the Zambezi Valley escarpment in Southern Zambia. The environmental scope involved scoping and environmental impact assessment to Zambian legal requirements and IFC performance standards. Responsible for report review and quality control of deliverables.

Technical due diligence of 150 MW power plant, Mozambique, AP Moller Capitol, 08/2020 - 03/2021, Environmental Specialist

Zutari performed technical due diligence for a bidder in the sale of a 150 MW gas-fired reciprocating engine power plant. The due diligence included review of the plant design, thermal performance, operation and maintenance, condition, service contracts, fuel supply agreement plus environmental compliance with applicable standards, including the IFC Performance Standards for Environmental and Social Sustainability and the Equator Principles III. Responsible for writing of environmental due diligence chapter for the due diligence report, including review of the project against national legal requirements, IFC environmental and social performance standards and Equator Principles.

Project Zebra: Ekland Safaris Lodge upgrade, South Africa, Limpopo, OBMI, 02/2017 - 02/2021, Environmental Practitioner

Zutari was appointed to undertake the sewer and water design of four existing lodges in the Ekland Safaris luxury game lodge near Louis Trichardt in Limpopo. The extensions to the lodges include spa's and private suites. The project also comprised the upgrade and rehabilitation of an existing runway to comply with ICAO Annex 14 standards and recommended practices in order to operate the Pilates PC12 and Cessna Caravan. The design included the addition of a surfaced apron, terminal building, airfield ground lighting and all associated services. The stormwater boundary fence and drainage system of the airstrip needed to be redesigned in order to accommodate the increase runway width and runway strip dimensions. All associated airfield ground lighting, services and access roads was included in the design. The project involved several environmental authorisation applications, including those for a lodges, fencing, staff housing facilities and other related facilities. Responsible for report review and quality control of deliverables.

LNG-to-power bid for the Port of Ngqura, South Africa, ENGIE Africa, 09/2020 - 01/2021, Environmental Specialist

ENGIE expressed interest to the Department of Mineral Resources and Energy (DMRE) for developing a liquefied-natural-gas-to-power (LNG-to-power) project in Ngqura, as part of the Risk Mitigation Power Procurement Program (RMPPP). Zutari was responsible for the preliminary marine infrastructure design and studies required for the FSU including mooring and berthing dolphins. The scope of works included master planning (port planning) considering existing and future operations and navigation, development of site design data, undertaking a downtime study, preliminary designs of the berthing structures including cost estimates and a project timeline and project specifications. Responsible for environmental screening study – identification of environmental permitting requirements.

BPC Lot 1 North West Transmission Grid (NWTG) project, Botswana, Botswana Power Corporation (BPC), 10/2014 - 12/2020, Independent Environmental Reviewer

The Botswana Power Corporation required the development of a robust and adequately dimensioned transmission system which links power sources to the various load centres at various sites in the north western part of Botswana. The scope of works entailed electrical engineering consultancy services for the design, supply, installation, testing and commissioning of a 400 kV line bay at Morupule B 400 kV substation, a 230 km 400 kV line from Morupule B substation to proposed Letlhakane 400/220 kV substation, the proposed substation at Letlhakane and a 17 km 220 kV line from the proposed substation to the existing Orapa 220 kV switching station. Work also included a 60 MVAR line-connected reactor at Morupule B substation on Letlhakane line and 2 x 60 MVAR line-connected reactors at Letlhakane substation and 30 MVAR switched tertiary connected shunt reactor for each primary grid transformer at Letlhakane. Zutari's services also included geotechnical investigation, aerial survey as well as an environmental and social impact assessment for the proposed transmission line route and substation site. Responsible for the review of the environmental and social impact assessment and environmental and social management plans.

Transaction advisor for the Mogalakwena PV plant, South Africa, Limpopo, Cresco Project Finance, 08/2017 - 08/2020, Environmental Specialist

Anglo American Platinum (AAP) has a large base load power demand at its Mogalakwena Platinum Mine and

intends to reduce its consumption of grid-supplied power by procuring locally generated solar power from an independent power producer (IPP). The solar power is to be generated from an approximately 75 MW photovoltaic (PV) farm to be located near the mine and processing plant. A transaction advisory team, consisting of financial, legal and technical consulting firms, has been appointed to assist in defining, structuring, evaluating and negotiating the IPP procurement. Zutari is fulfilling the role of technical advisor within the transaction advisory team. Zutari's scope includes site visits and data gathering; power consumption data analysis; geographic information systems (GIS) mapping and site selection; solar resource analysis; plant sizing and performance modelling; load flow analysis and identification of electrical connection point/s. The scope further involves capital and operations and maintenance (O&M) cost estimates, technical advice relating to structuring of the procurement process, drafting/inputs to request for qualification (RFQ) and request for proposal (RFP) documentation, including technical requirements, power purchase agreement (PPA), etc., evaluation of RFQ and RFP submissions from IPPs and negotiations with the preferred IPPs. Responsible for environmental screening of potential alternative sites, considering biodiversity risks and heritage risks; identification of potential environmental red flags or fatal flaws per site; identification of appropriate environmental authorisation processes.

Engineering services for the Aga Khan University Hospital Kampala, Uganda, Kampala, Aga Khan University Hospital (AKUH), 09/2016 - 06/2020, Environmental Impact Assessment Team Leader

Aga Khan University Hospital (AKUH) intends to develop a 600-bed hospital on a 60 acre site at the junction of Jinja and New Port Bell Rd in Nakawa, Kampala. The initial phase of the project known as the "Launch Phase" will be developed on a 7 – 10 acre portion of the site and will consist of a 85-bed teaching hospital with an estimated 14 300 m² gross building area. Responsible for the site visit and compilation of the report for the Phase 1 environmental site assessment and for management of the environmental impact assessment process (EIA), including report writing and the public participation process, and review of all specialist reports.

RMB Lender's Technical Advisor for the new Terminal Port of Ngqura, South Africa, Eastern Cape, Oiltanking Grindrod Calulo, 04/2019 - 06/2020, Environmental Specialist

Zutari acted in an advisory role to the lender (Rand Merchant Bank - RMB) on the construction of a 155,000 cbm liquid bulk storage facility undertaken by Oiltanking Grindrod Calulo (Pty) Ltd ("OTGC"). Zutari went through two phases of review with the aim to limit risk and guide the project to financial close. The review included both a commercial and technical due diligence. Throughout the duration of this project, Zutari worked closely with both the lender (RMB) and the owner (OTGC). Responsible for due diligence of project compliance with the Performance Standards of the International Finance Corporation and Equator principles.

Nkomazi Game Reserve, South Africa, Mpumalanga, AP Vos & Sons (Pty) Ltd, 05/2019 - 05/2020, Environmental Practitioner

Environmental management services were undertaken for the tented camp at Nkomazi Game Reserve. Mkomazi Game Reserve, near Barberton in Mpumalanga, is constructing a number tented camp facilities for tourist accommodation. Zutari was appointed to assist them with the environmental applications for these facilities. Responsible for report review and quality control of deliverables.

Cato Ridge land development pre-feasibility study, South Africa, KwaZulu-Natal, Cato Ridge Development Company Ltd/Assmang, 04/2019 - 04/2020, Environmental Practitioner

A pre-feasibility investigation was undertaken for a financial model to determine the extent of the project area, based on physical encumbrances on the properties and the expected CAPEX to develop the land and measure the financial inputs against the market. The main objective was to release and develop land in a responsible manner to achieve triple bottom line and hence a benefit for all stakeholders. In doing so, Assmang wished to leave behind a positive legacy in Cato Ridge. Responsible for environmental component of the pre-feasibility study, which included investigation of the natural and social (heritage and palaeontological) baseline of the site and the identification of potential fatal flaws, red flags and other concerns and the interpretation of specialist findings for the client.

Due diligence for the head Office of the Department of Rural Development and Land Reform, South Africa, Gauteng, African Infrastructure Investment Managers (AIIM), 02/2020 - 04/2020, Environmental Practitioner

The Department of Rural Development and Land Reform has been planning since 2009 to construct a new head office complex at a site in Berea Park, Pretoria. This complex is proposed to be constructed through Public-Private Partnership (PPP). African Infrastructure Investment Managers (AIIM), one of the potential investors in this PPP, develops and manages private equity infrastructure funds designed to invest long-term institutional unlisted equity in African infrastructure projects. AIIM requested a comprehensive technical and commercial due diligence assessment of the project. The objective of the Environmental and Social Due Diligence (ESDD) was to identify and assess all-project related environmental, community, social and health and safety risks and impacts associated with the investment, and to identify areas where positive project impacts can be enhanced, as part of a larger commercial due diligence that AIIM will undertake on the investment. Responsible for written assessment of the ESDD, which includes a description of the risks and gaps identified against applicable environmental and social requirements; recommendations to address identified risks and gaps through a high-level environmental and social action plan (ESAP) as per the AIIM ESAP format; and identified opportunities for value creation through ES interventions.

Transaction advisory services for Angola-Namibia (ANNA) transmission line interconnector, Namibia and Angola, Southern African Power Pool (SAPP), 03/2017 - 03/2020, Environmental and social impact assessment (ESIA) Manager

Zutari was appointed for the provision of transaction advisory services for the Angola Namibia (ANNA) Transmission Interconnector Feasibility Study. It includes multidisciplinary study to support an investment decision to build the interconnector. It also comprises the pre-feasibility including the development of concept; Part 2: feasibility to PIM; and Part 3: PIM to EPC and financial close. In addition, Part 4 is included, with the focus on training and knowledge transfer to the SAPP as the client and the two utility Sponsors, being NamPower (Namibia) and RNT (Angola). Responsible for coordinating and managing the environmental and social impact assessment (ESIA) and resettlement action plan for the proposed 400 kV powerline.

Luapula River Hydroelectric Scheme, Zambia and Democratic Republic of the Congo, Southern African Power Pool (SAPP), 07/2018 - 03/2020, Environmental Practitioner

Zambia and the Democratic Republic of Congo (DRC) have decided to jointly expedite the development of hydropower on the common sites of the transboundary Luapula River. Zutari was contracted to undertake pre-feasibility studies for the proposed scheme. Zutari was engaged to carry out pre-feasibility studies for the environmental and social impact assessment (ESIA) opportunity for the development of the proposed Luapula River Hydroelectric Scheme. The scheme, which includes multiple dams with capacities ranging from 600 to 900 MW, is geared to secure electricity supply for Zambia and the Democratic Republic of the Congo (DRC). To bring this vision to life, Zutari will work in parallel with a technical team to document the project baseline, assess and recommend alternatives, and identify the environmental and social concerns. The project team will also develop terms of reference (ToR), which will guide the ESIA. Responsible for development of an Environmental and Social Screening Report to identify potentially significant environmental and social fatal flaws, red flags and other concerns. This included a comprehensive assessment of environmental and social baseline conditions, based on secondary and primary data collection, and identification of potential environmental and social impacts and constraints and assessment of alternative designs and project configurations (e.g. dams at different sites and full supply levels). The Screening Report included a Resettlement Planning Framework, a Stakeholder Engagement Framework and Terms of Reference for an Environmental and Social Impact Assessment and stakeholder engagement results.

Tiapata Hydropower feasibility study, Guinea, responsAbility Renewable Energy, 05/2018 - 02/2020, Environmental Practitioner

Tiapata Small Hydropower Project (SHP) aims to abstract water from the Saala River which descends through a series of rapids and waterfalls within the Fouta Djallon Highlands region of central Guinea. Zutari was appointed to upgrade the feasibility study completed by SAEMS Hydro Ltd and Wollstra (2018) to a bankable feasibility level. Zutari was responsible for carrying out the prefeasibility study and then the feasibility study of the preferred option. The scheme will likely comprise of a diversion weir, 2.3 m diameter low pressure pipeline, surge tank, 2.3 m diameter steel penstock and a power station housing 4 Pelton wheel turbines. Responsible for the environmental impact assessment to national standards and to IFC standards.

Meta Abo brewery expansion, Ethiopia, Diageo Great Britain, 08/2017 - 01/2020, Environmental Assessment Practitioner

Zutari was appointed in combination with Yerer Engineering to undertake an environmental impact assessment study and develop an environmental management plan for the planned expansion of the Meta Abo Brewery, to include a spirits bottling plant. Responsible for coordination and management of the environmental and social impact assessment (ESIA).

New Bugesera International Airport (NBIA), Rwanda, Bugesera Airport Company Limited (BAC), 08/2017 - 12/2019, Environmental Construction Officer

Zutari is providing design review and construction supervision services on the greenfield New Bugesera International Airport (NBIA) project, with capacity for 1.44 million passengers per year utilising a terminal building of approximately 30 000 m². The runway and parallel taxiway length will be 3.8 km, with the Airbus A330 as design aircraft. This is an engineering and procurement (EPC) contract between the Bugesera Airport Company (BAC) and Mota-Engil Africa (MEA). Responsible for environmental audits of the contractor (Mota-Engil) against the approved Environmental and Social Management Plan; Mota-Engil's own Project Environmental and Social Plan (PESP); and the client's Construction Environmental and Social Management Plan (CESMP).

rAREH Tanzania Reconnaissance Study, Tanzania, responsAbility Renewable Energy, 02/2019 - 12/2019, Environmental Specialist

Zutari was appointed by responsAbility Renewable Energy Holding (rAREH) for a desktop study and a reconnaissance study to identify potential hydropower sites in Tanzania, and refine the findings of the sites' actual potential. The services were carried out by first conducting, a desktop study to identify possible hydropower sites using topographical mapping, applications such as Google Earth®, obtaining information on the river systems, etc., and thereafter a reconnaissance of selected/preferred sites. Henceforth, two separate reports compiled, namely, the desktop study report and a reconnaissance study. The project has a three-facet approach, the first one being to identify sites from scratch, the second being to identify 'owners' of sites who are looking for investors to partner with

them in the development of the sites and lastly, whilst on the site reconnaissance, to speak to the locals and obtain information about other potential sites which might not have been picked up during the desktop study phase. Responsible for desktop level environmental screening of potential project sites.

Assessment of trade and transport needs in North-West Uganda, Uganda, TradeMark East Africa Uganda, 09/2018 - 11/2019, Environmental Specialist

Uganda is home to around 1.1 million refugees, from countries such as South Sudan, Democratic Republic of Congo (DRC) and Somalia. Several humanitarian organisations are involved in attending to the needs of refugees (such as WFP and UNHCR) providing support in the form of food and non-food items. The presence of refugees and the continuous support in the form of food and non-food items has a significant impact on the transport logistics of Uganda. Warehouses have been erected, while vehicle fleets distribute the goods to storage facilities and ultimately to refugees in settlements. Considering the above, TradeMark East Africa (TMEA) appointed Zutari to prepare a scoping study of the trade and transport needs in North-West Uganda, with specific focus on the impact of the refugee influx. This included a high-level screening of the potential environmental impacts of refugee camps and the transport interventions. Responsible for generation of an environmental screening report of the potential environmental impacts of refugee camps and transport options.

Viability analysis for a Private-Public Partnership for implementation of the Flue Gas Desulphurisation (FGD) project at Medupi Power Station, South Africa, Limpopo, PriceWaterhouseCoopers (PwC), 01/2017 - 07/2019, Environmental Specialist

Zutari was appointed by PriceWaterhouseCoopers to assist with a viability analysis of proposed public-private partnerships (PPP) for the implementation of various capital projects by Eskom Generation at its power stations. This included the Flue Gas Desulphurization (FGD) project at Medupi Power Station. Responsible for generation of the environmental portion of the viability analysis report.

ZESCO Lusaka transmission and distribution refurbishment (TDR) project, Zambia and USA, ZESCO Limited, 10/2014 - 05/2019, Independent Environmental Reviewer

ZESCO intended to reinforce and upgrade the power transmission and distribution infrastructure in the Lusaka area as a priority to increase the capacity and improve the reliability of the electricity network for all consumers throughout the area. Zutari was appointed to carry out investigations and planning, design, procurement, construction supervision and project management services for ZESCO Lusaka transmission and distribution refurbishment project. Responsible for the review of the environmental and social impact assessment and environmental and social management plans against European Investment Bank standards.

Square Kilometre Array Central Processing Facility Upgrade, South Africa, Northern Cape, National Research Foundation (NRF), 07/2017 - 01/2019, Environmental Specialist

The Square Kilometre Array (SKA) Telescope is a science mega-project that aims to build the world's largest radio telescope. The SKA1 Observatory will consist of two instruments – the SKA1_Mid telescope to be constructed in South Africa and the SKA1_Low telescope to be constructed in Australia. SKA1_Mid includes approximately 133 steerable dishes that are 15 m in diameter combined with 64 dishes from the MeerKAT precursor instrument. The SKA1_Low includes roughly 130,000 smaller dipole fixed antennas. The scope of works for this project involved various sub-element upgrades concomitant with the upgrade of the Central Processing Facility (CPF) to serve the SKA1_MID telescope. The main components of the power infrastructure included a 33 kV overhead line from Eskom's Karoo Substation (near Carnarvon); a central core site substation at the Site Complex called the Power Facility (PF); and a 22 kV underground cable network supplying mini-substations which in turn supplies groups of MeerKAT dish antennas at 400 V. Responsible for generation of environmental screening report; analysis of environmental legal requirements; review of potential environmental risks of construction; generation of an environmental management plan.

Marine fibre cable landing sites environmental screening, South Africa, Vodacom, 11/2017 - 01/2019, Environmental Specialist

The project entailed environmental screening of potential landing sites for marine fibre lines near Port Elizabeth (Eastern Cape) and Amamzimtoti (KZN) and identification of potentially applicable environmental and related authorisation requirements. Responsible for generation of environmental screening report; analysis of environmental legal requirements; review of potential environmental risks of alternative landing sites; recommendation for most suitable landing sites.

Usafi Transport Terminal, Uganda, Kampala, Pegasys AME, 01/2018 - 11/2018, Environmental Specialist

The objective of this assignment was to provide a detailed plan for developing Kampala's Usafi Market area into a private sector mixed-use development with public transport connections. Zutari, in partnership with IMC Worldwide and Pegasys, was engaged in December 2017 to undertake a pre-feasibility study that investigates private sector-delivered options for a mixed-use development with public transport connections at the Usafi Market in Kampala. Works included supporting the overall management of the project; overseeing the development of a methodology for carrying out the study; client interaction; and stakeholder consultation. Responsible for environmental pre-feasibility study of environmental and social opportunities and risks.

EIA/WULA for bridge over watercourse, Mbombela, South Africa, Mpumalanga, Sommereg Beleggings,

04/2017 - 11/2018, Environmental Assessment Practitioner

Zutari was appointed for a basic assessment process and water use license application (WULA) for the construction of a bridge and concrete wall along the eastern edge of the watercourse adjacent to the BUCO commercial facility in Mbombela, Mpumalanga. Responsible for review of basic assessment report and appendices, including environmental management plan.

Sisi and Simu Hydropower Project feasibility study, Uganda, ResponsAbility Africa, 02/2017 - 04/2018, Environmental Impact Assessment (EIA) Reviewer

Zutari was appointed for the bankable feasibility study, environmental and social impact assessment and for drafting the employer's requirements. The project entailed an environmental impact assessment (EIA) for the proposed hydro-electric project on the Sisi and Simu Rivers on Mount Elgon. Responsible for reviewing the EIA deliverables of a local consultant appointed to undertake an EIA in order to ensure compliance with the requirements of the International Finance Corporation (IFC) and the Equator Principles (EPs).

Lagos Cable Transit Project - environmental services, Nigeria, Niger, African Development Bank (AfDB), 05/2012 - 03/2018, Environmental Reviewer

The Lagos Cable Transit Project, an African first, consists of the construction of three cable propelled transit (CPT) lines for mass transit which will link Lagos Island with Lagos Mainland and will also link residential and business areas. The implementation of the CPT lines could serve as a model for implementation of similar systems in other congested African cities. Zutari was responsible for undertaking technical advisory services related to all technical aspects of the project. The environmental component of the project comprised a review of the environmental and social impact assessment (ESIA) of the proposed the Lagos Cable Car Transit. The review comprised a comparison of the requirements of the Nigerian EIA legislation, the International Finance Corporation's Performance Standards for Environmental and Social Sustainability and the Equator Principles. Responsible for review of environmental impact assessment: It also entailed an analysis and assessment of the content and quality of the ESIA report against these requirements; identification of environmental and social impacts that are likely to occur as a result of the proposed project; an assessment of the adequacy' of the ESIA in addressing environmental impacts and recommending appropriate mitigation measures and the identification of gaps in the ESIA and recommendations to rectify shortcomings.

24G environmental application for Standerton Oil Mill, South Africa, Mpumalanga, Standerton Oil Mills, 11/2016 - 02/2018, Environmental Management System Specialist/Internal Environmental Reviewer

The project entailed applications for legalisation of infrastructure that had been commenced illegally in relation to the Standerton Oil Mills operations. This included the compilation of an environmental impacts and aspects register towards the development of an ISO 14001 environmental management system. Responsible for review of the Section 24G legislation documents, and for compilation of the environmental impacts and aspects register.

Transnet Tippler 3 Project FEL 3 Port of Richards Bay, South Africa, KwaZulu-Natal, Transnet SOC Richards Bay, 01/2017 - 01/2018, Internal Environmental Reviewer

Zutari was appointed by Transnet Capital Projects to undertake the complete design and construction methodology of the tippler and all bulk material handling equipment and services for a single cell tippler installation in the Port of Richards Bay. The appointment involved the preparation of various drawings for mechanical, structural, electrical and control and instrumentation elements of the tippler. In addition, various environmental and sustainability documentation were produced by Zutari. Responsible for internal review of the following report deliverables: sustainability report; environmental and community interface report and design criteria report.

Baseline design for the construction of railway line from Dar es Salaam - Isaka, Tanzania, CPCS Transcom St Michael Barbados, 09/2016 - 12/2017, Environmental Practitioner

Zutari was appointed for the baseline design for the construction of a railway line from Dar es Salaam to Isaka in Tanzania. Part of the scope included an environmental screening exercise to determine the environmental feasibility of the upgrading and re-alignment of the railway line. Responsible for site visit, compilation and editing of environmental screening report, which identified the applicable IFC performance standards, potential environmental and social impacts and requirements for the update of the environmental and social impact assessment.

Overvaal Rail Tunnel, South Africa, Mpumalanga, Transnet Freight Rail, 06/2017 - 12/2017, Internal Environmental Reviewer

The project entailed the compilation of a number of sustainability reports for Transnet to review the sustainability of the proposed second Overvaal Rail Tunnel. Responsible for internal review of the following report deliverables: sustainability report; environmental and community interface report and water use license report.

Aviation master plan for North West Province, South Africa, North West, North West Department of Community Safety and Transport Management, 04/2017 - 12/2017, Environmental Specialist

The project entailed master planning for the network of airports and airfields in the North West Province. The environmental scope of work involved screening of each airport to determine the environmental opportunities and constraints regarding potential expansion at each of these airports or airfields. Responsible for the compilation of a

screening report.

Sibanye Gold photovoltaic plant environmental impact assessment (EIA), South Africa, Gauteng, Sibanye Gold Shared Services/Sibanye Stillwater, 06/2015 - 11/2017, Environmental Assessment Practitioner

Zutari managed the environmental impact assessment (EIA) process required for authorising the proposed photovoltaic facility in terms of the National Environmental Management Act. Sibanye Gold, a mining company, intends to develop the project to gain greater independence from Eskom. The project will provide power exclusively to Sibanye Gold. The generated electricity may be used at any one of its mines in the Westonaria/Carletonville region. Responsible for the management of the environmental impact assessment process (EIA), including report writing and the public participation process, and review of all specialist reports. Also responsible for amendment of the environmental authorisation and related authority liaison, as well as undertaking a Phase 1 environmental site assessment of the proposed site to confirm the presence of any potential environmental risks for project development.

Haakdoorndrift opencast project, South Africa, Limpopo, Anglo American Platinum, 03/2016 - 11/2017, Environmental Assessment Practitioner

Zutari was appointed by Anglo American Platinum to undertake the environmental impact assessment (EIA), waste and water licenses for the Haakdoorndrift opencast project at their Amandelbult Complex as part of their opencast activities. Specialist studies include groundwater, soil and land capability, terrestrial and aquatic biodiversity, noise, blasting and vibration, heritage and palaeontology, social impact assessment (SIA) as well as floodline determination. An environmental screening exercise determined the environmental feasibility of relocation of a railway line on a proposed opencast pit in the Amandelbult mining complex. Three environmental basic assessments applied for environmental authorisation for Open Pits 37, 62 East and 36W. Zutari also audited the implementation of a phase out plan for polychlorinated biphenyl (PCB)-containing materials at Anglo's Waterval Smelter near Rustenburg. Responsible for the compilation of environmental screening report for a number of proposed open pits. Also responsible for the management, coordination and quality control of the basic assessments for Pits 37 and 62 East, including review of specialist studies. Other duties included the management, coordination and quality control of the environmental management programme for Open Pit 36W, as well as authority liaison, meetings and follow -ups regarding granting of authorisation and correction of mistakes on authorisations that had been granted. Furthermore, he was responsible for the internal review of an audit of PCB-containing materials at the Waterval Smelter.

Lord's View Data Centre, South Africa, Gauteng, Dark Fibre Africa (DFA), 09/2017 - 11/2017, Internal Environmental Reviewer

Zutari undertook the feasibility assessment for the establishment of a data centre in an industrial park. The environmental feasibility study was one of several technical feasibility studies. Responsible for internal review of the environmental screening report.

Kiwira pre-feasibility study for hydro-electric power stations, Tanzania, Mbeya, Kiwira Energy Limited, 11/2016 - 10/2017, Environmental Specialist

Zutari was appointed to undertake a pre-feasibility investigation for a number of small scale hydroelectric sites along the Kiwira River in western Tanzania. Responsible for identification of environmental fatal flaws and red flags through site visits. Also responsible for the generation of environmental project briefs and project registration with the Tanzanian National Environmental Management Council (NEMC) to initiate the environmental authorisation process. Other duties included the compilation and internal review of a scoping report for the proposed Kiwira II hydroelectric site, in addition to the compilation of an environmental screening report for the proposed Momba Dam.

Dragline relocation pre-feasibility study at Landau Colliery, South Africa, Mpumalanga, Anglo Operations Proprietary, 11/2015 - 09/2017, Environmental Practitioner

Zutari was appointed to undertake a dragline relocation pre-feasibility study at Landau Colliery located in eMahlaleni. The scope of works extended to waste classification of discard material sources for Madini and Elandsfontein dumps. The works also included the compilation of a scoping and environmental impact report for the proposed construction of a road, with the purpose of relocating the dragline from the Kromdraai Section to the Navigation Section of Landau Colliery. Responsible for an internal review of scoping and environmental impact reports and public participation documents; as well as participation in impact assessment workshops and client review workshops.

Environmental screening and general environmental advice to SAIL Mining, South Africa, Gauteng, SAIL Mining, 05/2014 - 06/2017, Environmental Advisor

The project entailed environmental screening to determine the need for any environmental authorisations as well as providing general advice regarding the management of environmental risks on the site in Rosslyn (chrome, waste, stormwater and dust) and management of a dust monitoring programme. Responsible for drafting of an environmental screening report and provision of ad hoc environmental advice.

Mohembo Bridge over the Okavango River, Botswana, Itinera/Cimola JV, 11/2016 - 06/2017, Environmental Assessment Practitioner

Zutari was appointed by Itinera, a contractor, to develop a site-specific Environmental, Health and Safety Management Plan (EHSMP) for the construction of the Mohembo Bridge over the Okavango River in the north-west of Botswana. Responsible for the development of the environmental portion of the EHSMP.

Mogalakwena 33 kV powerline, South Africa, Limpopo, Mogalakwena Local Municipality, 05/2015 - 06/2017, Internal Environmental Reviewer/Environmental Assessment Practitioner

The Mogalakwena Local Municipality appointed Zutari to design a 33 kV powerline in the Waterberg, and to obtain environmental authorisation under the environmental impact assessment (EIA) regulations in terms of the National Environmental Management Act, 1998. Responsible for internal review of the environmental basic assessment report and environmental management programme.

Waterberg feasibility (FEL 3) study for rail infrastructure, South Africa, Transnet SOC Johannesburg, 12/2014 - 12/2016, Environmental Practitioner

Zutari was appointed to assist Transnet in attaining their business goal of establishing an incremental rail capacity development plan for coal tonnage throughput up to 24 Mtpa, for export and domestic destinations. Zutari investigated and established the requirements in terms of upgrading the existing rail infrastructure between Lephalale and Ermelo in order to support the envisaged expansion, which includes infrastructure, rolling stock and other assets. Responsible for editing and revision of FEL 3 environmental feasibility reports, including the environmental design criteria report, environmental and social governance report and sustainable development design report.

Environmental, health and safety legal register of Khanyisa Power Station, South Africa, Mpumalanga, Alstom/General Electric, 06/2016 - 12/2016, Environmental Specialist

Zutari was tasked with the compilation of a comprehensive database of environmental, health and safety and spatial planning legal authorisations for construction of the proposed Khanyisa Power Station, with a focus on requirements applicable to the contractor. Responsible for project management and identification of environmental legal requirements.

Menlyn diesel spill response, South Africa, Gauteng, Pareto, 08/2016 - 11/2016, Independent Environmental Specialist

The project entailed a response to spillage of approximately 20 000 litres of diesel from Menlyn Park shopping centre into the Moreletaspruit in eastern Pretoria. Responsible for review of spill response in terms of company's procedures and processes; compilation of emergency reports to relevant environmental authorities; liaison with authorities; and review of specialist ecological reports.

Overvaal Tunnel FEL 3 and FEL 4, South Africa, Mpumalanga, Transnet SOC Johannesburg, 06/2014 - 11/2016, Internal Environmental Reviewer

Zutari was appointed for the feasibility (FEL 3) development in respect of the construction of the second Overvaal tunnel as well as the complete engineering (FEL 4) thereof. In addition to the development of the tunnel, Transnet SOC required to reinstate, upgrade and/or construct a ventilation system for the existing tunnel. The new tunnel needs to accommodate a double electrified signalled track. Responsible for the review of the environmental and social management plan (ESMP) and the water use license application report.

Sebokeng CBD feasibility study, South Africa, Gauteng, Development Bank of Southern Africa (DBSA), 09/2015 - 10/2016, Environmental Practitioner

The purpose of the feasibility study is to determine the potential technical and financial sustainability and success of the project to be implemented. An environmental screening exercise was undertaken to determine environmental feasibility of the development of a mixed use precinct in Sebokeng. Responsible for the compilation of the screening report.

Pilgrim's Rest residential development, South Africa, Mpumalanga, Mpumalanga Provincial Government: Department of Human Settlements, 10/2015 - 10/2016, Environmental Assessment Practitioner

The project comprised an environmental basic assessment process for the authorisation of the construction of a residential area at Pilgrim's Rest. Responsible for internal review of basic assessment report, participation documents and specialist reports.

Independent engineering audits for the South African National Roads Agency Limited (SANRAL) and the N3 Toll Concession (N3TC), South Africa, South African National Roads Agency Limited (SANRAL) and N3 Toll Concession (Pty) Ltd (N3TC), 09/2009 - 09/2016, Environmental Specialist

The South African National Roads Agency Limited (SANRAL) signed a 30-year concession contract with the N3 Toll Concession (N3TC) to maintain and upgrade the section of National Route 3 (N3) between Cedara and Heidelberg. Zutari was appointed as the independent engineer to oversee and audit the contract, including reviewing all designs, audit construction work, maintenance work and the toll plaza operations as well as environmental audits of the environmental system implementation. Responsible for auditing and monitoring of the environmental system.

Ingula pumped storage scheme, South Africa, Gauteng, Eskom Holdings SOC, 11/2011 - 08/2016, Environmental Reviewer

The project comprised annual environmental compliance audits against the requirements of the Ingula pumped storage scheme's water use licence (WUL) and integrated water use licence (IWUL). Responsible for the compilation of and review of integrated waste and water management plan (IWWMP) audits.

Lesotho knit fabric mill development, Lesotho, Lesotho National Development Corporation (LNDC), 04/2016 - 08/2016, Environmental Practitioner

Zutari was appointed to develop options for service delivery for three knit fabric mill plants located in existing industrial parks in Tikoe, Nyenye and Ha Belo in Lesotho. The scope of works entailed preparing a block plan for each of the three estates indicating the consolidation of stands required to suit the needs of each investor, investigating the available supply of electricity and making recommendations regarding upgrades that were required, ensuring that measures were in place to improve electricity efficiency were outlined, investigating potential water supply sources and covering ground water, surface water and municipal supply. Additional services include undertaking a cost benefit analysis on the three options for each individual site, designing a wastewater treatment package plant to suit the capacity requirements for each investor based on the contaminants specified by the investor, and as well as carrying out a high level environmental screening highlighting all potential environmental issues and applications required. Responsible for compilation of the screening report.

Mokolo Crocodile Water Augmentation Project (MCWAP), South Africa, Limpopo, Trans-Caledon Tunnel Authority (TCTA), 09/2009 - 06/2016, Reviewer

The project entailed comprehensive engineering services for the Mokolo Crocodile Water Augmentation Project (MCWAP), including the construction of two major bulk raw water transfer systems and associated infrastructure. The MCWAP supplies raw water to meet the demands of the new power station in Lephalale, mines and industry, and domestic users. The main components of the scheme are abstraction weirs, pump stations, pipelines and balancing storage. Responsible for the independent review of a draft basic assessment report (BAR).

Olifants River water resources development project, Phase 2, South Africa, Limpopo, Trans-Caledon Tunnel Authority (TCTA), 09/2009 - 06/2016, Internal Reviewer

The second phase of the Olifants River water resources development project (ORWRDP-2) is an extensive water resource development project to supply water for domestic and industrial (mining) use in the Limpopo Province, South Africa. The Trans-Caledon Tunnel Authority (TCTA) appointed the Aurecon (now Zutari) Nnodana Joint Venture (ANJV) to undertake the design and construction supervision of the project. Responsible for internal review of a visual impact assessment for upgrading of reservoirs and pipelines.

Klipplaats 400 kV line deviation, South Africa, Mpumalanga, Glencore Xstrata Coal South Africa (Glencore South Africa (Pty) Ltd), 01/2015 - 05/2016, Environmental Reviewer

The project entailed environmental studies, water use license application and preliminary design for the Klipplaats 400 kV line deviation at the Tweefontein Coal Mine, the registered land owner of the farm Klipplaat 14IS in Mpumalanga. Responsible for the review and quality control of the basic assessment report and environmental management programme.

Servitudes and EMP for transmission line construction, South Africa, Gauteng, Eskom Holdings SOC Limited, 05/2013 - 05/2016, Internal Reviewer

Zutari's appointment entails the acquisition of options to register servitudes over land within an environmentally approved corridor for 2 x 400 kV transmission lines for a distance of 119.611 km from Matla Power Station near Secunda, Mpumalanga Province to Jupiter B Substation, in the vicinity of Rosherville, Gauteng Province and the management of the EMP during construction of the corridor on behalf of Eskom. Responsible for the review of the internal report.

Lesotho MCA Health Infrastructure Programme 2010, Lesotho, Millennium Challenge Account (MCA) - Lesotho, 10/2009 - 04/2016, Health, Safety and Environment (HSE) and Environmental Management (EM) Manager

This project involved the provision of programme management, construction supervision and environmental management services for the health infrastructure programme in Lesotho. This included the design of the National Reference Laboratory (NRL) and blood transfusion centre, the design of student and staff hostels at existing Lesotho Hospital, and the construction of 138 new health centres and 14 new outpatient departments (OPDs). Responsible for liaising between client and contractor to facilitate resolution of outstanding construction to address health, safety and environmental (HSE) issues.

Legal authorisation requirements for a variety of solar photovoltaic facilities, South Africa, SunEdison, 09/2015 - 03/2016, Reviewer

The project comprised the identification of potential gaps in existing environmental authorisations (e.g. listed activities, validity of previous authorisations, etc.) for five different planned solar photovoltaic facilities. Responsible as internal reviewer.

Basic assessment for the upgrade of Island View substation, South Africa, KwaZulu-Natal, Transnet SOC, 06/2015 - 02/2016, Environmental Assessment Practitioner

Appointed for the basic assessment for the proposed upgrade of Island View substation, Fynlands industrial basin, Port of Durban. Responsible for the management of the basic assessment (BA) process, including report writing and the public participation process, and review of all specialist reports.

Environmental impact assessment (EIA) at the Komati Mill, South Africa, Mpumalanga, TSB Sugar, 06/2014 - 12/2015, Environmental Assessment Practitioner

The project entailed environmental authorisation application and water use licence application (WULA) for the establishment of new cane fields at TSB Sugar's sugar mill near Malalane. Responsible for the management of the environmental impact assessment process (EIA).

Environmental control officer (ECO) services for the construction of the KDS-Homestead power line, South Africa, Northern Cape, Eskom Distribution, 07/2014 - 12/2015, Environmental Assessment Practitioner

The project comprised the environmental monitoring of construction of the KDS-Homestead distribution power line in Kimberley. Responsible for the management and review of environmental monitoring deliverables.

Feasibility (FEL 3) development for the construction of a second Overvaal tunnel (Part 1) and the complete engineering (FEL 4) for Part 2, South Africa, Mpumalanga, Transnet SOC Johannesburg, 06/2014 - 12/2015, Reviewer

Zutari was appointed for the feasibility (FEL 3) development in respect of the construction of the second Overvaal tunnel as well as the complete engineering (FEL 4) thereof. In addition to the development of the tunnel, Transnet SOC required to reinstate, upgrade and/or construct a ventilation system for the existing tunnel. The new tunnel needs to accommodate a double electrified signalled track. Responsible for the review of the environmental and social management plan (ESMP) and the water use license application report.

Kinangop Wind Farm, 1A status review and risk assessment, Kenya, Kinangop Wind Park, 11/2015 - 12/2015, Report Contributor

Following termination of the EPC contract, Zutari was appointed to assess the project status and risks associated with remobilising the 60.8 MW wind farm project. Responsible as report contributor regarding legal and administrative requirements.

Khanyisa Power Station, South Africa, Mpumalanga, ACWA Power, 02/2015 - 11/2015, Environmental Assessment Practitioner

The project involved the application for amendment of an existing environmental authorisation for the expansion of the authorised capacity of 450 MW to 600 MW and other related processes. Responsible for the management of the environmental impact assessment process (EIA), amendment report, amendment report, revision of the environmental management programme (EMPr), and all related specialist reports.

Uganda's detailed strategic implementation plan (SIP), Uganda, Ministry of Works and Transport (Uganda), 09/2014 - 10/2015, Environmental Specialist

As a land-locked country, Uganda depends on regional road, rail and inland water transport systems for the transportation of goods. Majority of the import and export traffic passes through the Northern corridor to Mombasa, little using the Central corridor to Dar-es-Salaam in Tanzania. In order to strengthen the use of the Central Corridor, the National Transport Masterplan (NTMP) was implemented and adopted a multi-modal approach. Responsible for the compilation of report on environmental and social safeguard issues to be considered in project prioritisation, as well client training on these issues.

Identification of legal requirements for a gas-fired power station, South Africa, Enel, 07/2015 - 10/2015, Report Author

Appointed for the compilation of a database of legal authorisation requirements for the construction and operation of a gas-fired power station. Other authors contributed sections on health and safety, grid planning and land use authorisations. Responsible as report author.

Richards Bay Coal Terminal (RBCT) short-term coal stockpile, South Africa, KwaZulu-Natal, Transnet National Ports Authority (TNPA), 05/2013 - 07/2015, Internal Reviewer

Design of a short-term coal stockpile at Richards Bay Coal Terminal (RBCT) to handle 1.0 Mtpa of coal for New Entrants Miners. Responsible for the review of the internal report.

Netcare Energy Policy, South Africa, Netcare Limited, 02/2015 - 05/2015, Policy Writer

The project entailed drafting an energy management policy for Netcare, a health service provider, towards the development of their environmental management system. Responsible for the drafting of policy.

National Transport master plan (NATMAP) review and upgrade, South Africa, Department of Transport, 01/2015 - 05/2015, Reviewer

The project involved the revision of the National Transport master plan, a strategic plan for transport development in South Africa developed by the Department of Transport. The initial draft document was developed in 2007 and was required to be revised to be accepted by the Department of transport and Cabinet. Responsible for data collection, presentation of the current status quo and revision of Chapter 8 (Energy and Environment).

Bankable feasibility study (BFS) for a small hydropower scheme on the Nithi River in Central Kenya, Kenya, Frontier Investment Management, 04/2014 - 04/2015, Environmental Impact Assessment (EIA) Reviewer

The project entailed an environmental impact assessment (EIA) for the proposed hydro-electric project on the Nithi River, Mount Kenya. Responsible for reviewing the EIA deliverables of a local consultant appointed to undertake an EIA in order to ensure compliance with the requirements of the International Finance Corporation (IFC) and the Equator Principles (EPs).

Contamination assessment of selected Transnet properties, South Africa, Transnet SOC, 03/2014 - 03/2015, Environmental Reviewer

The project comprised contamination assessment of various sites to identify environmental contamination as well as compile site assessment reports and financial model for the closure and rehabilitation of these sites - included various specialist studies. Responsible for the review and quality control of the contaminated site assessment report.

Mobile disaster recovery trailers for Vodacom, South Africa, Gauteng, Planning & Cost Engineering Services (Pty) Ltd (PaCE), 10/2014 - 03/2015, External Reviewer

The project entailed mobile disaster recovery trailers for Vodacom's Gauteng data centres, with the scope of work being communicated as the project progresses. Responsible for the role of an external reviewer.

Feasibility assessment for proposed small-scale hydro-electric facilities on the Tugela River, South Africa, KwaZulu-Natal, Various clients, 01/2015 - 01/2015, Report Author

The project comprised environmental opportunities and constraints and a fatal flaw assessment (as contribution to a feasibility study) for four proposed mini hydro-electric facilities between Bergville and Ladysmith. Responsible as report author.

Feasibility study of the Nyamagasani II Hydropower Project, Uganda, Frontier Investment Management, 02/2014 - 12/2014, Environmental Impact Assessment (EIA) Reviewer

The project comprises a feasibility study and environmental and social impact assessment (ESIA) for the 5 MW Nyamagasani II Hydropower Project, located on the Nyamagasani River. The feasibility study includes geotechnical; hydrological (daily flows and floods); environmental and social, including resettlement action plan (RAP) and environmental management plan (EMP); civil and hydraulics; mechanical, electrical and interconnection, flow measurements and economic studies. Responsible for reviewing the EIA deliverables of a local consultant appointed to undertake the EIA in order to ensure compliance with the requirements of the International Finance Corporation (IFC) and the Equator Principles (EPs).

Ekurhuleni smart metering feasibility study, South Africa, Gauteng, Ekurhuleni Metropolitan Municipality, 09/2013 - 10/2014, Report Author

The Grantee's Energy Department's (EED's) electricity metering and billing processes and systems suffered from several shortcomings, which consisted of inaccurate meter reading, delays in billing, delays in revenue collection, and unbilled electricity. Zutari was appointed to carry out a feasibility study to evaluate the technical, financial, environmental and other critical aspects of implementing advanced metering infrastructure in Ekurhuleni, South Africa. Responsible for undertaking an environmental screening exercise to identify potential environmental and social impacts and review environmental authorisation requirements. Also responsible as a report author.

Feasibility study investigating the upgrading the 98 km Thaba Tseka – Taung - Mokhotlong road to a bituminous surfacing standard, Lesotho, Lesotho Ministry of Public Works and Transport, 04/2014 - 07/2014, Environmental Specialist

The project entailed a pre-feasibility assessment of the proposed upgrading of the Thaba Tseka - Mokhotlong dirt road to a tarred road. Responsible for reviewing the environmental issues relevant to the proposed upgrading of the road, including a site visit and a review of an environmental impact assessment (EIA) undertaken on the same project in 2006.

AFGRI Mill ISO 14001 certification audit, South Africa, Mpumalanga, AFGRI Milling, 11/2013 - 06/2014, Lead Environmental Auditor

The project entailed a third party Stage 1 ISO 14001 certification audit for AFGRI Mill in Kinross. Responsible for conducting the Stage 1 ISO 14001 certification audit of the environmental management system (EMS).

Basic assessment (BA) and Section 24G rectification assessment of the Vaal River pipeline, South Africa, North West, AngloGold Ashanti, 11/2009 - 03/2014, Senior Environmental Scientist

The project entailed an environmental basic assessment (BA) for the installation of a water pipeline on the Vaal River Gold Mine in Orkney. Responsible for project management and quality control of deliverables.

Nuclear-1 environmental impact assessment (EIA), South Africa, Eastern Cape, Eskom Generation, 04/2013 - 03/2014, Project Leader

The project entailed an environmental impact assessment (EIA) process for the proposed Nuclear-1 Power Station. Responsible for project management, responding to stakeholder comments, and authority liaison, review of approximately 30 specialist reports and providing overall strategic guidance of the EIA process.

Port of Saldanha Expansion Project, South Africa, Western Cape, Transnet SOC Limited, 11/2013 - 03/2014, Project Leader

The project involved environmental impact assessment (EIA) processes and atmospheric emission licence for the installation of a third tippler at the Port of Saldanha. The project also included a scoping and environmental impact report (EIR) process for the expansion of the port (the latter was suspended prior to submission of the draft scoping report). Responsible for the finalisation and submission of the basic assessment report (BAR) for the third tippler, responding to the interested and affected parties' (I&AP's) comments and authority liaison to ensure a timeous authorisation, and post-authorisation amendment of the authorisation and response to appeals by interested parties.

Third party ISO 14001 audit reports, South Africa, Various clients, 04/2013 - 03/2014, Internal Reviewer

The project comprised an internal review of a range of third party ISO 14001 audit reports for various clients throughout South Africa.

Engineering design (FEL 4) for Nacala Port, Mozambique, Nampula, Vale Moçambique Limitada, 10/2011 - 11/2013, Senior Environmental Scientist

Zutari was appointed for the complete on-shore port front-end-engineering design (FEED) for the Nacala Port, consisting of bulk materials handling (BMH), bulk earthworks, rail embankment and utilities and transportation infrastructure. Zutari undertook a number of general functions during its detailed design, including verifying and updating the design criteria documents generated during the Nacala Port front-end loading 3 (FEL 3) study and the engineering design to achieve the requirements for the construction phase. Responsible for review of engineering reports and designs and strategic advice on environmental issues and implications of the design for the environmental authorisation.

ABSA Project X, South Africa, Gauteng, ABSA, 04/2012 - 11/2013, Due Diligence Assessor

Zutari was part of a professional team involved in the conversion and upgrading of an existing factory building and office block of 24 000 m² in Waltloo into a call centre, administration building, canteen, two large gate houses and security buildings and a data centre. Zutari provided structural, civil, fire, wet services, roads and landscaping services on the project. Responsible for the site visit and the compilation of the environmental due diligence assessment (EDDA).

Nuclear-1 environmental impact assessment (EIA), South Africa, Eastern Cape, Arcus GIBB, 06/2012 - 04/2013, Senior Environmental Scientist

The project entailed an environmental impact assessment (EIA) for a proposed Generation III nuclear power station with a maximum generation capacity of 4 000 MW to be located at one of three alternative sites in the Eastern and Western Cape. Zutari was contracted to assist GIBB with the revision of the revised draft environmental impact report (EIR) and to respond to stakeholder comments on this report. Responsible for the revision of the EIR, responding to stakeholder comments, and authority liaison.

Saldanha Tank Farm, South Africa, Western Cape, WorleyParsons, 03/2012 - 03/2013, Visual Impact Assessment (VIA) Specialist

The project involved a visual impact assessment (VIA) for a proposed oil storage facility at Saldanha. Responsible for project management and quality control of deliverables.

Environmental basic assessment for the return water pipeline at Mponeng Gold Mine, South Africa, Gauteng, AngloGold Ashanti, 07/2011 - 02/2013, Senior Environmental Scientist

Zutari was appointed to do the tender design for the replacement of the existing return water pipeline that feeds into the Mponeng process plant in Carletonville. The project included a 4 km pipeline with a 400 mm diameter. Responsible for project management and quality control of deliverables.

Port of Richards Bay capacity expansion conceptual study (FEL 1), South Africa, KwaZulu-Natal, Transnet SOC, 03/2012 - 11/2012, Reviewer

The port facilities in Richards Bay reached operational capacity necessitating expansion. The key objectives of the conceptual (FEL 1) and pre-feasibility (FEL 2) studies were to determine the requirements for all land, rail, terminal, port and marine service engineering options to facilitate the expansionary development of the terminal ports. Zutari's services included rail infrastructure, bulk materials handling (BMH), civil and structural infrastructure, port structural engineering, marine and berth engineering, earthworks, geotechnical and electrical engineering, utilities, health and safety, environmental and solid waste. Responsible for the internal review of report deliverables, including an environmental and community interface report and a sustainability report.

Pre-feasibility study of Mulepe-1 Diamond Mine, Angola, Lunda Norte, De Beers Consolidated Mines (DBCM), 11/2011 - 05/2012, Senior Environmental Scientist

Zutari was appointed to carry out the pre-feasibility study of the hydropower potential in three rivers surrounding De Beers' Mulepe-1 Concession. The project consisted of the measurement of flows in the rivers, rainfall/runoff hydrological modelling, environmental fatal flaw analysis, site reconnaissance, preliminary geological evaluation and determination of the hydropower potential. Zutari determined the optimal and most cost effective solution for the supply of reliable clean energy to the mine. Responsible for the compilation of the screening report.

Environmental advice for the construction of a remote apron stand at OR Tambo International Airport (ORTIA), South Africa, Gauteng, Airports Company South Africa (ACSA), 04/2012 - 05/2012, Senior Environmental Scientist

The project involved providing environmental advice regarding the interpretation of legal requirements for the recommencement of construction of the remote apron stand at OR Tambo International Airport (ORTIA) in Kempton Park. Responsible for the review of legal requirements and drafting of a report on the recommended way forward.

Tau Tona pipeline basic assessment (BA), South Africa, Gauteng, AngloGold Ashanti, 07/2010 - 04/2012, Senior Environmental Scientist

The project entailed an environmental basic assessment (BA) for a pipeline at Tau Tona Gold Mine in Carletonville. Responsible for project management and quality control of deliverables.

Visual opinion for Witberg, South Africa, Western Cape, Arcus GIBB, 11/2011 - 01/2012, Visual Impact Assessment (VIA) Specialist

The project involved giving an opinion on the visual impact of an access road to the proposed Witberg Wind Farm near Matjiesfontein. Responsible for the site visit and the compilation of a brief opinion on the expected visual impacts.

Extension of Sunderland Ridge wastewater treatment works (WWTW), South Africa, Gauteng, City of Tshwane Metropolitan Municipality (CTMM), 01/2007 - 12/2011, Senior Environmental Scientist

Zutari was appointed to provide the engineering services for the extension of the Sunderland Ridge wastewater treatment works (WWTW) to 95 Ml/d. The purpose of the project was to provide a feasibility study for the 30 Ml/d extension; licence applications; environmental impact assessments (EIAs) and the relevant authorisations for the 30 Ml/d extension and process design of the extension. Responsible for project management and quality control of deliverables.

Environmental impact assessment (EIA) for St. Helena Wind Farm, South Africa, Western Cape, Arcus GIBB, 09/2011 - 11/2011, Senior Environmental Scientist

The project comprised a visual impact assessment (VIA) of the St. Helena Wind Farm near Saldanha as part of the environmental impact assessment (EIA) phase. Responsible for project management and quality control of deliverables.

Scoping phase for St. Helena Wind Farm, South Africa, Western Cape, Just Energy, 01/2011 - 06/2011, Senior Environmental Scientist

During the scoping phase of this project, a visual impact assessment (VIA) was prepared for the St. Helena Wind Farm near Saldanha. Responsible for project management and quality control of deliverables.

ISO 14001 auditing, South Africa, South African National Accreditation System (SANAS), 01/2005 - 01/2011, Technical Expert

The project comprised ISO 14001 auditing for the South African National Accreditation System (SANAS), including witnessing of the conduct of the ISO 14001 Certification Body auditors during audits and the assessment of certification body management systems and documentation. Responsible for the assessment of the competence of accredited environmental auditors.

Visual impact assessment (VIA) for Langebaan boathouse for the 4 Special Forces Regiment, South Africa, Western Cape, Department of Public Works (DPW), 07/2010 - 09/2010, Senior Environmental Scientist

The project entailed an environmental impact assessment (EIA) and a visual impact assessment (VIA) for the National Environmental Management Act (NEMA), Section 24G, application for the authorisation of a boathouse construction for the 4 Special Forces Regiment at Langebaan. Responsible for the compilation of VIA.

Second party ISO 14001 environmental management systems (EMSs) audits, South Africa, Western Cape, Eskom Generation, 01/2008 - 01/2010, Environmental Auditor

The project entailed second party ISO 14001 environmental management systems (EMSs) audits, including three-day second party comprehensive EMSs audits of coal-fired power stations in Mpumalanga, a pumped storage scheme in KwaZulu-Natal and gas turbine plants in the Western Cape. Responsible for environmental auditing.

Greater Port Harcourt, Nigeria, Niger, Rivers State Government of Nigeria and Greater Port Harcourt Development Authority (GPHDA), 01/2008 - 01/2010, Senior Environmental Scientist

The project comprised a strategic environmental assessment (SEA), generic environmental management plan (EMP) and the development of terms of reference (TOR) for the environmental impact assessments (EIAs) for Greater Port Harcourt. Responsible for the compilation of the SEA.

Environmental management programme (EMPR) for Finsch Mine, South Africa, Northern Cape, De Beers, 01/2008 - 01/2009, Project Leader and Senior Environmental Scientist

The project entailed updating the environmental management programme (EMPR) to consolidate various guidelines and operating procedures. Responsible for the updating of the EMPR.

Development of a master plan for Matjhabeng (Welkom) Local Municipality, South Africa, Free State, Latitude Management Services, 01/2008 - 01/2009, Senior Environmental Scientist

The project involved the compilation of the environmental portion of the status quo assessment, critical interventions and master plan for the municipality. Responsible for the development of environmental components of the master plan.

Namakwa Sands basic assessment processes for co-generation power plants, South Africa, Promethium Carbon/Prana Energy, 01/2008 - 01/2009, Senior Environmental Scientist

The project involved basic assessment processes for the installation of co-generation power plants at mines and industrial facilities across South Africa, for the generation of electricity from waste gas. The projects enable the project initiator to earn carbon credits through the clean development mechanism (CDM) in terms of the Kyoto Protocol under the United Nations Framework Convention on Climate Change (UNFCCC). Responsible for project management and quality control of deliverables.

Strategic environmental technical support team for the Gautrain Project, South Africa, Gauteng, Gautrain, 01/2008 - 01/2009, Senior Environmental Scientist

The project entailed the provision of a strategic environmental technical support team to the Gauteng Provincial Government (GPG) for the R20 billion Gautrain Project. Technical support was provided during the construction and operational phases of this flagship transport service project. Responsible for the environmental monitoring of contractor activities; the review of the environmental snag list; attendance and advice to the monthly provincial environmental committee (PEC) and the environmental management committee (EMC) meetings and coordination and management of annual external environmental audits.

Mokopane Integration Project, South Africa, Limpopo, Savannah Environmental (Pty) Ltd, 01/2008 - 01/2009, Senior Independent Reviewer

The project entailed an environmental impact assessment (EIA) of the Mokopane Integration Project, including transmission lines and substations. Responsible for the independent review of the EIA documentation and the compilation of a review report.

Nuclear power station, South Africa, Western Cape, Eskom Generation, 01/2008 - 01/2009, Senior Environmental Scientist

The project, implemented by the Generation Division of Eskom Holdings Limited, entailed a detailed environmental impact assessment (EIA), including the screening and selection of a suitable site for the nuclear plant, and a scoping process. The project also included social and biophysical specialist studies, public consultation and legal and nuclear technology studies. Responsible for the compilation of the environmental impact report (EIR) and environmental management plan (EMP).

Kalukundi Copper-Cobalt Project, Democratic Republic of the Congo, Africo Resources, 01/2008 - 01/2009, Senior Environmental Manager

The project entailed environmental services for the proposed copper and cobalt mine in the Kolwezi District in the Eastern Democratic Republic of the Congo (DRC). Responsible for field surveys, an environmental impact assessment (EIA) and an environmental management plan (EMP).

Hendrina-Prairie-Marathon transmission line, South Africa, Mpumalanga, Eskom Transmission, 05/2007 - 06/2008, Project Manager

The project comprised an environmental impact assessment (EIA) for the proposed 185 km-long, 400 kV Hendrina-Prairie-Marathon transmission line between Hendrina and Nelspruit. Responsible for project management and quality control of deliverables.

Huddle Park Golf & Recreation Estate, South Africa, Gauteng, Tiyani Consortium, 01/2005 - 01/2008, Project Leader and Senior Environmental Scientist

The project entailed an environmental impact assessment (EIA) for the Huddle Park Golf & Recreation Estate in Johannesburg. Responsible for the EIA, client liaison, team management, financial management and quality control.

Millsite Development in Krugersdorp, South Africa, Gauteng, Rand Leases, 01/2007 - 01/2008, Project Manager

The project comprised scoping and an environmental impact assessment (EIA) for the proposed Millsite Development in Krugersdorp. Responsible for client liaison, team management, financial management and quality control.

Backlog of the environmental impact assessment (EIA), scoping and exemption applications in terms of the Environment Conservation Act, 1989 (Act No. 73 of 1989), South Africa, Limpopo, Department of Environmental Affairs and Tourism (DEAT), 01/2007 - 01/2008, Reviewer

The project involved the backlog of the environmental impact assessment (EIA), scoping and exemption applications in terms of the Environment Conservation Act, 1989 (Act No. 73 of 1989), on behalf of the Limpopo Department of Economic Development, Environment and Tourism (LDEDET) and the Mpumalanga Department of Agriculture and Land Administration (MDALA). Responsible for the review of environmental scoping and impact assessment reports.

Senqu Sources Protected Area strategic environmental assessment (SEA), Lesotho, Maloti Drakensberg Transfrontier Project (MDTP), 01/2006 - 01/2008, Project Leader and Senior Environmental Manager

The project entailed a strategic environmental assessment (SEA) for the proposed Senqu Sources Protected Area with the aim of establishing a network of formally protected areas in the Maloti Drakensberg Region. Responsible for client liaison, team management, financial management, quality control and fieldwork.

K'Shani Golf and Nature Reserve near Nelspruit, South Africa, Mpumalanga, K'Shani Golf and Nature Reserve (Pty) Ltd, 01/2006 - 01/2007, Project Manager

The project entailed an environmental impact assessment (EIA) process in terms of the National Environmental Management Act's (NEMA's) EIA regulations for the proposed 2 300 ha K'Shani Golf and Nature Reserve near Nelspruit. Responsible for project management and quality control of deliverables.

Eskom Kudu Integration Project, South Africa and Namibia, Eskom, 01/2006 - 01/2007, Project Leader/Senior Environmental Scientist

The project entailed an environmental impact assessment (EIA) for the Eskom Kudu Integration Project for a proposed 400 km-long, 400 kV electricity transmission line from the Kudu Combined Cycle Gas Turbine (CCGT) power station in Oranjemund, Namibia, through the Northern Cape, to Vredendal in the Western Cape, South Africa. Responsible for leading the EIA, client liaison, team management, financial management and quality control.

Flood control of the Apies River in Pretoria, South Africa, Gauteng, BKS Group (Pty) Ltd, 01/2006 - 01/2007, Project Manager

The project comprised environmental scoping for proposed flood control berms in the Apies River floodplain between Wonderboompoort and the Bon Accord Dam. Responsible for client liaison, team management, financial management and quality control.

Menlyn Roads Project: upgrading of the National Route 1 (N1) highway in the eastern part of Pretoria, South Africa, Gauteng, City of Tshwane Metropolitan Municipality/South African National Roads Agency Limited (SANRAL), 01/2005 - 01/2006, Project Manager

The project entailed an environmental impact assessment (EIA) for the Menlyn Roads Project, including the upgrading of municipal roads and the National Route 1 (N1) highway in the eastern part of Pretoria. Responsible for project management and quality control of deliverables for the municipal and national road upgrades.

Water pipeline between the Vaal Dam and Secunda, South Africa, Gauteng, Trans-Caledon Tunnel Authority (TCTA), 03/2005 - 07/2005, Project Manager

The project was concerned with an environmental impact assessment (EIA) for a 115 km, 1.9 m diameter water pipeline between the Vaal Dam and Secunda, as part of the Vaal River Eastern Subsystem Augmentation Project (VRESAP). Responsible for client liaison, team management, financial management and quality control.

Cellular phone mast sites for Cell C, South Africa, Aurecon, 01/1999 - 01/2002, Environmental Manager

The project entailed exemption applications of approximately 300 cell phone mast sites for the Cell C network. Responsible for site visits, assessments and reporting.

Nissan environmental management system (EMS), Pretoria, South Africa, Gauteng, Nissan South Africa, 01/1998 - 01/1999, Group Environmental Manager

The project entailed the implementation and certification of ISO 14001 compliant environmental management system (EMS). Responsible for company-wide coordination of EMS implementation, environmental auditing, training, general advice, strategic review of EMS performance and reporting to top management.

Environmental impact assessment (EIA) for Marion Island, South Africa, Western Cape, Department of Environmental Affairs and Tourism (DEAT), 01/1997 - 01/1998, Environmental Manager

The project comprised an environmental impact assessment (EIA) of the proposed tourism to Marion Island. Responsible for site visits, data collection, specialist study coordination and report writing.

ISO 14001 certification and surveillance audits, South Africa, South African Bureau of Standards (SABS), 01/1997 - 01/1998, Environmental Auditor

The project entailed ISO 14001 certification and surveillance audits of four companies in various provinces of South Africa. Responsible for environmental auditing.

Environmental impact assessment (EIA) for Letsibogo Dam, Botswana, Cave Klapwijk & Associates (CKA), 01/1994 - 01/1995, Environmental Assistant

The project entailed an environmental impact assessment (EIA) of the Letsibogo Dam on the Motloutse River in north eastern Botswana. Responsible for report writing, quality control and review of the sub-consultant's deliverables.

Open cast coal mining rehabilitation, South Africa, Mpumalanga, Amcoal, 11/1991 - 01/1992, Researcher

The project entailed fieldwork for the rehabilitation of open cast coal mining, including vegetation monitoring and soil compaction monitoring on Amcoal's open cast coal mines. Responsible for the collection of field data.

Scoping phase for Wolseley Wind Farm, South Africa, Western Cape, SAGIT Energy Ventures, 01/2011 - Click or tap to enter a date., Senior Environmental Scientist

This project entailed a visual impact assessment (VIA) for the proposed Wolseley Wind Farm near Wolseley. Responsible for the compilation of a scoping phase visual impact assessment.

Revision of the initial report for Langehoogte Wind Farm, South Africa, Western Cape, Arcus GIBB, 10/2011 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed the revision of the visual impact assessment (VIA) for the Langehoogte Wind Farm near Caledon. Responsible for report revision based on peer review comments.

Tumelo distribution power line, South Africa, Gauteng, Eskom Distribution, 01/2009 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed an environmental impact assessment (EIA) process of the Tumelo distribution power line near Kagiso. Responsible for project management and quality control of deliverables.

De Hoek Cement Factory, South Africa, Western Cape, Pretoria Portland Cement (PPC), 01/2009 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed basic assessments (Bas) for upgrades to the Pretoria Portland Cement's (PPC's) De Hoek Cement Factory in Malmesbury. Responsible for project management and quality control of deliverables.

OR Tambo International Airport (ORTIA) Midfield Development, South Africa, Gauteng, Airports Company South Africa (ACSA), 01/2009 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed the provision of a strategic advisory team (SAT) to the Airports Company South Africa (ACSA) for the Midfield Development at OR Tambo International Airport (ORTIA) in Kempton Park. Responsible for providing inputs for strategic advice to ACSA regarding environmental implications of proposed upgrades.

Delta Apron at OR Tambo International Airport (ORTIA), South Africa, Gauteng, Airports Company South Africa (ACSA), 01/2008 - Click or tap to enter a date., Project Leader/Senior Environmental Scientist

The project comprised a basic assessment for the upgrading of the Delta Apron at OR Tambo International Airport (ORTIA) in Kempton Park. Responsible for the environmental impact assessment (EIA).

Medupi Landfill Site Project, South Africa, Limpopo, Envirolution Consulting, 01/2009 - Click or tap to enter a date., Senior Independent Reviewer

The project entailed an environmental impact assessment (EIA) of the Medupi Landfill Site Project in Lephalale. Responsible for the review of EIA documentation.

Apollo-Lepini distribution power line, South Africa, Gauteng, Envirolution Consulting, 01/2009 - Click or tap to enter a date., Senior Independent Reviewer

The project entailed an environmental impact assessment (EIA) of the Apollo-Lepini distribution power line. Responsible for reviewing applicable legislation and projects against EIA legislation requirements.

Watershed-Mmabatho distribution power line, South Africa, North West, Eskom Distribution, 01/2009 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed an environmental basic assessment (BA) for the Watershed-Mmabatho distribution power line. Responsible for project management and quality control of deliverables.

Westgate-Tarlton-Kromdraai distribution power line, South Africa, Gauteng, Eskom Distribution, 01/2009 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed an environmental impact assessment (EIA) of the Westgate-Tarlton-Kromdraai distribution power line. Responsible for project management and quality control of deliverables.

Mulilo Coal-fired Power Station, South Africa, Limpopo, Mulilo Power (through Parsons Brinkerhoff), 01/2009 - Click or tap to enter a date., Senior Environmental Scientist

The project involved an environmental impact assessment (EIA) process of the proposed Mulilo Coal-fired Power Station near Musina. Responsible for project management and quality control of deliverables.

Environmental management plan (EMP) for Eskom Transmission, South Africa, Western Cape, Eskom Transmission, 01/2008 - Click or tap to enter a date., Senior Environmental Scientist

The project comprised the compilation of an environmental management plan (EMP) for the construction and operational phases of the Perseus-Gamma, and Hydra-Gamma 765 kV transmission power lines, an extension to the Hydra Substation, turn-ins of the Beta-Hydra 765 kV transmission power line to Perseus and the upgrading of the Perseus Substation. Responsible for the review of project documentation and the EMP.

Crude acrylic acid (CAA) tank, South Africa, Free State, Sasol, 01/2008 - Click or tap to enter a date., Project Manager

The project entailed a scoping and an environmental impact assessment (EIA) process for the installation of a crude acrylic acid (CAA) tank at Sasol's site in Sasolburg. Responsible for project management and quality control of deliverables.

Eskom Komati Water Scheme pipeline and power line project, South Africa, Mpumalanga, Eskom Generation, 01/2008 - Click or tap to enter a date., Project Manager

The project entailed scoping and an environmental impact assessment (EIA) for the proposed Eskom Komati Water Scheme pipeline and power line project. Responsible for the EIA.

Viking Bay Development, South Africa, Gauteng, Tribid Investments, 01/2006 - Click or tap to enter a date., Project Manager

The project comprised an environmental impact assessment (EIA) for the new hotel, residential golf estate and game farm development at Viking Bay, adjacent to the Vaal Dam. Responsible for client liaison, team management, financial management and quality control.

Orlando Dam Intersection in Soweto, South Africa, Gauteng, Johannesburg Property Company (JPC), 01/2007 - Click or tap to enter a date., Project Leader and Senior Environmental Manager

The project entailed environmental scoping for the proposed Orlando Dam Intersection, a mixed-use redevelopment at the former Orlando Power Station site in Soweto, including an environmental impact assessment (EIA). Responsible for client liaison, team management, financial management and quality control.

Development of Comet in Boksburg, South Africa, Gauteng, Urban Dynamics, 01/2007 - Click or tap to enter a date., Project Manager

The project comprised scoping and an environmental impact assessment (EIA) for the proposed Comet Extension, including eight commercial and light industrial developments. Responsible for client liaison, team management, financial management and quality control.

Ispat brick making plant, South Africa, Clay Fusion Technologies (Pty) Limited, 01/2006 - Click or tap to enter a date., Project Manager

The project entailed an environmental impact report (EIR) for a brick making plant at Ispat Iscor site. Responsible for client liaison, team management, financial management and quality control.

Upgrade of Ispat Galvanising plant in Vanderbijlpark, South Africa, Gauteng, Iscor, 01/2006 - Click or tap to enter a date., Project Manager

The project entailed environmental scoping for the upgrading of the galvanising plant at Ispat Iscor. Responsible for client liaison, team management, financial management and quality control.

Widening of 14th Avenue in Johannesburg, South Africa, Gauteng, Arup, 01/2005 - Click or tap to enter a date., Project Manager

The project entailed environmental scoping for the widening of 14th Avenue in Johannesburg. Responsible for client liaison, team management, financial management and quality control.

Widening of Addo Road in Port Elizabeth, South Africa, Eastern Cape, PD Naidoo & Associates (PNA), 01/2005 - Click or tap to enter a date., Project Manager

The project entailed environmental scoping for the widening of Addo Road (Road MR 450) in Port Elizabeth. Responsible for client liaison, team management, financial management and quality control.

Desilting of Alberton Dam, South Africa, Gauteng, SRK Consulting, 01/2004 - Click or tap to enter a date., Project Leader and Environmental Manager

The project involved environmental scoping and an environmental management plan (EMP) for the desilting of the Alberton Dam. Responsible for client liaison, team management, financial management and quality control.

Development of a shopping centre on agricultural holdings, South Africa, Gauteng, AJP Group, 01/2004 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping for the development of a shopping centre on Holdings 34 and 35 in Kempton Park, Pretoria. Responsible for report writing, site assessment of alternative sites and the public participation process (PPP).

Electricity supply cables between Pretoria North Substation and Annlin Extension 19, South Africa, Gauteng, Moolman Group, 01/2003 - Click or tap to enter a date., Environmental Manager

The project involved environmental scoping for the installation of electricity supply cables between Pretoria North Substation and the proposed Annlin Extension 19. Responsible for report writing, site assessment of alternative sites and the public participation process (PPP).

Access road for The Innovation Hub, South Africa, Gauteng, Arup, 01/2003 - Click or tap to enter a date., Environmental Manager

The project involved environmental scoping for the access road to the Innovation Hub in Pretoria. Responsible for report writing, site assessment and public participation process (PPP) meetings.

Water pipeline from Driefontein Dam to Duvha Power Station, South Africa, Mpumalanga, Eskom, 01/2004 - Click or tap to enter a date., Environmental Manager

The project comprised environmental scoping for a water pipeline from Driefontein Dam to Duvha Power Station in Emalehleni. Responsible for site visits, environmental impact assessments (EIAs), report writing and public participation.

Dunkeld West Filling Station in Johannesburg, South Africa, Gauteng, Seedprop Consolidated Investments, 01/2003 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping for a filling station in Dunkeld West, Johannesburg. Responsible for site visits, environmental impact assessments (EIAs), report writing and public participation.

Environmental scoping for the upgrading of the Sinter Plant at Iscor, South Africa, Gauteng, Iscor Flat Steel, 01/2003 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping for the upgrading of the Sinter Plant at Iscor in Vanderbijlpark. Responsible for site visits, environmental impact assessments (EIAs), report writing, public participation and sub-consultant management.

Extensions to Clover Hill in Bronkhorstspuit, South Africa, Gauteng, Clover Hill Developments (Pty) Ltd, 01/2004 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping for the Clover Hill Extensions 1 - 4, adjacent to the Bronkhorstspuit Dam. Responsible for public participation (stakeholder engagement) and report writing.

Midrand Estates Development, South Africa, Gauteng, Eco Assessments, 01/2000 - Click or tap to enter a date., Environmental Manager

The project entailed an environmental impact assessment (EIA) of the proposed Midrand Estates development. Responsible for fieldwork, site assessment and report writing.

Statue of Freedom in Port Elizabeth, South Africa, Eastern Cape, KPMG Consortium - GAPP Architects, 01/2005 - Click or tap to enter a date., Environmental Manager

The project comprised environmental feasibility/risk assessment for the Statue of Freedom in Port Elizabeth. Responsible for report writing and assessment of alternative sites.

Development of a lodge for the Automotive Supplier Park (ASP), South Africa, Gauteng, PD Naidoo & Associates (PNA), 01/2004 - Click or tap to enter a date., Project Leader and Environmental Manager

The project entailed environmental considerations for the development of a lodge at the Automotive Supplier Park (ASP) in Rosslyn. Responsible for client liaison, team management, financial management and quality control.

Road upgrades for Madikwe Game Reserve, South Africa, North West, Eco Assessments CC, 01/2002 - Click or tap to enter a date., Environmental Manager

The project included fieldwork, public participation, the development of an environmental management plan (EMP) and environmental scoping of roads and the bulk water supply system at Madikwe Game Reserve. Responsible for

fieldwork assessment, public participation (stakeholder engagement) and report writing.

Development of Alberton Waterfront, South Africa, Gauteng, Odyssey Development and Construction, 01/2001 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping for the development of the Alberton Waterfront. Responsible for fieldwork assessment, public participation (stakeholder engagement) and report writing.

Brits/Doreen Roads filling station in Pretoria, South Africa, Gauteng, Gerneke & Potgieter, 01/2002 - Click or tap to enter a date., Environmental Manager

The project entailed the development of a filling station on the corner of Brits Road and Doreen Road in Akasia, Pretoria. Responsible for fieldwork assessment, public participation (stakeholder engagement) and report writing.

Makgabetlwane water pipeline, South Africa, North West, Munayi Malaka Engineers, 01/2001 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping of a water pipeline at Makgabetlwane. Responsible for public participation (stakeholder engagement) and report writing.

Marion Island research base in the South Atlantic Ocean, South Africa, Western Cape, Department of Environmental Affairs and Tourism (DEAT), 01/2002 - Click or tap to enter a date., Environmental Manager

The project entailed environmental scoping for the research base on Marion Island. Responsible for public participation (stakeholder engagement), report writing and the development of an environmental management plan (EMP).

Telecommunications tower for the Council of Scientific and Industrial Research (CSIR), South Africa, Gauteng, Telkom, 01/2003 - Click or tap to enter a date., Environmental Control Officer (ECO)

The project entailed an environmental management plan (EMP) for the construction of a 40 m-tall concrete microwave telecommunications tower at the Council for Scientific and Industrial Research (CSIR). Responsible for on-site monitoring of environmental effects of construction work.

Alluvial Diamond Prospecting, South Africa, Northern Cape, South African National Parks (SANParks) through Cameron Cross Inc., 01/2008 - Click or tap to enter a date., Reviewer

Pico Diamonds environmental management plan (EMP) for Alluvial Diamond Prospecting in the Richtersveld National Park. Responsible for review of scoping and environmental impact assessment (EIA) reports.

Kliprivier Nature Estate, South Africa, Limpopo, Dabchick Consultancy Limited, 01/2008 - Click or tap to enter a date., Reviewer

The project comprised a scoping report for the proposed Kliprivier Nature Estate on Portions 4 and 8 of the farm Kliprivier 464 KQ, and Portion 10 of the farm Rhenosterfontein 465 KQ. Responsible for review of scoping and environmental impact assessment (EIA) reports.

Limpopo Wildlife Estate, South Africa, Limpopo, South African National Parks (SANParks) through Cameron Cross Associates, 01/2007 - Click or tap to enter a date., Reviewer

The project entailed a scoping report for the proposed Limpopo Wildlife Estate on portions of the farms Modena 13 MS, Parma 40 MS and Pontdrift 12 MS in Limpopo. Responsible for the review of scoping and environmental impact assessment (EIA) reports.

Dome Paradise Township, South Africa, North West, Advocate Jaco Venter, 01/2007 - Click or tap to enter a date., Reviewer

The project entailed scoping and environmental impact assessment (EIA) reports for the proposed Dome Paradise Township on Portions 19 and 37 of the Farm Rietpoort 518 IQ. Responsible for the review of scoping and EIA reports.

Shopping centre and residential development on the Farm Klipriviersdal, South Africa, Gauteng, Rand Merchant Bank (RMB), 01/2007 - Click or tap to enter a date., Reviewer

The project involved a scoping and an environmental impact assessment (EIA) application for a proposed shopping centre and residential development on the Farm Klipriviersdal 371 in Meyerton. Responsible for the review of EIA documentation and report writing.

Mmamabula-Delta 400 kV transmission lines, South Africa, Limpopo, Haygon Safaris (Pty) Ltd, 05/2007 - Click or tap to enter a date., Reviewer

The project entailed an environmental impact assessment (EIA) process for the four proposed 400 kV Mmamabula-Delta transmission lines in Lephalale. Responsible for site visits, review of EIA documentation, client liaison and general project management.

Variant alignment for the Gautrain, South Africa, Gauteng, Centurion Association for a Reasonable Environment (WeCARE), 01/2006 - [Click or tap to enter a date.](#), Reviewer

The project entailed several environmental impact assessment (EIA) reports and the environmental management plan (EMP) for the proposed variant alignment of the Gautrain through the Centurion area. Responsible for the review of the EIA reports, the EMPs and other related documents, quality control, client liaison and financial management.

Gauteng Communication Network Strategy (GAUCONS), South Africa, Gauteng, Gauteng Department of Agriculture and Rural Development (GDARD), 01/2002 - [Click or tap to enter a date.](#), Environmental Manager

The project entailed the development of the Gauteng Communication Network Strategy (GAUCONS), a decision-support and administration system for the authorisation of telecommunications masts in Johannesburg. Responsible for report writing and stakeholder liaison.

Buffer Zone projects, South Africa, Gauteng Department of Agriculture and Rural Development (GDARD), 01/2002 - [Click or tap to enter a date.](#), Environmental Manager

This project entailed Phases 1 and 2 of the Buffer Zone projects for the Gauteng Department of Agriculture and Rural Developments (GDARD), which provides guidelines for the authorisation of developments in proximity to activities that cause pollution, including landfill sites, sewage treatment plants (STPs), industries and mine dumps. Responsible for report writing and fieldwork.

National Forest Inventory (NFI) for the Eastern Cape, South Africa, Eastern Cape, Department of Water Affairs (DWA), 01/2002 - [Click or tap to enter a date.](#), Environmental Assistant

The project entailed data gathering and database population of the National Forest Inventory (NFI). Responsible for data gathering and capturing and stakeholder liaison.

Alexandra Renewal Project (ARP) in Johannesburg, South Africa, Gauteng, Gauteng Department of Agriculture and Rural Development (GDARD), 01/2002 - [Click or tap to enter a date.](#), Environmental Manager

The project delivered a report on the environmental management framework (EMF) for the Alexandra Renewal Project (ARP) in Johannesburg. Responsible for field data.

Environmental management framework (EMF) for the Loch Vaal area, South Africa, Gauteng, Aurecon, 01/2001 - [Click or tap to enter a date.](#), Environmental Manager

The project included a report on data gathering and fieldwork, and an environmental management framework (EMF) for the Loch Vaal area in Centurion. Responsible for the compilation of the EMF document.

Environmental management framework (EMF) for Centurion, South Africa, Gauteng, Gauteng Department of Agriculture and Rural Development (GDARD), 01/2002 - [Click or tap to enter a date.](#), Project Assistant

The project comprised the development of an environmental management framework (EMF) for the Loch Vaal region in Centurion. Responsible for field work and report writing.

Emalahleni integrated municipal environmental programme (IMEP), South Africa, Mpumalanga, Emalahleni Local Municipality, 01/2007 - [Click or tap to enter a date.](#), Senior Environmental Scientist

The project entailed the auditing of legal compliance for the Emalahleni Local Municipality's integrated municipal environmental programme (IMEP) in Witbank. Responsible for an audit of environmental legal compliance.

Environmental implementation plan (EIP) for Pretoria, South Africa, Gauteng, Department of Trade and Industry (DTI), 01/2006 - [Click or tap to enter a date.](#), Project Manager

The project entailed the development of a second edition environmental implementation plan (EIP), in terms of the National Environmental Management Act (NEMA) (No. 107 of 1998). Responsible for client liaison, team management, financial management and quality control.

Development of an environmental management system (EMS) for Nelspruit, South Africa, Mpumalanga, Mbombela Local Municipality, 01/2003 - [Click or tap to enter a date.](#), Project Leader and Environmental Manager

The project was concerned with the development of an environmental management system (EMS) for the Mbombela Local Municipality in Nelspruit. Responsible for client liaison, team management, financial management, quality control and training of client representatives.

Development of an environmental policy for Nelspruit, South Africa, Mpumalanga, Mbombela Local Municipality, 01/2003 - [Click or tap to enter a date.](#), Project Leader and Environmental Manager

The project entailed the development of an environmental policy for the Mbombela Local Municipality in Nelspruit. Responsible for client liaison, team management, financial management and quality control.

Information management system (IMS) directorate for Pretoria, South Africa, Gauteng, Department of Water Affairs (DWA), 01/1998 - [Click or tap to enter a date.](#), Project Assistant

The project comprised the development of an information management system (IMS) directorate, namely the Forest Regulation of the Department of Water Affairs (DWA). Responsible for report writing, conducting interviews, reporting and the monitoring of templates.

Environmental management system (EMS) for Johannesburg, South Africa, Gauteng, De Beers Research and Development Company (DebTech), 01/1998 - [Click or tap to enter a date.](#), Project Leader and Senior Environmental Manager

The project entailed the development of an ISO 14001 environmental management system (EMS) for the De Beers Research and Development Centre (DebTech). Responsible for client liaison, team management, financial management, quality control and initial review of client's environmental impacts and aspects.

Environmental management system (EMS) for Antarctica, , Department of Environmental Affairs and Tourism (DEAT), 01/1995 - [Click or tap to enter a date.](#), Environmental Auditor

The project entailed the development of an environmental management system (EMS) for the South African National Antarctic Expedition's (SANAE's) IV Base. Responsible for environmental auditing.

Abattoir Waste Management Guideline Manual (AWM Guideline Manual) document and standard environmental management plan (EMP), South Africa, Gauteng Department of Agriculture and Rural Development (GDARD), 01/2007 - [Click or tap to enter a date.](#), Project Manager

The project involved the provision of an Abattoir Waste Management Guideline Manual (AWM Guideline Manual) and a standard environmental management plan (EMP) for the evaluation of environmental impact assessment (EIA) applications. Responsible for client liaison, team management, financial management, quality control and presentations to stakeholders.

Environmental impact assessment (EIA) regulations training manual, South Africa, Gauteng, Department of Environmental Affairs and Tourism (DEAT), 01/2006 - [Click or tap to enter a date.](#), Senior Environmental Manager

The project entailed the development of a presentation for a series of information seminars on environmental impact assessment (EIA) regulations in terms of the National Environmental Management Act (NEMA) (No. 107 of 1998) in Pretoria. Responsible for preparation of presentations and interpretation of legal requirements.

Socio-Economic Impact Assessment and Risk Management, Integrated Environmental Management Information Series 22 and 23, South Africa, Gauteng, Department of Environmental Affairs and Tourism (DEAT), 01/2005 - [Click or tap to enter a date.](#), Editor and Project Manager

The project entailed the editing and project management of the Integrated Environmental Management Information Series 22 and 23 documents, namely the Socio-Economic Impact Assessment and the Risk Management documents, for the Pretoria area. Responsible for management of sub-consultants, quality and financial management and report writing.

Environmental Assessment of International Agreements, Integrated Environmental Management Information Series 19, South Africa, Department of Environmental Affairs and Tourism (DEAT), 01/2005 - [Click or tap to enter a date.](#), Co-author with James Cross

The project involved compiling the Environmental Assessment of International Agreements, Integrated Environmental Management Information Series 19 document. Responsible for management of sub-consultants, quality and financial management and report writing.

National strategy for the development of integrated environmental management (IEM), South Africa, Department of Environmental Affairs and Tourism (DEAT), 01/1998 - [Click or tap to enter a date.](#), Assistant

The project involved the development of a discussion document, namely a national strategy for the development of integrated environmental management (IEM). Responsible for report writing and management of sub-consultants and stakeholders.

Revision of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998), South Africa, Department of Environmental Affairs and Tourism (DEAT), 01/2003 - [Click or tap to enter a date.](#), Environmental Manager

The project included the revision of Chapter 5 of the National Environmental Management Act (NEMA) (Act No 107 of 1998), which deals with environmental impact assessment (EIA) and integrated environmental management (IEM) procedures. Responsible for report writing, stakeholder engagement, preparation of presentations and other project documentation.

National environmental management bills, South Africa, Department of Environmental Affairs and Tourism (DEAT), 01/2003 - [Click or tap to enter a date.](#), Assistant and Report Writer

The project involved costing of the promulgation of a series of six national environmental management bills, including the Air Quality Amendment Bill, the Biodiversity Bill, the Protected Areas Amendment Bill and the National Environmental Management Act's (NEMA's) 1st and 2nd Amendment Bills. Responsible for the management of sub-consultants, report writing and stakeholder liaison.

Development of a Cell Phone Code of Practice, South Africa, South African Bureau of Standards (SABS), 01/1999 - Click or tap to enter a date., Assistant

The project entailed the development of a South African Code of Practice, including environmental considerations for the planning and management of telecommunications structures. Responsible for report writing and providing of general project assistance.

Lesotho rehabilitation and conservation strategy, Lesotho, Lesotho Department of Water Affairs, 01/2007 - Click or tap to enter a date., Project Manager

The project entailed supplemental field studies and beneficiary analysis related to a proposed rehabilitation and conservation strategy for the wetlands in the highlands of Lesotho, including an environmental impact assessment (EIA). Responsible for client liaison, team management and financial management.

Declaration of the Prince Edward Islands (PEI) as a world heritage site, , Department of Environmental Affairs and Tourism (DEAT), 01/2001 - Click or tap to enter a date., Environmental Manager

The project entailed a motivation report for the declaration of the Prince Edward Island (PEI) as a world heritage site (WHS). Responsible for report writing and management of consultants.

Rehabilitation of cutting, South Africa, Naas Grimbeek, 01/2002 - Click or tap to enter a date., Environmental Manager

The project involved the rehabilitation of a cutting at the house of Mr Naas Grimbeek at the Hartebeespoort Dam. Responsible for site inspections and the development of a rehabilitation plan.

Scoping phase for Langehoogte Wind Farm, South Africa, Western Cape, SAGIT Energy Ventures, 01/2011 - Click or tap to enter a date., Senior Environmental Scientist

The project entailed a visual impact assessment (VIA) for the Langehoogte Wind Farm near Caledon. Responsible for report based on peer review comments.

Visual assessment of Springfontein Wind Farm, South Africa, Free State, Savannah Environmental (Pty) Ltd, 06/2012 - Click or tap to enter a date., Visual Impact Assessment (VIA) Specialist

The project entailed a visual impact assessment (VIA) of the proposed wind farm near Springfontein. Responsible for the site visit, quality control of deliverables and revision of the VIA report.

Environmental audit of the Matola Coal Terminal (TCM), Mozambique, Maputo, Grindrod Limited, 03/2012 - Click or tap to enter a date., Environmental Audit Team Leader

The project entailed an environmental audit of the operation of the Matola Coal Terminal (TCM) in Maputo. Responsible for one site audit and the compilation of the audit report.

Foskor integrated water and waste management plan (IWWMP), South Africa, KwaZulu-Natal, Foskor, 03/2014 - Click or tap to enter a date., Internal Reviewer

The project involved an internal review of a draft integrated water and waste management plan (IWWMP) for the installation of a proposed expansion to the phosphate handling facilities in Richards Bay. Responsible for conducting an internal review.

ISO 14001 internal audit for the Matimba Power Station, South Africa, Limpopo, Eskom Generation: Matimba Power Station, 08/2014 - Click or tap to enter a date., Environmental Auditor

The project comprised a second party internal environmental management systems (EMS) audit of the coal-fired Matimba Power Station in Lephalale. Responsible for environmental auditing against ISO 14001 and audit management system requirements.

Epol Rustenburg Feed Mill ISO 14001 certification audit, South Africa, North West, Epol, 09/2013 - Click or tap to enter a date., Lead Environmental Auditor

The project entailed a third party Stage 1 ISO 14001 certification audit for the Epol Feed Mill in Rustenburg. Responsible for conducting the Stage 1 ISO 14001 certification audit of the environmental management system (EMS).

Feasibility study for Southern Energy's 2x330 MW coal fired power plant project, Zimbabwe, Southern Energy, 01/2015 - Click or tap to enter a date., Environmental Reviewer

The project entailed a review of a feasibility study report for the construction of a proposed new 660 MW coal-fired power station near Hwange in Zimbabwe. Responsible for the review of the feasibility study against the

performance standards of international development finance institutions.

In diversity there is beauty and there is strength.

MAYA ANGELOU

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