GRID CONNECTION INFRASTRUCTURE FOR THE GREAT KAROO WIND FARM, NORTHERN CAPE PROVINCE

Environmental Management Programme for the switching station associated with the Great Karoo Wind Farm grid connection infrastructure

February 2021

GENERIC ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR THE DEVELOPMENT AND EXPANSION OF SUBSTATION INFRASTRUCTURE FOR THE TRANSMISSION AND DISTRIBUTION OF ELECTRICITY

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 substation infrastructure for the transmission and distribution of electricity, 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 substation infrastructure for the transmission and distribution of electricity. 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 substation infrastructure for the transmission and distribution of electricity requiring EA in terms of NEMA. 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 realization 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 substation infrastructure for the transmission and distribution of electricity, 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

Part	Section	Heading	Content
			will comply with the pre-approved generic EMPr template contained in Part B: Section 1, 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 impact management actions have been either pre-approved or approved in terms of Part C. 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 Part B: section 2 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 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

Part	Section	Heading	Content
			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,
  - a timeframe for implementation
- For monitoring
  - a responsible person
  - frequency
  - 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 property or farm in which the proposed substation 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. threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features and within 50 m from the development footprint.

Sub-section 3 is the declaration that the applicant (s)/proponent (s) 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 impact management 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 as a minimum 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;

"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)	Role 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. Responsibilities - 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.

Responsible Person(s)	Role and Responsibilities
Developer Site Supervisor (DSS)	Role 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. Responsibilities - 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; - 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)	Role 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

Responsible Person(s)	Role and Responsibilities
	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; - 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;

Responsible Person(s)	Role and Responsibilities
	- 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;

Responsible Person(s)	Role and Responsibilities
	- Measure and communicate environmental performance to the Contractor; - Conduct environmental awareness training on site together with ECO and cEO; - 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 of substation infrastructure for the transmission and distribution of electricity 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.

Responsible Person(s)	Role and Responsibilities
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; - 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 substation 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. As 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 activities, 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 included in the EMPr file and submitted to the CA at intervals as indicated in the EA.

The ECOs must prepare a monthly EAR. 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 substation infrastructure for the transmission and distribution of electricity. There is a list of aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity, 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 substation infrastructure for the transmission and distribution of electricity.

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 contactor 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;	ECO / cEO / dEO	Hold environmental awareness training workshops	Pre-construction Construction and Operations	ECO dEO	Monthly and as and when required	Attendance register and training minutes / notes for the record
– The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course;	Contractor	Scheduling of sufficient sessions through consultation with the ECO / cEO / dEO	Pre-construction Construction	ECO dEO	Monthly and as and when required	Attendance register and training minutes / notes for the record
– Refresher environmental awareness training is available as and when required;	cEO / dEO in consultation with the ECO	Hold refresher environmental awareness training workshops	During the construction phase	ECO dEO	Monthly and as and when required	Attendance register and training minutes / notes for the record
– 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;	cEO / dEO	Hold training workshops and ensure that the EA and EMPr is readily available	During the construction phase	ECO dEO	Monthly and as and when required	Attendance register and training minutes / notes for the record

– 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.	Contractor	Develop and place appropriate posters at key locations	Pre-construction Construction	ECO dEO cEO	Monthly	Photographic record
– 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; 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.	cEO / dEO in consultation with the ECO	Develop environmental awareness training material which covers the minimum requirements	Pre-construction Construction	ECO dEO	Prior to the commencement of the environmental awareness training	Environmental awareness training material requirements checklist
– A record of all environmental awareness training courses undertaken as part of the EMPr must be available;	ECO / cEO / dEO	Filing system including all proof of training (i.e. attendance	During the construction phase	ECO dEO	Monthly	Completed and up to date filing system with

		register and training minutes / notes for the record)				proof of training
– Educate workers on the dangers of open and/or unattended fires;	cEO / dEO in consultation with the ECO	Develop environmental awareness training material which covers the dangers of open and/or unattended fire	Pre-construction Construction	ECO dEO	Prior to the commencement of the environmental awareness training	Environmental awareness training material requirements checklist
– A staff attendance register of all staff to have received environmental awareness training must be available.	ECO / cEO / dEO	Filing system including all proof of training (i.e. attendance register)	During the construction phase	ECO dEO	Monthly	Completed and up to date filing system inclusive of all attendance registers
– Course material must be available and presented in appropriate languages that all staff can understand.	ECO / cEO / dEO	Develop environmental awareness training material in the required languages. Training material must by readily available to all staff	During the construction phase	ECO dEO	Monthly	Environmental awareness training material requirements checklist and the training register which must indicate the language of the training

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;	Contractor	Development of an appropriate method statement	Pre-construction	ECO dEO	Once, prior to construction	Availability of the method statement which complies with the minimum requirements listed
– 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;	DPM	Place construction camps outside of sensitive areas identified in the Basic Assessment Report	Pre-construction Construction	ECO dEO	Once, prior to construction	Availability of a layout and sensitivity map indicating avoidance of

						sensitive areas
– Sites must be located where possible on previously disturbed areas;	DPM	Place site outside of sensitive areas and within previously disturbed areas identified in the BA Report	Pre-construction	ECO dEO	Once, prior to construction	Availability of a layout and sensitivity map indicating avoidance of sensitive areas and placement within disturbed areas
– The camp must be fenced in accordance with ***Section 5.5: Fencing and gate installation***; and	DPM	Design and implementation of fencing as per the requirements of Section 5.5 of this EMPr	Pre-construction & Construction	ECO dEO	Once, prior to construction and once during the construction of the fencing	The camp is fenced in accordance with Section 5.5 of this EMPr
– The use of existing accommodation for contractor staff, where possible, is encouraged.	Not applicable – the development of new accommodation is not proposed. Staff will be accommodated in					

	neighbouring Towns.					

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;	dEO / cEO in consultation with the ECO	Spatially demarcate access restricted areas informed by the BA Report	Pre-construction	ECO	Once, prior to construction	Access restricted areas are identified and provided in a spatial format
– 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	dEO / cEO in consultation with the ECO	Erect appropriate temporary barriers around access restricted areas	At the commencement and for the duration of the construction phase	ECO	Monthly	Access restricted areas are closed-off through temporary barriers and barriers are maintained to a sufficient standard

– Unauthorised access and development related activity inside access restricted areas is prohibited.	Contractor / dEO / cEO	Erect appropriate temporary barriers around access restricted areas and provide clear signage of restricted status	During the construction phase	ECO	Monthly, and as and when required	Photographic evidence and notes of compliance that no unauthorised access or activities has taken place within the access restricted areas

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
– An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities;	DPM Contractor	Develop access agreements with the affected landowners. Ensure that agreements are approved and signed	Pre-construction	dEO ECO	Once, prior to construction	Availability of approved and signed negotiations

– 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	Contractor	Undertake maintenance activities on private roads used for construction as degradation takes place	During the construction phase	cEO / ECO	Weekly	Photographic record of the pre-construction condition and degradation of roads, and records of the implementation and effectiveness of maintenance activities
– All contractors must be made aware of all these access routes.	dEO / cEO	Develop a map illustrating all access routes associated with the project and present and provide the map to all contractors	Pre-construction Construction	ECO	Once, prior to construction	Access routes map readily available
– Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense;	Contractor	All access routes developed that are not in-line with the access route agreements must be closed and re-habilitated to the pre-disturbance state	Construction and Rehabilitation	cEO ECO	Bi-weekly (every two weeks)	Photographic record of the closure of access roads and re-vegetation

– Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads;	Contractor (and Eskom maintenance staff where relevant to operation)	Existing access routes to be used must be specified and the development of new roads must be avoided as far as possible	Construction and operation	cEO Operation and maintenance team	Weekly	Implementation of the approved layout
– 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;	dEO / cEO	Record the conditions of private roads to be used (prior to use) as per the requirements of section 4.9 and agree on the required condition of the roads with the landowner, DPM and contractor	During the construction phase	ECO	Prior to the use of private roads	Photographic record and proof of the road conditions agreed upon with the relevant parties
– Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands	DPM and Contractor	Design access roads to follow fence lines and avoid vegetated areas	Pre-construction	ECO	Once during the design and once prior to construction	Implementation of the approved layout
– Access roads must only be developed on pre-planned and approved roads.	Contractor	Construction of access roads only on pre-planned and approved access roads	During the construction phase	ECO once during the design dEO	Once during the design and weekly during the constructio	Implementation of the approved layout

					n of access roads	

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;	Contractor	Identify and inform all relevant staff of the existing gates to be used	Pre-construction & Construction	dEO	Monthly	Existing gates are utilised on a frequent basis and only limited new access gates are developed
– Existing and new gates to be recorded and documented in accordance with **section 4.9: photographic record**;	ECO	Existing and new gates will be recorded and documented as per the requirements of section 4.9	During the construction phase	ECO	Once, when the constructio n of all new gates have been completed	Photographic record of the existing and new gates as per the requirements of section4.9
– All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner;	Contractor	Ensure all relevant gates are fitted with locks and are always locked	Construction and Operation	ECO monthly, Operation and	Bi-weekly (every second week)	All gates are locked and no complaints from

				maintenance team and cEO		landowners are received in this regard
– 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;	dEO	Install new gates where required with the approval of the affected landowner	During the construction phase	ECO	Once, prior to construction and during the construction phase, as and when required	New gates are installed where the power line crosses fences
– 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;	Contractor	Install gates in a manner so that there is a gap of no more than 100mm between the bottom of the gate and the ground	During the construction phase	cEO	Once, during the erection of the gates during the construction phase	New gates installed as per the requirement
– Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate;	Contractor	Implement a reinforced concrete sill beneath gates installed for jackal proofing	During the construction phase	cEO	Once, during the erection of the gates during the construction phase	New gates installed as per the requirement
– Original tension must be maintained in the fence wires;	Contractor	Maintain original tension of fences through required activities	During the construction phase	ECO	Monthly	No tension reduction on fence wires
– All gates installed in electrified fencing must be re-electrified;	Contractor	Electrify gates installed in electrified fencing	During the construction phase	ECO	Once, during the erection of the gates during the	Gates installed in electrified fencing is electrified

					construction phase	
– All demarcation fencing and barriers must be maintained in good working order for the duration of the development activities;	Contractor	Undertake maintenance activities on fences and barriers	During the construction phase	ECO	Monthly	Photographic record of maintained fences and barriers
– Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where applicable;	Contractor	Fence construction camps, batching plants, hazardous storage areas and access restricted areas. Avoid sensitive flora	During the construction phase	ECO	Once during the erection of fencing	Photographic record of fences erected
– Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the land owner.	dEO/ cEO Contractor	Obtain written approval from the relevant landowner where temporary fencing is required to restrict livestock movement	During the construction phase	ECO	To be monitored as temporary fencing is required	Written approval to be provided by the dEO
– All fencing must be developed of high quality material bearing the SABS mark;	Contractor	Make use of high quality materials approved by SABS	During the construction phase	cEO	To be monitored as fencing is erected during the construction phase	Use of high quality materials for fencing approved by SABS
– The use of razor wire as fencing must be avoided;	Contractor	Razor wire must not be sourced or used for the erection of fencing	During the construction phase	ECO	To be monitored as fencing is erected during the	Fences erected do not make use of razor wire

					constructio n phase	
– 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;	DSS and Contractor	Ensure fenced areas are locked as required through the implementation of a formalised process. Appoint a security company	During the construction phase	cEO	Weekly and as and when required	Fences are locked and no complaints from landowners are received. A security company is appointed
– On completion of the development phase all temporary fences are to be removed;	Contractor	Removal of all temporary fences	At the end of the Construction Phase	ECO dEO	Once, following the completion of the constructio n phase	No temporary fences associated with the project is present following the completion of the construction phase
– The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.	Contractor	Appropriate removal of all fence uprights	At the end of the Construction Phase	ECO dEO	Once, following the completion of the constructio n phase	No fence uprights associated with the project is present following the completion of the construction phase

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;	Not applicable					
– 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.	Not applicable					
– Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and	Contractor / dEO / cEO in consultation with the ECO	Implement the required water conservation measures throughout on-site construction processes	During the construction phase	ECO	Monthly, and as and when required	Successful implementation of water conservation

c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged.						

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;	Contractor	Implement measures for the control and management of runoff	During the construction phase	cEO	Weekly	No mismanagement of runoff or contaminated water due to the temporary concrete batching plant
– 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;	Contractor and cEO	Obtain approved absorbent material and make use of licensed waste	During the Construction Phase	ECO	Monthly	Availability of approved absorbent material at the

		disposal facilities for disposal of oil				construction site and proof of disposal of oil at licensed disposal facilities
– 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;	DPM in consultation with the ECO	Consultation between the DPM and the ECO to determine if water can be discharged directly into water bodies (where present). The necessary water quality testing must be undertaken prior to discharge	During the construction phase	ECO	As and when the need arises to discharge natural stormwater runoff and clean water	Proof of consultation between the DPM and ECO and the outcomes thereof to be provided. Proof of water quality testing and the results thereof.
– 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.	DPM in consultation with the ECO	Consultation between the DPM and the ECO to determine if water can released following settling.	During the construction phase	ECO	As and when the need arises to discharge settled water	Proof of consultation between the DPM and ECO and the outcomes thereof to be provided.

5.8 Solid and hazardous waste management

Impact management outcome: Wastes are 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;	Contractor	Develop and implement a waste management plan	During the construction phase	ECO	Monthly	Implementation of the waste management plan and proof of waste management through proof of responsible disposal
– Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided;	Contractor	Provision of appropriate waste collection bins strategically placed throughout the site	During the construction phase	cEO	Weekly	Appropriate waste collection bins are available throughout the site
– A suitably positioned and clearly demarcated waste collection site must be identified and provided;	DPM and Contractor	Identify an appropriate location for the waste collection site which must be clearly demarcated through signage and temporary fencing	Design and Construction Phase	ECO	Once, prior to the commencement of construction	A waste collection site is appropriately placed and demarcated

– The waste collection site must be maintained in a clean and orderly manner;	Contractor	Regular collection of waste and maintenance of the area must be undertaken as per the waste requirements for the project during construction	During the Construction Phase	cEO	Weekly	The waste collection site is maintained and clean
– Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal;	Contractor	Provide separate and marked bins for the different waste types associated with the construction phase	During the Construction Phase	cEO	Weekly	Separate waste bins are available on site and waste generated is separated into the relevant bins
– Staff must be trained in waste segregation;	cEO / dEO in consultation with the ECO	Include waste segregation as part of the environmental awareness training material.	Pre-construction Construction	ECO	Monthly, and as and when required	Environmental awareness training material requirements checklist
– Bins must be emptied regularly;	Contractor	Bins must be emptied before reaching total capacity and on a regular basis as required for the project	During the construction phase	ECO	Monthly	No mismanagement of bins.
– General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company;	Contractor	Disposal of general waste at licensed waste disposal	During the construction phase	ECO	Monthly	Disposal certificates of disposal at

		facilities must be undertaken as per the waste management plan				licensed facilities to be provided
– Hazardous waste must be disposed of at a registered waste disposal site;	Contractor	Disposal of hazardous waste at licensed waste disposal facilities must be undertaken as per the waste management plan	During the construction phase	ECO	Monthly	Disposal certificates of disposal at licensed facilities to be provided
– Certificates of safe disposal for general, hazardous and recycled waste must be maintained.	Contractor	Obtain certificates for safe disposal of waste	During the construction phase	ECO	Monthly	Disposal certificates of disposal at licensed facilities to be provided and filed as part of the filing system

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;	Contractor	Contractor to undertake activities which can cause spills of pollutants outside of watercourses	During the construction phase	cEO	Weekly	No incidents reported of spillage of pollutants into watercourses
– In the event of a spill, prompt action must be taken to clear the polluted or affected areas;	Contractor and cEO	Develop a management plan or process for implementation should a spill take place	During the construction phase	cEO	Weekly	Feedback must be provided by the contractor in terms of how the spill was handled and photographic evidence of the feedback must be provided and kept on record
– Where possible, no development equipment must traverse any seasonal or permanent wetland	cEO and Contractor	Ensure layout has been informed by the environmental sensitivities as determined by the basic assessment and specialist studies	Construction Phase	ECO	Once off review that the layout used is the approved one	Confirm no development equipment traverses any seasonal or permanent wetland as per the authorised layout by reviewing the as-built designs

						(once-off confirmation) .
– No return flow into the estuaries must be allowed and no disturbance of the Estuarine functional Zone should occur;	N/A – no estuaries applicable					
– Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available;	cEO, Contractor	Ensure that permeant crossings (access roads) are provided for access to the grid connection corridor if no alternative crossing is available.	During the construction phase	cEO	Weekly	Ensure that permeant crossings are developed if there is no alternative.
– There must not be any impact on the long term morphological dynamics of watercourses or estuaries;	DPM, cEO	Develop a management plan or process for implementation should a spill take place within a watercourse and ensure continually monitoring	During the construction and operation phase	ECO, dEO	For all phases of the project life cycle (i.e. constructio n, operation, decommissi oning)	No incidents reported of spillage of pollutants into watercourses
– Existing crossing points must be favored over the creation of new crossings (including temporary access)	DPM, cEO	Develop a management plan or process for implementation should a spill take place within a watercourse and	During the pre-construction and construction phase	ECO, dEO	During the constructio n phase of the project.	Existing crossing points utilised as opposed to new ones created and no incidents

		ensure continually monitoring				reported of spillage of pollutants into watercourses
– 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 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 stabilised as soon as development allows.	Contractor	Activities undertaken near watercourses must be in-line with and consider the specified environmental controls	During the construction phase	ECO	Monthly, and as and when required	No degradation of the watercourses and no incidents of destruction reported

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;	cEO and contractor	Demarcate areas of indigenous vegetation to be avoided before clearance is undertaken	Construction and operation (i.e. for maintenance purposes)	ECO monthly, Operation and maintenance team weekly	Weekly, and as and when required	No unnecessary clearance of indigenous vegetation is undertaken
– Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species;	Contractor	Demarcate areas containing protected or endangered species to be avoided by construction activities	During the Construction Phase	ECO monthly and Operation and maintenance team weekly	Weekly, and as and when required	No clearance of protected or endangered species other than those permitted to be removed
– 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;	Relevant specialist in consultation with the Contractor	Develop and implement a Plant Search and Rescue Plan	Pre-construction & Construction	cEO	Weekly, and as and when required	Implementation of the Plant Search and Rescue Plan and photographic evidence and notes of the implementation of the plan
– Permits for removal must be obtained from the relevant CA prior to the cutting or clearing of the affected species, and they must be filed;	DPM	Undertake the permitting process in order to obtain the relevant	Pre-construction	ECO	Once, prior to the commencement of the	CA permits on file

		permits for the removal of protected species. Permits must be kept on file			construction phase and removal of the protected species	
– 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;	ECO	Ensure that the audit report indicates all species rescued and replanted and provides feedback in terms of compliance with the conditions of permits for replanting	During the Construction Phase and following the completion of the Construction Phase	ECO	Once off or as and when required	ECO confirmed rescued and replanted programme implemented correctly.
– Trees felled due to construction must be documented and form part of the Environmental Audit Report;	ECO	Ensure that the audit report documents the details of trees felled	During the Construction Phase and following the completion of the Construction Phase	ECO	Once, prior to the commencement of the construction phase and removal of the protected species	CA permits on file
– Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris;	Contractor	Felled trees, vegetation cuttings and debris must be disposed of at a licensed	During the Construction Phase	ECO	Monthly	No felled trees, vegetation cuttings and debris are dumped in

		waste disposal facility				inappropriate locations and disposal certificates are available as proof of responsible disposal
– 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;	DPM qnd Contractor	A suitably qualified pest control operator must be appointed	Construction and Operation	ECO	As and when the use of herbicides is required	Only registered pest control operators must be appointed and proof of their registration must be provided
– A daily register must be kept of all relevant details of herbicide usage;	DPM qnd Contractor	A suitably qualified pest control operator must be appointed	Construction and Operation	ECO	As and when the use of herbicides is required	Only registered pest control operators must be appointed and proof of their registration must be provided
– No herbicides must be used in estuaries	N/A – no estuaries applicable					

– 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**.	Contractor in consultation with the cEO	Spatially demarcate protected species and sensitive vegetation and implement appropriate fencing where required as per section 5.3	During the construction phase	ECO	Once, during the undertaking of the demarcation of the areas and the erection of the fencing	Demarcation and fencing is undertaken in-line with the requirements of section 5.3
– Alien invasive vegetation must be removed and disposed of at a licensed waste management facility.	Contractor	Undertake removal of alien invasive vegetation in accordance with the relevant guideline relevant to the project area and ensure the vegetation is disposed of at a licensed waste disposal facility	Construction and Operation	ECO Operation and maintenance team	Monthly, and as and when required	Proof must be provided that alien invasive vegetation has been cleared in accordance to the relevant guideline and that the vegetation was disposed of at a licensed waste disposal facility

5.11 Protection of fauna

Impact management outcome: Disturbance to fauna is minimised.

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;	dEO / cEO Contractor	Develop a procedure for dealing with livestock within the affected properties	Pre-construction and during the construction phase	ECO	Once, prior to the commencement of construction and as and when required during the construction phase	Written consent provided by the landowner and proof of representation of the landowner during interference
– The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the development programme;	dEO / cEO in consultation with the Contractor	Ensure that the planning and development programme considers breeding sites for wild bird species	Pre-construction & Construction	ECO	Once, prior to the commencement of construction and as and when required	The planning and development programme includes the consideration of breeding sites for wild bird species
– 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;	dEO / cEO in consultation with the Contractor	Avoid breeding sites and ensure that special care is taken in the presence of nestlings and fledglings	During the Construction Phase Operation Phase	ECO monthly, cEO and Operation and maintenance team weekly	Weekly, and as an when required during the construction. Monthly, and as and when required	Photographic record of intact breeding sites

					during operation	
– Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds;	dEO / cEO in consultation with the Contractor	All mitigation measures recommended by the avifauna specialist must be implemented	During the Construction Phase Operation Phase	ECO Operation and maintenance team	Monthly during construction and monthly during operation	Photographic record of compliance and successful implementation of the recommended measures
– 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;	dEO / cEO in consultation with the Contractor	All site staff must be informed of this requirement during the Environmental Awareness Training and the consequences of not adhering to the requirement. These areas must be demarcated as Access Restricted Areas	During the Construction Phase	ECO	Monthly, and as and when required	No instances of poaching is reported
– No deliberate or intentional killing of fauna is allowed;	dEO / cEO in consultation with the Contractor	All site staff must be informed of this requirement during the Environmental Awareness Training and the consequences of not adhering to	During the Construction Phase	ECO	Monthly, and as and when required	No instances of deliberate or intentional killing is reported

		the requirement. These areas must be demarcated as Access Restricted Areas				
– 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	dEO / cEO in consultation with the Contractor	Implement and maintain snake deterrents on pylons in areas where snakes are abundant	During the Construction Phase Operation Phase	ECO Operation and maintenance team	Once, during the construction of the pylons and as and when required. Monthly during operation	Photographic record of the implementation and maintenance of snake deterrents
– 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.	DPM in consultation with the dEO	Undertake a permitting process to obtain the required permits	Pre-construction	ECO	Once, prior to the commencement of construction and as and when required	Permits for removal and/relocation must be kept on file and be readily available

5.12 Protection of heritage resources

Impact management outcome: Impact to heritage resources is minimised.

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**;	DPM and a suitably qualified specialist dEO / cEO in consultation with the Contractor and ECO	Undertake a Heritage Walk-through Survey Spatially identify and demarcate areas of heritage significance as per the Heritage Impact Assessment and the Heritage Walk-through Report and as per the requirements of section 5.3	Pre-construction	ECO	Once, prior to the commencement of construction	Proof of avoidance of sensitive heritage features through details of avoidance and photographic records
– Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance;	dEO (in consultation with specialists if/as required).	Ensure construction staff are adequately informed (via environmental awareness training) to carry out monitoring of excavations for fossils, artefacts and important heritage material	During the Construction Phase	ECO	Monthly, or as required	Environmental awareness training includes measures relating to monitoring for chance finds
– 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/	dEO / cEO in consultation with the Contractor and ECO	Develop and implement procedures for situations where human remains,	During the Construction Phase	ECO	As and when required	Proof of work ceased and the required procedures followed in

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.		archaeological, palaeontolgoical or historical material are uncovered				cases where material is discovered.

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.;	cEO in consultation with the Contractor	Develop an Emergency Preparedness, Response and Fire Management Plan specific to the project	Pre-construction Construction	cEO	Once, prior to the commencement of construction and weekly during the construction phase	Compliance with the Emergency Preparedness, Response and Fire Management Plan
– All unattended open excavations must be adequately fenced or demarcated;	Contractor	Ensure that all excavations undertaken is fenced and demarcated within a reasonable	During the Construction Phase	cEO	Weekly	Excavations are fenced where required and photographic proof can be provided

		timeframe and in instances where excavations will be open for long-periods of time				
– Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding;	Contractor	All staff must be easily identifiable and the climbing of towers and scaffolding must only be undertaken by authorised personnel as managed by the Contractor	During the construction phase	ECO	Monthly, and as and when required	No incidents of unauthorised climbing is reported
– Ensure structures vulnerable to high winds are secured;	Contractor	Ensure that sufficient stabilisation measures are implemented to secure structures vulnerable to high winds	During the construction phase	cEO	Weekly, and as and when required	No incidents of unstable structures due to high winds is reported
– Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.	cEO	Compile and regularly update as incidents and complaints are submitted from the public and indicate the actions taken to resolve the complaint	During the construction phase	ECO	Monthly, and as and when required	The incidents and complaints register is complete and provides all the required details

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;	Contractor	Mobile chemical toilets must be placed appropriately and in areas that avoid environmental sensitivities	During the Construction Phase	cEO	Weekly	Mobile toilets are installed and avoid environmental sensitivities
– 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;	Contractor in consultation with the cEO	All site staff must be informed of this requirement during the Environmental Awareness Training and the consequences of not adhering to the requirement.	Pe-construction & Construction	ECO	Monthly, and as and when required	No evidence of non-compliance identified
– 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;	Contractor in consultation with the cEO	The installation of the toilets by the Contractor must be as per the listed requirements	During the Construction Phase	cEO	Weekly	No evidence of non-compliance identified

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 EMPr; 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.	Contractor	Certificates obtained from the licensed waste disposal facility with the emptying of the toilets must be kept on file	During the Construction Phase	ECO	Monthly, and as and when required	Certificates for waste disposal from the licensed waste disposal facility available on site

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;	Contractor	Only environmentally-friendly pest control must be used, when required	During the Construction Phase	ECO	As and when pest control is required for the project	Contractor to provide proof of pest control used being environmentally-friendly
– Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS;	cEO / Contractor in consultation with the ECO	The effects of sexually transmitted diseases and HIV/ AIDS must be covered in the Environmental Awareness Training	Pre-construction & Construction	ECO	Once, prior to the commencement of construction and monthly during construction	Environmental awareness training material requirements checklist
– The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area;	Contractor	Develop and place information posters on HIV/ AIDS	During the Construction Phase	cEO	Weekly	Photographic evidence of poster placement
– Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable;	cEO / Contractor in consultation with the ECO	Information and education of sexually transmitted diseases must be covered in the Environmental Awareness Training.	Pre-construction & Construction	ECO	Monthly	Environmental awareness training material requirements checklist

– Free condoms must be made available to all staff on site at central points;	Contractor	Placement of free condoms in mobile toilets and at the construction camps	During the Construction Phase	ECO	Monthly	Proof of placement of free condoms by the contractor to be provided
– Medical support must be made available;	dEO / cEO in consultation with the Contractor	Ensure that designated personnel with first aid training are available on site and that first aid kits to provide medical support is readily available	Construction and Operations	ECO	Monthly	Check the availability of first aid trained personnel and medical kits (including if these are complete in terms of supplies)
– Provide access to Voluntary HIV Testing and Counselling Services.	Contractor	Compile a HIV testing schedule and provide counselling services where required	During the Construction Phase	ECO	Quarterly, and as and when required	Voluntary testing schedules and proof of counselling (where undertaken)

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;	Contractor	Develop an Emergency Preparedness, Response and Fire Management Plan specific to the project	Pre-construction	ECO	Once, prior to the commencement of construction	Emergency Preparedness, Response and Fire Management Plan compiled
– The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation;	Contractor	Develop an Emergency Preparedness, Response and Fire Management Plan specific to the project which covers accidents, potential spillages and fires	Pre-construction	ECO	Once, prior to the commencement of construction	Emergency Preparedness, Response and Fire Management Plan includes required specifications
– All staff must be made aware of emergency procedures as part of environmental awareness training;	cEO / dEO in consultation with the ECO	Develop environmental awareness training material which covers the relevant emergency procedures	Pre-construction	ECO	Prior to the commencement of the environmental awareness training	Environmental awareness training material requirements checklist
– The relevant local authority must be made aware of a fire as soon as it starts;	Contractor in consultation with the ECO	Develop and include a procedure in the Emergency Preparedness,	Construction	ECO	As and when a fire occurs	The local authority was informed as per the relevant

		Response and Fire Management Plan for the event of a fire and the procedure to be followed for informing the local authority				procedure set out in the Emergency Preparedness, Response and Fire Management Plan
– In the event of emergency necessary mitigation measures to contain the spill or leak must be implemented (see **Hazardous Substances section 5.17**).	Contractor	Implement the required mitigation measures in the event of a spill or leak as per the requirements of Section 5.17.	Construction and Operations	ECO	As and when a spill or leak occurs	The mitigation measures included under Section 5.17 have been adhered to

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 minimised and non-hazardous and non-toxic alternatives substituted where possible;	cEO in consultation with the Contractor	Develop a strategy of how hazardous substances can be and should be minimised	Pre-construction & Construction	ECO	Once, prior to the commencement of construction and monthly	Contractor to provide evidence of substances used for proof of compliance

					during the constructio n phase	
– All hazardous substances must be stored in suitable containers as defined in the Method Statement;	Contractor	Develop a Method Statement for the storage of hazardous substances in suitable containers	Pre-construction & Construction	ECO	Once, prior to the commence ment of constructio n and monthly during the constructio n phase	Photographic proof that hazardous substances are stored in suitable containers as per the requirements of the relevant Method Statements
– Containers must be clearly marked to indicate contents, quantities and safety requirements;	Contractor	Where hazardous waste is stored these must be clearly marked indicating the required details of the contents	During the Construction Phase	ECO	Monthly	Photographic proof that containers are marked as per the requirements
– All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers;	Contractor	Ensure that storage areas are sufficiently bunded which are of sufficient capacity to contain a spill / leak from the stored containers	During the Construction Phase	ECO	Monthly during the Constructio n Phase	Photographic proof that storage areas are bunded and proof that the bund areas are of sufficient capacity to contain a spill / leak from

						the stored containers
– Bunded areas to be suitably lined with a SABS approved liner;	Contractor	Ensure that bunded storage areas are suitably lined	During the Construction Phase	ECO	Once, during the Constructio n Phase	Photographic proof that bunded storage areas are suitably lined
– An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis;	cEO / Contractor	Compile and update an Alphabetical Hazardous Chemical Substance (HCS) control sheet specific to the project	During the Construction Phase	ECO	Monthly, and as and when required	Complete and up to date control sheet provided by the Contractor
– All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS);	cEO / Contractor	Keep a record of all hazardous chemicals and the respective MSDS	During the Construction Phase	ECO	Monthly, and as and when required	Record of hazardous chemicals and the respective MSDS
– All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet;	cEO / Contractor	Provide training for personnel working with HCS	Pre-construction	ECO	Once, prior to the commence ment of constructio n and as and when required	Record of training provided to personnel working with HCS

– 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;	cEO / Contractor	Develop environmental awareness training material which covers the relevant impacts and safety measures. Provide appropriate training and personal protective equipment for the relevant personnel handling hazardous substances and materials	Pre-construction & Construction	ECO	Prior to the commencement of the environmental awareness training and monthly during the construction phase for personal protective equipment	Environmental awareness training material requirements checklist and all relevant personnel have undergone appropriate training and have access to personal protective equipment
– The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers;	Contractor	Appropriate storage facilities must be constructed or obtained for the storing of diesel, other liquid fuel, oil and hydraulic fluid	During the Construction Phase	ECO	Monthly, and as and when required	Storage tanks for the project are appropriate and no incidents are reported in this regard
– The tanks/ bowsers 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/ bowsers (110% statutory requirement plus an allowance for rainfall);	Contractor	Appropriate storage facilities must be constructed or obtained for tanks as per the requirements listed	During the Construction Phase	ECO	Monthly, and as and when required	Storage areas for the tanks/ bowsers for the project are appropriate and no

						incidents are reported in this regard
– The floor of the bund must be sloped, draining to an oil separator;	Contractor	Appropriate storage facilities must be constructed as per the requirements listed	During the Construction Phase	ECO	Once, during constructio n	Bunded storage areas are constructed according to the requirements
– 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;	Contractor	Appropriately constructed refuelling facility must be developed as per the requirements. Drip trays must be provided for use	During the Construction Phase	ECO cEO	Monthly Weekly	Soils at the refuelling facility are protected as required and drip trays are provided and used
– All empty externally dirty drums must be stored on a drip tray or within a bunded area;	Contractor	Ensure that empty dirty drums are stored appropriately as per the requirements	During the Construction Phase	ECO cEO	Monthly Weekly	Drip trays or bunded areas are used for the storage of dirty drums
– No unauthorised access into the hazardous substances storage areas must be permitted;	Contractor	Ensure through the implementation of procedures that no unauthorised access is undertaken into the storage areas	During the Construction Phase	ECO	Monthly	Proof of the implementati on of the relevant procedure must be provided by the contractor

– No smoking must be allowed within the vicinity of the hazardous storage areas;	Contractor	Inform all employees of the requirement and develop and place relevant signage in the relevant areas	During the Construction Phase	ECO cEO	Monthly Weekly	Photographic record of the signage placed must be provided
– Adequate fire-fighting equipment must be made available at all hazardous storage areas;	Contractor	Hazardous storage areas must be fitted with adequate fire-fighting equipment	During the Construction Phase	ECO	Monthly	Adequate fire-fighting equipment is available and has been serviced
– 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;	Contractor	Provide a mobile refuelling unit as well as suitable ground protection, where required	During the Construction Phase	ECO	Monthly, and as and when required	A mobile refuelling unit and suitable ground protection is available for use
– 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;	Contractor	Provide an appropriate spill kit for the project for the use of hazardous substances	During the Construction Phase	ECO	Monthly, and as and when required	Appropriate spill kits are available for use
– The responsible operator must have the required training to make use of the spill kit in emergency situations;	cEO and Contractor	Provide training on the use of spill kits to the relevant employees	Pre-construction	ECO	Once, prior to the commencement of construction	Proof of training to be provided by the contractor

– An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken;	cEO and Contractor	Provide an appropriate number of spill kits in relevant areas	During the Construction Phase	ECO	Monthly	Proof of appropriate number of spill kits in appropriate areas to be provided by the contractor
– 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**.	cEO and Contractor	Storage and disposal of contaminated soil must be in accordance with the National Environmental Management: Waste Act and sections 5.7 and 5.8 of this EMPr	During the Construction Phase	ECO	Monthly, and as and when required	Proof of storage and disposal in terms of the National Environmental Management: Waste Act must be provided. Certificates of disposal at licensed waste disposal facilities must be provided

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;	Contractor	Demarcate specific areas for the maintenance of vehicles and equipment	During the Construction Phase	ECO	Monthly	A dedicated area for the maintenance of vehicles and machinery is used.
– 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;	Contractor	Ensure that a drip tray is available for an emergency repairs required	During the Construction Phase	ECO	Monthly	Contractor to provide evidence of drip tray use for emergency repairs
– Leaking equipment must be repaired immediately or be removed from site to facilitate repair;	Contractor	Ensure that where leaking equipment is identified it is repaired immediately or removed from site for repairs	During the Construction Phase	ECO	Monthly	Contractor to provide details of equipment repaired or removed from site
– Workshop areas must be monitored for oil and fuel spills;	cEO	Undertake regular inspections of the workshop areas for oil and fuel spills and keep an updated register of inspection on site	During the Construction Phase	ECO	Monthly	Register of inspection

– Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available;	Contractor	Provide an appropriate spill kit for the project	During the Construction Phase	ECO	Monthly, and as and when required	Appropriate spill kits are available for use
– 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;	Contractor	Ensure that the workshop area is sufficiently bunded in accordance with the required specification	During the Construction Phase	ECO	Once, during the Constructio n Phase and as and when required	Workshop area is bunded in accordance with the required specification
– Water drainage from the workshop must be contained and managed in accordance **Section 5.7: Storm and waste water management.**	Contractor	Ensure that water drainage from workshop area is managed as per the requirements of section 5.7	During the Construction Phase	ECO	Monthly	Workshop drainage is managed in accordance with the requirements

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;	Contractor	Provide impermeable surface for the mixing of concrete	During the Construction Phase	cEO	Weekly	No concrete mixing is undertaken on open ground

– Batching plants areas must be fitted with a containment facility for the collection of cement laden water.	Contractor	Implement measures for the control and management of cement laden water	During the construction phase	cEO	Weekly	No mismanagement of laden water due to the temporary concrete batching plant
– Dirty water from the batching plant must be contained to prevent soil and groundwater contamination	Contractor	Implement measures for the control and management of dirty water to prevent soil and groundwater contamination	During the construction phase	cEO	Weekly	No mismanagement of dirty water due to the temporary concrete batching plant and no/minimal 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;	Contractor	Demarcate and provide a storage area for bagged cement in-line with the listed requirements	During the Construction Phase	cEO	Weekly	Photographic proof of bagged cement stored within the demarcated area
– A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted;	Contractor	Provide a washout facility for the washing of associated	During the Construction Phase	cEO	Weekly	No cement laden water is released into the

		equipment. Enforce limitations on water use for washing of equipment				environment. Only minimal water is used for washing
– Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licensed disposal facility;	Contractor	Make use of hardened concrete where possible or dispose of concrete in a suitable manner	During the Construction Phase	ECO	Monthly	Certificates of disposal of concrete at licensed waste disposal facility
– Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site;	Contractor	Bind empty cement bags and temporarily store it in an appropriate area on site	During the Construction Phase	ECO	Monthly	Proof of binding of empty cement bags and storage in an appropriate are on site to be provided by the Contractor
– Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to **Section 5.20: Dust emissions**)	Contractor	Ensure that sand and aggregates are kept damp or otherwise protected from dust generation	During the Construction Phase	ECO	Monthly	Proof of damping (or alternative dust suppression) of sand and aggregates must be provided by the Contractor

– 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;	Contractor	Ensure that all excess sand, stone and cement is removed or reused	At the completion of the Construction Phase	ECO	Once, with the completion of constructio n	Certificates for the disposal of sand, stone and cement at licensed waste disposal facilities or proof of reuse must be provided
– Temporary fencing must be erected around batching plants in accordance with **Section 5.5: Fencing and gate installation**.	Contractor	Erect Temporary fencing	During the construction phase	cEO	Weekly	Temporary fencing around batching plants

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;	Contractor	Apply appropriate dust suppressant	During the Construction Phase	cEO	Weekly	Contractor to provide proof of use of appropriate dust suppressants

– Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re- vegetated or stabilised as soon as is practically possible;	Contractor	Proper planning for vegetation removal must be undertaken as well as for the associated rehabilitation	During the Construction Phase and Rehabilitation	cEO	Weekly	Plan for implementation must be provided by the Contractor
– Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present;	Contractor	Ensure that specific limitations are placed on the transport and handling of erodible materials during high wind conditions or when a visible dust plume is present	During the Construction Phase	cEO	Bi-weekly (every second week)	No complaints submitted in this regard
– 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;	ECO	ECO to provide adequate recommendations	During the Construction Phase	Not Applicable		
– Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind;	Contractor	Place soil stockpiles in areas less affected by wind	During the Construction Phase	cEO and ECO	Bi-weekly (every second week) Monthly	Soil stockpiles are not exposed to wind and have not been eroded
– Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO;	Contractor in consultation with the ECO	Contractor to implement erosion control measures as recommended	During the Construction Phase	cEO	Weekly, until erosion is no longer a problem	Recommendations made by the ECO have been implemented

		and agreed with the ECO				by the Contractor
– Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas;	cEO / dEO / contractor	Inform all drivers of speed limits and place appropriate signage along the relevant roads	During the Construction Phase Operation Phase	ECO Operation and Maintenance team	Monthly	No complaints from community members are submitted
– Straw stabilisation 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;	Contractor	Ensure that straw stabilisation is undertaken as per the listed requirements	During the Construction Phase	ECO	Monthly	Photographic record of all straw stabilisation undertaken
– For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.	Contractor	Appropriate dust suppressant measures are implemented	During the Construction Phase	cEO	Weekly	Photographic record of measures being implemented and the results thereof

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	cEO / dEO / contractor	Ensure the contractor is suitably licensed with all necessary credentials and certifications	Pre-Construction Phase	ECO/EO	Once off, before blasting activities commence.	ECO/EO to check all valid credentials and certifications on hand.
– Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.	cEO / dEO / contractor	Ensure all responsible personnel have been notified of blasting activities 24 hours in advance and keep records of notifications.	Pre-Construction Phase	ECO/EO	Once off, before blasting activities commence.	ECO/EO to confirm all necessary personnel have been notified. Notification records to be provided.

5.22 Noise

Impact Management outcome: Prevent unnecessary noise to the environment by ensuring that noise from development activity 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;	Contractor	Ensure that noise limits do not exceed acceptable limits and avoid the use	During the Construction Phase	ECO	Monthly, and as and when required	No complaints registered in this regard. No

		of amplification communication				amplification equipment is used.
– All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained;	Contractor	Provide and implement silencing technology	During the Construction Phase	ECO	Monthly, and as and when required	No complaints registered in this regard. Silencing technology is utilised.
– 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;	cEO	Update complaints register. Provide daily transport to and from site for employees	During the Construction Phase	ECO	Monthly, and as and when required	Complaints register provided by the cEO and proof of transportation services provided
– 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 development activities must still meet the impact management outcome related to noise management.	cEO and Contractor in consultation with the ECO	Compile a Code of Conduct for staff. Appropriate operating hours must be identified for the project.	Pre-construction and Construction	ECO	Once, prior to the commencement of construction	No complaints registered in this regard.

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;	cEO / Contractor	Identify and demarcate through signage designated smoking areas	Pre-construction & Construction	ECO	Monthly	Photographic record of designated smoking area
– Firefighting equipment must be available on all vehicles located on site;	cEO / dEO in consultation with the Contractor	Provide all vehicles with firefighting equipment	Construction	ECO	Monthly	All vehicles are fitted with firefighting equipment and the details thereof are provided by the cEO
– The local Fire Protection Agency (FPA) must be informed of construction activities;	cEO in consultation with the ECO	Undertake formal consultation to inform the local FPA of the associated construction activities	Pre-construction	ECO	Once, during the commencement of the Construction Phase	Proof of consultation with the FPA
– Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site;	dEO / cEO / Contractor in consultation with the ECO	Develop environmental awareness training material which covers the contact numbers for the FPA and	Pre-construction & Construction	ECO	Prior to the commencement of the environmental awareness training and once during the	Environmental awareness training material requirements checklist and photographic record of contact

		emergency services. Place the contact numbers for the FPA and emergency services at a visible and central location			constructio n phase	numbers on display
– Two way swop of contact details between ECO and FPA.	ECO	Consultation between the ECO and FPA in order to exchange contact details	Pre-construction	Not Applicable		

5.24 Stockpiling and stockpile areas

Impact management outcome: Reduce erosion and sedimentation as a result of stockpiling.

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;	Contractor	Identify and demarcate an appropriate location for the storage of excavated materials	Pre-construction & Construction	ECO	Monthly	Excavated material is not stored within sensitive environment al areas

– All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods;	Contractor	Implement appropriate and sufficient maintenance on stockpiled material regularly	During the Construction Phase	cEO ECO	Bi-weekly (every second month) Monthly	Stockpiled material is maintained sufficiently and is clear of weeds and alien vegetation
– Topsoil stockpiles must not exceed 2 m in height;	Contractor	Enforce limitations for the height of topsoil stockpiles	During the Construction Phase	cEO ECO	Bi-weekly (every second month) Monthly	Topsoil stockpiles do not exceed 2m in height
– During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.);	Contractor	Appropriate material must be provided in order to cover stockpiles when required	During the Construction Phase	ECO	Monthly	Contractor to provide proof of availability of appropriate material to cover stockpiles when required
– Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.	Contractor	Sandbags must be provided in order to prevent erosion of stockpiled materials	During the Construction Phase	ECO	Monthly	Contractor to provide proof of availability of sandbags to prevent erosion of stockpiled materials

5.25 Civil works

Impact management outcome: Impact to the environment minimised during civil works to create the substation terrace.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where terracing is required, topsoil must be collected and retained for the purpose of re-use later to rehabilitate disturbed areas not covered by yard stone;	Contractor	Collection and safe storage of topsoil for later use in rehabilitation phase	During the Construction Phase	ECO	Monthly	Visual inspection of topsoil stockpiles for later use
– Areas to be rehabilitated include terrace embankments and areas outside the high voltage yards;	Contractor	Regard areas that do not house infrastructure as requiring rehabilitation and apply rehabilitation measures to these regions	During the Construction Phase, where the area is no longer going to be utilised	ECO	Monthly	Visual inspection of rehabilitation implementation to ensure these areas are being rehabilitated
– Where required, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled;	Contractor	If required stabilise soil using recognised methods to ensure proper rehabilitation and erosion control	Duration of the construction phase	ECO	Monthly	Visual inspection of stabilised soil regions and descriptions of staff of stabilisation method used

– These areas can be stabilised 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;	Contractor	If required stabilise soil using recognised methods to ensure proper rehabilitation and erosion control	Duration of the construction phase	ECO	Monthly	Visual inspection of stabilised soil regions and descriptions of staff of stabilisation method used
– Rehabilitation of the disturbed areas must be managed in accordance with **Section 5.35: Landscaping and rehabilitation**;	Contractor	Review and ensure that all rehabilitation measures are implemented in accordance with the requirements of Section 5.35	Duration of the construction phase	ECO	Monthly	Visual inspection of rehabilitation conducted and the degree of conformanc e with the requirements set out in Section 35.5 of this report
– All excess spoil generated during terracing activities must be disposed of in an appropriate manner and at a recognised landfill site; and	Contractor	Dispose of all excess spoil using appropriate means and at recognised landfill sites. Keep written registers of the disposal conducted	Duration of the construction phase	ECO	Monthly	Evidence of disposal slips as applicable kept in the site environment al file
– Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes.	Contractor	Where spoil is utilised for landscaping purposes implement a 150mm topsoil	Duration of the construction phase	ECO	Monthly	Spoil material used in landscaping is suitably covered with a later of

		layer on top following shaping and compaction to promote rehabilitation				topsoil at least 150mm deep

5.26 Excavation of foundation, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs as a result of excavation of foundation, cable trenching and drainage systems.

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 licensed landfill site, if not used for backfilling purposes;	Contractor	Use a licensed waste disposal facility for the disposal of excess spoil	During the Construction Phase	ECO	Monthly	Certificates obtained for the disposal of excess spoil at a licensed waste disposal facility
– Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes;	Contractor	Spoil used for landscaping must be applied as per the listed requirements	Construction and Rehabilitation	ECO	Monthly	Photographic record of spoil used for landscaping purposes as well as feedback from the contractor

– Management of equipment for excavation purposes must be undertaken in accordance with **Section 5.18: Workshop, equipment maintenance and storage**; and	Contractor	Undertake the management of equipment for excavation as per the requirements of section 5.18	During the Construction Phase	ECO	Monthly	Management of equipment is undertaken in line with the requirements of section 5.18
– Hazardous substances spills from equipment must be managed in accordance with **Section 5.17: Hazardous substances**.	Contractor	Undertake the management of hazardous substances spills from equipment as per the requirements of section 5.17	During the Construction Phase	ECO	Monthly	Management of hazardous substances spills from equipment is undertaken in line with the requirements of section 5.17

5.27 Installation of foundations, cable trenching and drainage systems

Impact management outcome: No environmental degradation occurs during the installation of foundation, cable trenching and drainage system.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Batching of cement to be undertaken in accordance with **Section 5.19: Batching plants**; and	Contractor	Ensure correct batching of cement	During the construction phase	cEO	Weekly	Measures in place to ensure the batching of

						cement is done in accordance with Section 5.19: Batching plants
– Residual solid waste must be disposed of in accordance with **Section 5.8: Solid waste and hazardous management**.	Contractor	Undertake the disposal of residual solid waste as per the requirements of section 5.8	During the Construction Phase	ECO	Monthly	The disposal of residual solid waste is undertaken in line with section 5.8.

5.28 Installation of equipment (circuit breakers, current Transformers, Isolators, Insulators, surge arresters, voltage transformers, earth switches)

Impact management outcome: No environmental degradation occurs as a result of installation of equipment.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Management of dust must be conducted in accordance with **Section 5. 20: Dust emissions**;	Contractor	Review and implement dust management actions in accordance with the requirement of Section 5.20 of this report	During the Construction Phase	ECO	Monthly	Dust management actions observed to be in accordance with the requirement of Section

						5.20 of this report
– Management of equipment used for installation must be conducted in accordance with **Section 5.18: Workshop, equipment maintenance and storage**;	Contractor	Review and implement equipment management actions in accordance with the requirement of Section 5.18 of this report	During the Construction Phase	ECO	Monthly	Equipment management actions observed to be in accordance with the requirement of Section 18of this report
– Management hazardous substances and any associated spills must be conducted in accordance with **Section 5.17: Hazardous substances**; and	Contractor	Review and implement hazardous substances and any associated spills in accordance with the requirement of Section 5.17 of this report	During the Construction Phase	ECO	Monthly	Hazardous substances and any associated spills management actions observed to be in accordance with the requirement of Section 5.20 of this report

– Residual solid waste must be recycled or disposed of in accordance with **Section 5.8: Solid waste and hazardous management**.	Contractor	Review and dispose/recycle residual solid waste in accordance with the requirement of Section 5.8 of this report	During the Construction Phase	ECO	Monthly	Dispose/recycle residual solid waste in observed to be in accordance with the requirement of Section 5.8 of this report

5.29 Steelwork Assembly and Erection

Impact management outcome: No environmental degradation occurs as a result of steelwork assembly and erection.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– During assembly, care must be taken to ensure that no wasted/unused materials are left on site e.g. bolts and nuts	Contractor	Conduct an inspection of the site once assembly is complete to remove all stray bolts or unused materials that may be left on site	Duration of the construction phase	ECO	Monthly	Evidence of leftover waste/unused materials on site following closure of assembly

– Emergency repairs due to breakages of equipment must be managed in accordance with **Section 5.18: Workshop, equipment maintenance and storage** and **Section 5.16: Emergency procedures.**	Contractor	Review and conduct all emergency repairs in accordance with Section 5.18 of this report	Duration of the construction phase	ECO	Monthly	Evidence of emergency repairs carried out having been conducted in accordance with Section 5.18 of this report

5.30 Cabling and 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
– Residual solid waste (off cuts etc.) shall be recycled or disposed of in accordance with **Section 6.8: Solid waste and hazardous Management**;	Contractor	Undertake recycling or disposal of solid waste as per the requirements of section 6.8	During the Construction Phase	ECO	Monthly	Undertake recycling or disposal of solid waste as per the requirements of section 6.8
– Management of equipment used for installation shall be conducted in accordance with **Section 5.18: Workshop, equipment maintenance and storage**;	Contractor	Undertake the management of equipment as per	During the Construction Phase	ECO	Monthly	Management of equipment is undertaken in

		the requirements of section 5.18				line with the requirements of section 5.18
– Management hazardous substances and any associated spills shall be conducted in accordance with **Section 5.17: Hazardous substances**.	Contractor	Undertake the management of hazardous substances as per the requirements of section 5.17	During the Construction Phase	ECO	Monthly	Management of equipment is undertaken in line with the requirements of section 5.17

5.31 Testing and Commissioning (all equipment testing, earthing system, system integration)

Impact management outcome: No environmental degradation occurs as a result of Testing and Commissioning.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste must be recycled or disposed of in accordance with **Section 5.8: Solid waste and hazardous management**.	Contractor	Undertake recycling or disposal of solid waste as per the requirements of section 5.8	During the Construction Phase	ECO	Monthly	Undertake recycling or disposal of solid waste as per the requirements of section 5.8

5.32 Socio-economic

Impact management outcome: enhanced socio-economic development.

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;	dEO / cEO	Identify and implement appropriate strategies for communication with the communities through consideration of the community needs	Pre-construction & Construction	ECO	Once, prior to the commencement of construction and monthly during the construction	Communication is undertaken as per the identified strategies and no complaints are submitted regarding communication
– Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process;	Contractor	Development and implement a Grievance Mechanism which considers the community needs and provides procedures for conflict resolution	Pre-construction & Construction	ECO	Once, prior to the commencement of construction and monthly during the construction phase	Conflict resolution is undertaken in line with the requirements of the Grievance Mechanism. No complaints on conflict resolution is submitted by the community

– Sustain continuous communication and liaison with neighboring owners and residents	Contractor	Development and implement and Grievance Mechanism provides procedures for communication / liaison with neighbouring landowners and residents	Pre-construction & Construction	ECO	Once, prior to the commencement of construction and monthly during the construction phase	Communication / liaison with neighbouring landowners and residents are undertaken in line with the requirements of the Grievance Mechanism. No complaints on communication with neighbouring landowners and residents is submitted
– Create work and training opportunities for local stakeholders; and	Contractor	Develop and implement a "locals first" policy for the provision of employment opportunities	Pre-construction & Construction	ECO	Once, prior to the commencement of construction and monthly during the construction phase	The "locals first" policy is considered in terms of the employment and training opportunities
– Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-	Contractor	Ensure no workers are permitted to	Construction	ECO	Throughout construction	No workers remaining on site over night

night on the site. This would reduce the risk to local farmers.		stay over night on the site				

5.33 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: Hazardous substances** and **5.18: Workshop, equipment maintenance and storage**;	Contractor	Regular emptying of the bunds must be undertaken. This must be undertaken as per the requirements listed in sections 5.17 and 5.18	During the Construction Phase	ECO	Prior to site closure for more than 05 days	Bunds are emptied as per the requirements listed under sections 5.17 and 5.18
– Hazardous storage areas must be well ventilated;	Contractor	Install appropriate ventilation in all hazardous storage areas	During the construction phase	ECO	Prior to site closure for more than 05 days	Effective ventilation is installed in hazardous storage areas
– Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service;	Contractor / cEO	Ensure fire extinguishers are serviced, as required and are easily accessible with appropriate signage indicating	During the Construction Phase	ECO	Prior to site closure for more than 05 days	Signage placed indicating location of fire extinguishers

		location. Ensure service records and kept up to date and filed				and service records
– Emergency and contact details displayed must be displayed;	Contractor / cEO	Place emergency and contact details which are readily available and easily accessible	During the Construction Phase	ECO	Prior to site closure for more than 05 days	Photographic proof of contact details on display
– Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel;	Contractor in consultation with the ECO	Hold a workshop with all security personnel to provide a brief of the project and security requirements. Provide facilities in order to contact management and emergency personnel	Pre-construction & construction	ECO	Prior to site closure for more than 05 days	Proof of the workshop held must be kept on file by the contractor.
– Night hazards such as reflectors, lighting, traffic signage etc. must have been checked;	Contractor	Regular checks of night hazards must be undertaken	During the Construction Phase	ECO	Prior to site closure for more than 05 days	Proof of checks of night hazards must be provided by the contractor
– Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.;	cEO / Contractor in consultation with the ECO	Identify any potential fire hazards and notify the relevant local authority	During the Construction Phase	ECO	Prior to site closure for more than 05 days	Proof of notification of the fire hazards to the local authority

						must be provided by the Contractor
– Structures vulnerable to high winds must be secured;	Contractor	Ensure structures vulnerable to wind are secure prior to site closure	During the Construction Phase	ECO	Prior to site closure for more than 05 days	Structures vulnerable to wind are secured prior to site closure
– Wind and dust mitigation must be implemented;	Contractor	Implement wind and dust mitigation prior to site closure	During the Construction Phase	ECO	Prior to site closure for more than 05 days	Wind and dust mitigation is implemented prior to site closure
– Cement and materials stores must have been secured;	Contractor	Ensure cement and material stores are secured prior to site closure	During the Construction Phase	ECO	Prior to site closure for more than 05 days	Cement and material stores are secured prior to site closure
– Toilets must have been emptied and secured;	Contractor	Ensure toilets are emptied and secured prior to site closure	During the Construction Phase	ECO	Prior to site closure for more than 05 days	Toilets are emptied and secured prior to site closure
– Refuse bins must have been emptied and secured;	Contractor	Ensure refuse bins are emptied and secured prior to site closure	During the Construction Phase	ECO	Prior to site closure for more than 05 days	refuse bins are emptied and secured prior to site closure
– Drip trays must have been emptied and secured.	Contractor	Ensure drip trays are emptied and secured prior to site closure	During the Construction Phase	ECO	Prior to site closure for more than 05 days	Drip trays are emptied and secured prior to site closure

5.34 Dismantling of old equipment

Impact management outcome: Impact to the environment to be minimised during the dismantling, storage and disposal of old equipment commissioning.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All old equipment removed during the project must be stored in such a way as to prevent pollution of the environment	Contractor	Ensure old equipment secured and where required, stored in contained areas where no spillage or pollution may result	During the Construction Phase	ECO	Monthly	Drip trays are emptied and secured prior to site closure
– Oil containing equipment must be stored to prevent leaking or be stored on drip trays;	Contractor	Ensure old equipment secured and where required, stored in contained areas where no spillage or pollution may result	During the Construction Phase	ECO	Monthly	Drip trays are emptied and secured prior to site closure
– All scrap steel must be stacked neatly and any disused and broken insulators must be stored in containers;	Contractor	Store defunct insulators in containers and scrap steel in one single place, neatly secured	During the Construction Phase	ECO	Monthly	Where needed, insulators observed to be stored in containers

						and scrap stored neatly as determined by the ECO
– Once material has been scrapped and the contract has been placed for removal, the disposal Contractor must ensure that any equipment containing pollution causing substances is dismantled and transported in such a way as to prevent spillage and pollution of the environment;	Contractor , cEO	Ensure dismantling and packaging of scrapped material is transported in such a way as to prevent spillage and pollution of the environment;	During the Construction Phase	ECO	Monthly	Where needed, insulators observed to be stored in containers and scrap stored neatly as determined by the ECO
– The Contractor must also be equipped to contain and clean up any pollution causing spills; and	cEO and Contractor	Provide training on the use of spill kits to the relevant employees	During the Construction Phase	ECO	Monthly	Proof of training to be provided by the contractor
– Disposal of unusable material must be at a licensed waste disposal site.	cEO and Contractor	Ensure a registered waste disposal site is utilized and keep disposal slips and record in the site environmental file	During the Construction Phase	ECO	Monthly	Visual inspection of disposal record documentation and registration of the waste disposal site utilised.

5.35 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 of to a registered waste site;	Contractor	Develop and implement a rehabilitation plan for the rehabilitation of all disturbed areas. Dispose of all spoil and waste at a licensed waste disposal facility	Pre-construction & Rehabilitation	cEO	Weekly	Rehabilitation of the disturbed areas is undertaken as per the rehabilitation plan. All certificates of waste disposal at licensed facilities are available.
– 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	Contractor in consultation with the ECO	Assess all slopes and determine whether contouring is required	Rehabilitation	cEO	Weekly	All slopes are assessed and contoured as required
– 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;	Contractor in consultation with the ECO	Assess all slopes and determine whether terracing is required	Rehabilitation	cEO	Weekly	All slopes are assessed and terraced as required
– Berms that have been created must have a slope of 1:4 and be replanted with indigenous species	Contractor	Ensure all berms have a slope of 1:4 and is replanted	Rehabilitation	cEO	Weekly	All berms have a slope of 1:4 and is

and grasses that approximates the original condition;		with indigenous species and grasses				replanted with indigenous species and grasses
– 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;	Not applicable					
– Rehabilitation of access roads outside of farmland;	Not applicable					
– Indigenous species must be used for with species and/grasses to where it compliments or approximates the original condition;	Contractor	Make use of indigenous species for rehabilitation	Rehabilitation	cEO	Weekly	Indigenous species are used for rehabilitation
– Stockpiled topsoil must be used for rehabilitation (refer to **Section 5.24: Stockpiling and stockpiled areas**);	Contractor	Ensure stockpiled topsoil is used as per the requirements listed under section 5.24	Rehabilitation	cEO	Weekly	Stockpiled topsoil is used as per the requirements listed under section 5.24
– Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion;	Contractor	Ensure that topsoil is spread evenly	Rehabilitation	cEO	Weekly	Topsoil is spread evenly
– Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed;	Contractor	Remove all visible weeds from placement area and topsoil before spreading the topsoil	Rehabilitation	cEO	Weekly	No weeds are visible in the placement area or the topsoil
– Subsoil must be ripped before topsoil is placed;	Contractor	Undertake the ripping of subsoil prior to the	Rehabilitation	cEO	Weekly	Subsoil is ripped before topsoil is placed

		spreading of topsoil				
– The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment;	Contractor	Plan the timeframe for rehabilitation in order to undertake vegetation planting during the optimal time for vegetation establishment	Rehabilitation	ECO	At the start of rehabilitation to confirm correct timeframe	Rehabilitation is undertaken during the optimal time
– Where impacted through construction related activity, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled;	Contractor	All disturbed slope areas must be stabilised	Rehabilitation	cEO	Weekly	Disturbed slopes are stabilised sufficiently
– Sloped areas stabilised 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;	Contractor	Stabilise slopes as per the design specifications	Pre-construction & Rehabilitation	cEO	Weekly	Slopes are stabilised as per the design specifications
– Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil.	Contractor	Spoil used for landscaping must be applied as per the listed requirements	Rehabilitation	cEO	Weekly	Photographic record of spoil used for landscaping purposes as well as feedback from the contractor
– 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:	Contractor in consultation with a suitably qualified specialist	Make use of a suitable vegetation seed mixture should enhancement be required	Rehabilitation	ECO	As and when required	Use of a suitable vegetation seed mixture if required

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						

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: Great Karoo Wind Farm (Pty) Ltd

Tel No: 021 670 1423

Fax No: Not supplied

Postal Address: PO Box 23101, Claremont,

Physical Address: Fernwood House, 2nd Floor, The Oval, 1 Oakdale Road, Newlands, Western Cape, 7700, Cape Town.

7.1.2 Details and expertise of the EAP:

Name of EAP: Jo-Anne Thomas
Tel No: 011-656-3237
Fax No: 086-684-0547
E-mail address: joanne@savannahsa.com
Expertise of the EAP (Curriculum Vitae included): Refer to Appendix 2 of this EMPr for a CV of the EAP

7.1.3 Project name: Grid connection infrastructure, including 132kV Overhead Powerline, Switching Station and ancillaries, for the Great Karoo Wind Farm, Northern Cape.

7.1.4 Description of the project:

Great Karoo Wind Farm (Pty) Ltd proposes the development of specific grid connection infrastructure required to connect and evacuate the generated power of the authorised Great Karoo Wind Farm (DEFF Ref: 12/12/20/2370/3) to the national electricity grid. Following consultation with Eskom, it has been confirmed that the Great Karoo Wind Farm must connect to the Hidden Valley substation located at the Karusa Wind Farm (currently under construction) to the west of Great Karoo Wind Farm. Therefore, Great Karoo Wind Farm (Pty) Ltd is proposing the development of grid connection infrastructure from the authorised onsite substation to the Hidden Valley substation in order to connect and evacuate the generated power of the authorised Great Karoo Wind Farm to the national electricity grid. The project is located ~44km south of Sutherland and ~50km north of Matjiesfontein within the Northern Cape Province and falls within the Namakwa District Municipality and the Karoo Hoogland Local Municipality.

The grid connection infrastructure includes a switching station (up to 100m x 100m) to be developed adjacent to the authorised Great Karoo Wind Farm substation and a 132kV double- or single-circuit overhead power line, with a length of up to 14km. The pylon structures of the power line will be up to 32m high and the power line will be developed within a servitude of up to 40m wide. A corridor of 300m wide has been identified for the power line, widening to ~750m wide in the eastern section of the power line. In addition, a 500m assessment area around the wind farm substation has been considered for the placement of the switching station. Collectively, this assessment area is referred to as the grid connection corridor. The proposed grid connection infrastructure will be located within the grid connection corridor based on environmental sensitivities and technical constraints. Is it important to note that the entire grid connection corridor is being proposed for approval, and not the exact layout of the grid connection infrastructure therein. This is due to the need to determine the associated Great Karoo Wind Farm layout first, before exact determination of the technical routing may be possible. As such, the entire corridor is proposed for development with the understanding that all environmentally sensitive features will be avoided.

The entire extent of the corridor is located within the Komsberg Renewable Energy Development Zone (REDZ) and within the central corridor of the Strategic Transmission Corridors. Access to the grid connection corridor is possible via numerous existing smaller farm roads in close proximity to the corridor, primarily off the Regional 354 (R354) tarred road running between the towns of Matjiesfontein and Sutherland. During construction, a service track along the length of the power line servitude of up to 6m wide will be established to allow for large crane movement. This track will be rehabilitated following the construction phase to a typical 'jeep' track (i.e. off-road track) for use during operation. Formal roads will therefore not be constructed underneath the power line for maintenance purposes. However, where the power line traverses drainage lines, road crossing infrastructure (e.g. culverts) may be developed within the drainage line. The switching station will be accessed via the already authorised access road to the Great Karoo Wind Farm substation. Other associated infrastructure includes temporary laydown area/s that will be rehabilitated upon completion of the construction phase.

7.1.5 Project location:

The grid connection corridor (with both alternatives and switching station contained therein) is located within the Karoo Hoogland Local Municipality and the Namakwa District Municipality (DC6) and traverses the following three (3) affected properties:

- Farm Kentucky 206;
- RE Portion 1 of the Farm Orange Fontein No. 203; and
- Farm De Hoop 202.

NO	FARM NAME(if applicable)	FARM NUMBER (if applicable)	PORTION NAME	PORTION NUMBER	LATITUDE	LONGITUDE
1	Kentucky	206	0	0	32°49'7.88"S	20°43'27.99"E
2	Orange Fontein	203	RE of portion 1	RE of portion 1	32°48'10.35"S	20°41'27.12"E

3	De Hoop	202	0	0	32°48'35.92"S	20°37'23.64"E

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. threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features within 50 m from the development footprint.

Site sensitivity

Combined sensitivity maps for the grid connection corridor is provided below. This has been compiled based on the specialist sensitivities determined from their respective studies, and therefore aims to represent the entirety of the site and the combined sensitivities. Please note, to improve display and clarity of the various features, two maps have been produced, one showing the avifaunal mitigation priority areas and the biodiversity sensitivity (refer Figure 1), and one showing the land capability sensitivity and heritage features present within the corridor (refer 3). The following explanatory notes are applicable to the sensitivities depicted below:

- Avifaunal mitigation priority areas: The fine-scale avifauna habitats that were delineated within the avifaunal specialist assessment were assigned a mitigation priority category based on the characteristics of the avifauna assemblage within each one. The priority categories range from 'Low' to 'Very High', with 'Very High' areas requiring stringent mitigation measures and 'Low" areas not of concern or requiring minimum mitigation measures. Generally, lowland areas and rocky slopes were assigned a 'Moderate' category as they were typically dominated by small passerine species. However, where threatened or priority species occurred or displayed breeding behaviour, these areas were categorised as a 'Very High' mitigation priority. Drainage lines are likely to be used as flyways, especially by heavy-bodied waterfowl, and therefore were assigned a 'High' priority category. It is important to note that the avifaunal mitigation priority areas are not considered by the specialist to be no-go areas, but rather areas where stringent mitigation must be applied, as detailed in the avifaunal impact assessment section above and the specialist assessment report (refer to Appendix D - G). No-go zones are however determined from an avifaunal perspective, which are detailed further in section 6.8 below, and depicted in the sensitivity maps below.
- Biodiversity Sensitivity: Four different habitat types were delineated within the assessment and allocated a sensitivity category based on the criteria determined by the specialist. Ridges and Rocky Slope spatially varied in their sensitivity. Ridges were allocated a 'high' sensitivity as they were the source points for drainage lines as well as their uniqueness within the landscape. Rocky slopes were generally assigned a 'moderate' sensitivity, except where they formed the source point of drainage lines

and were accordingly assigned a 'high' sensitivity. Please note, the specialist report indicates that areas of high sensitivity are not regarded as no-go's or exclusion zones, and therefore provided the mitigation measures supplied are applied by the proponent, development may proceed within these regions.

- Heritage: one heritage feature was found on site for the Soetwater OHL corridor, which is shared partially by this proposed development. A no-go buffer of 35m (detailed further below) is shown along with the location of the feature within the grid connection corridor, is shown on Figure 2. No other heritage features were located within the grid connection corridor and so no other sensitivities are assigned.
- Land use capability: The agricultural compliance statement confirmed the regional sensitivity moderate sensitivity, as per the DEA screening tool results, however concluded that the proposed development will have a negligible impact on the agricultural production of the land. The moderate sensitivity confirmed by the specialist is shown in Figure 2 below.

Buffer zones, no-go zones or exclusion zones

One heritage feature was found on site for the Soetwater OHL corridor, which is shared partially by this proposed development(the proposed Great Karoo powerline will run parallel to the Soetwater OHL along the north-south section of the line). This feature is shown on Figure 2. Recent comment by SAHRA related to the Soetwater project indicated that the feature (a 'stone packed feature') must be surrounded by a fence with 5m clearance from the feature itself, and that no development is allowed within 30m of the fence surrounding the site (i.e. a no-go zone of 35m around the feature itself is to be established). The heritage specialist has indicated that the measures required by SAHRA for the feature relating to Soetwater should also apply to that of this project, and therefore a 35m conservation buffer, deemed as a no-go for any project related infrastructure, is deemed appropriate for this heritage feature. Please refer to Figure 1 for the location of the feature along the grid connection corridor and as well as the 35m no-go buffer.

In addition, the avifaunal specialist found a pair of *Bubo africanus* (Spotted-Eagle Owl) nesting within the drainage line parallel to the OHL adjacent to the Hidden Valley (Karusa) Substation. The species forms life-long pair bonds and tends to re-use nesting sites. The avifaunal specialist therefore recommended that construction and installation within this portion of the OHL be undertaken in late August to avoid disturbance. Where this is not possible due to the construction timelines, the specialist suggested a 50 m buffer around the nest site be maintained to ensure no construction activity occurs within the buffer. Although, the risk of collision for owls tend to be minimal due to their eyesight, the species is at risk of electrocution (Prinsen et al, 2011). The specialist further indicated that no pylons are to be erected within 100 m of the nest site to reduce the risk of electrocution. Where technically feasible, the distance between the nest and the nearest pylons should be increased to 200m. These exclusions areas have been depicted in the sensitivity maps above (refer Figure 1 and Figure 2).

The biodiversity specialist concluded that development of infrastructure can occur within any area of the corridor footprint, but pylons and the switching station are not be located in drainage lines. Formal crossings must be developed for the road to traverse these drainage lines. The location of the proposed infrastructure is not to exceed the boundary of the corridor.

No other exclusion zones, buffer zones or no-go zones were determined for the proposed development.

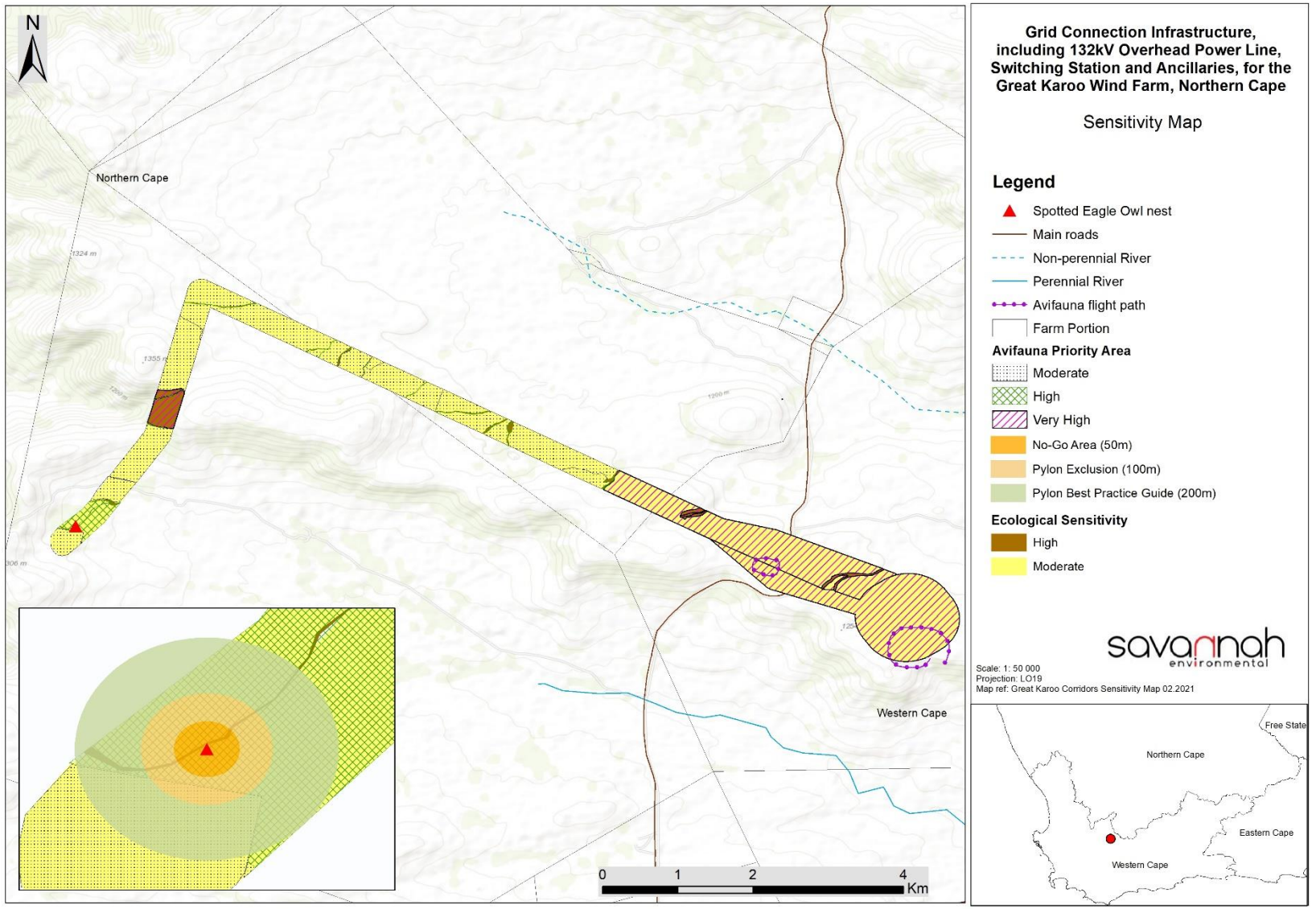

Figure 1: Biodiversity sensitivity map and avifaunal mitigation priority areas for the grid connection corridor.

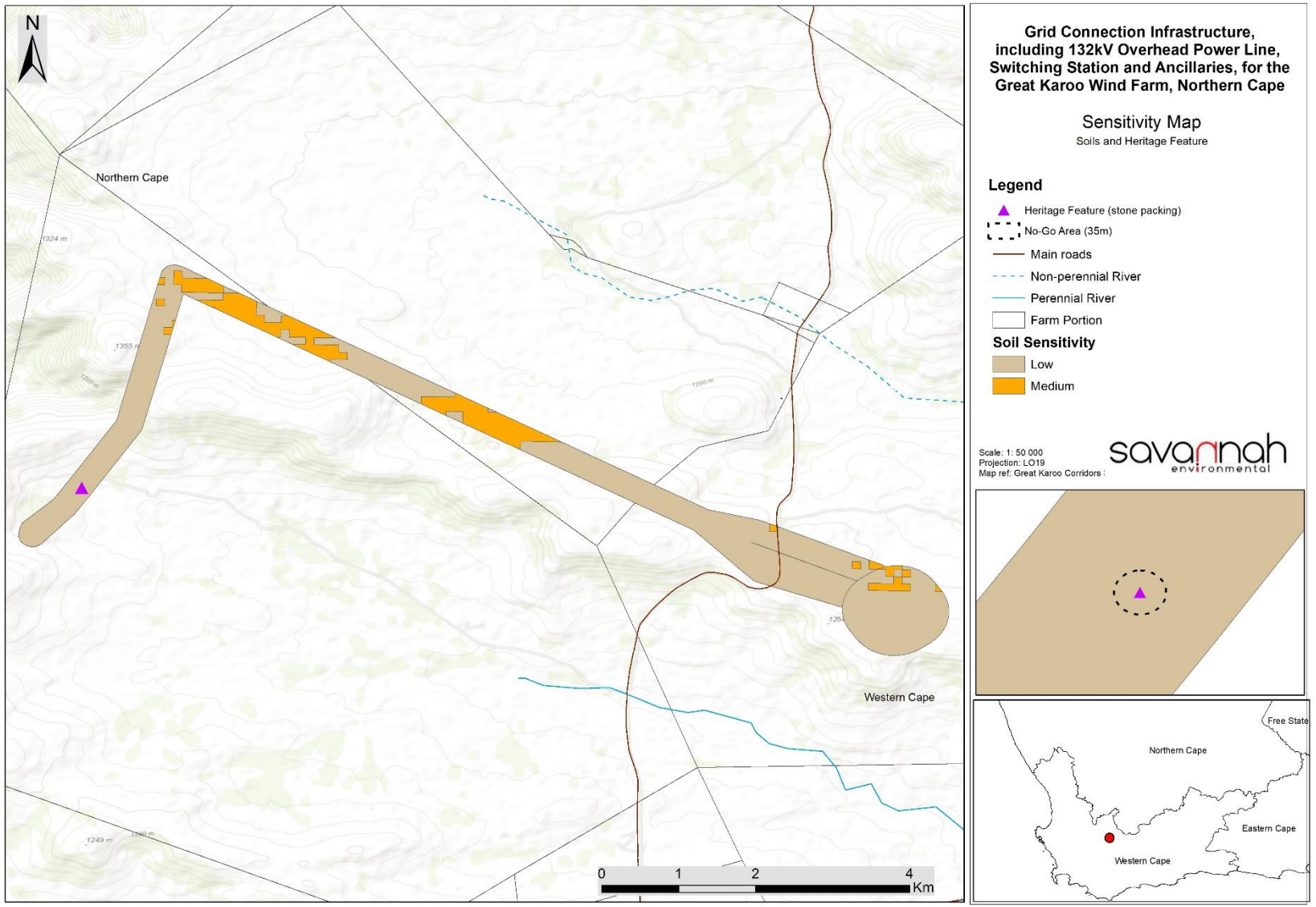

Figure 2: Land capability sensitivity map and heritage feature within the grid connection corridor.

Figure 3: Map of relative agriculture theme sensitivity.

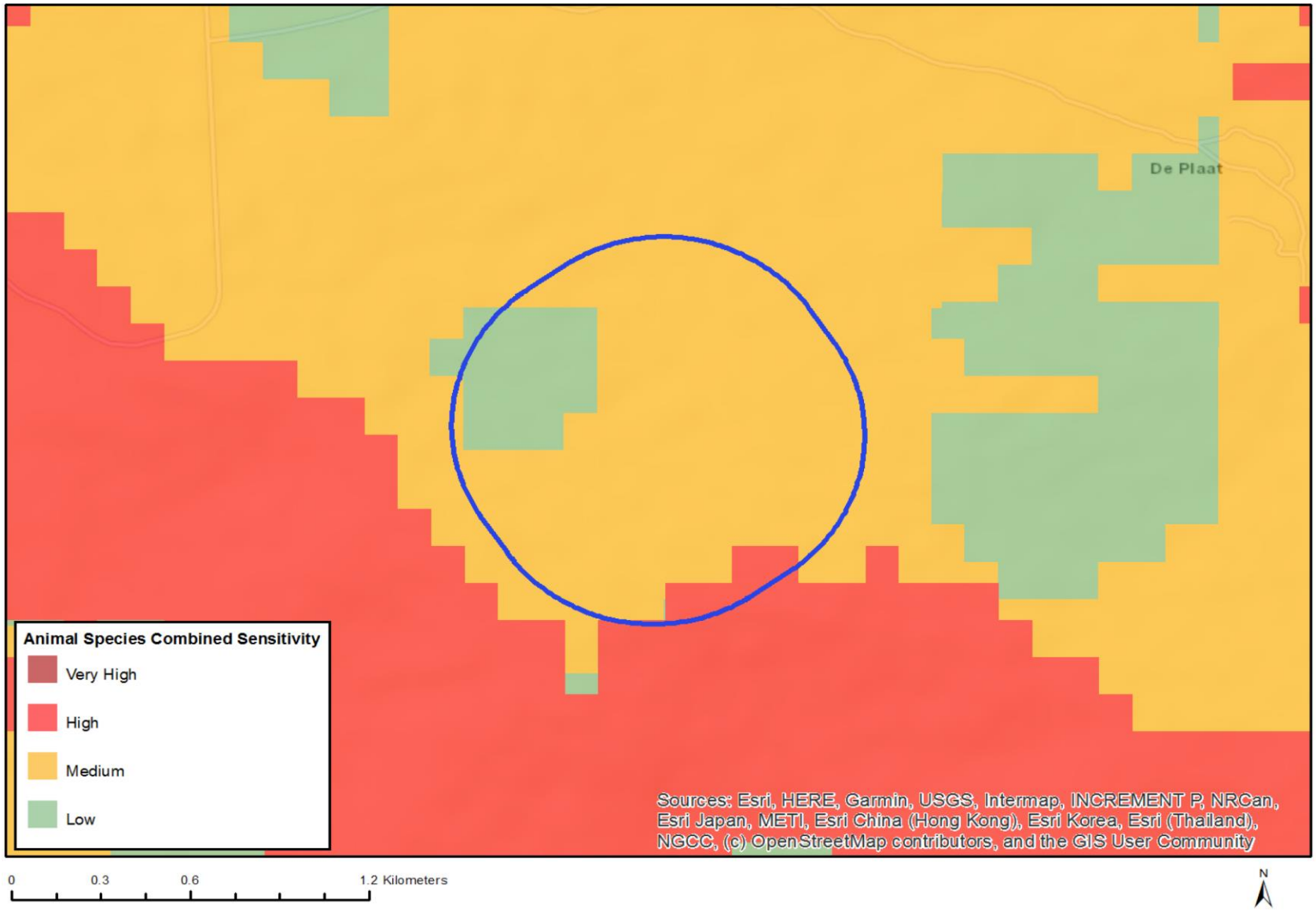

Figure 4: Map of relative animal species theme sensitivity.

Figure 5: Map of relative aquatic biodiversity theme sensitivity

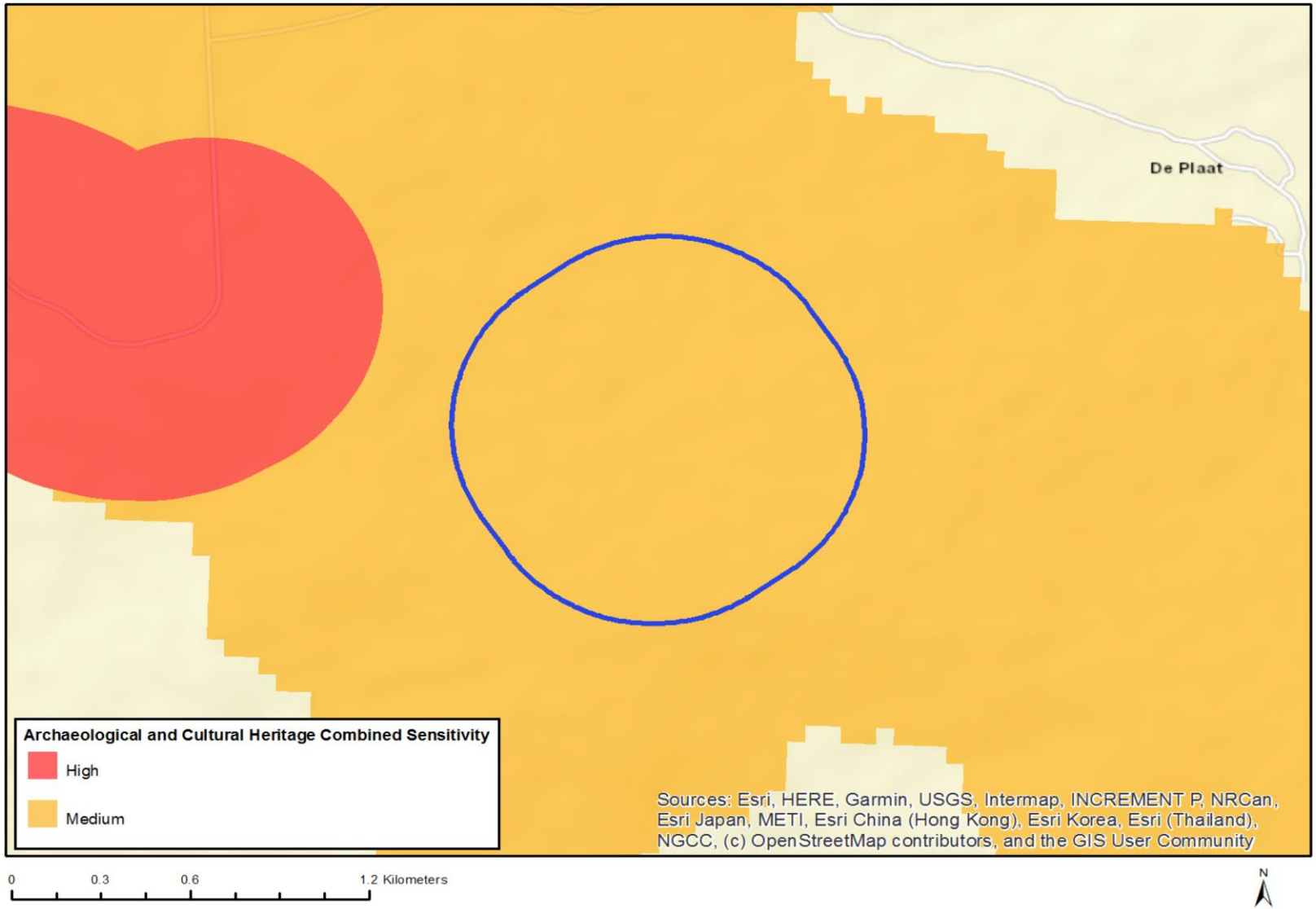

Figure 6: Map of relative archaeological and cultural heritage theme sensitivity.

Figure 7: Map of relative civil aviation theme sensitivity

Figure 8: Map of relative palaeontology theme sensitivity

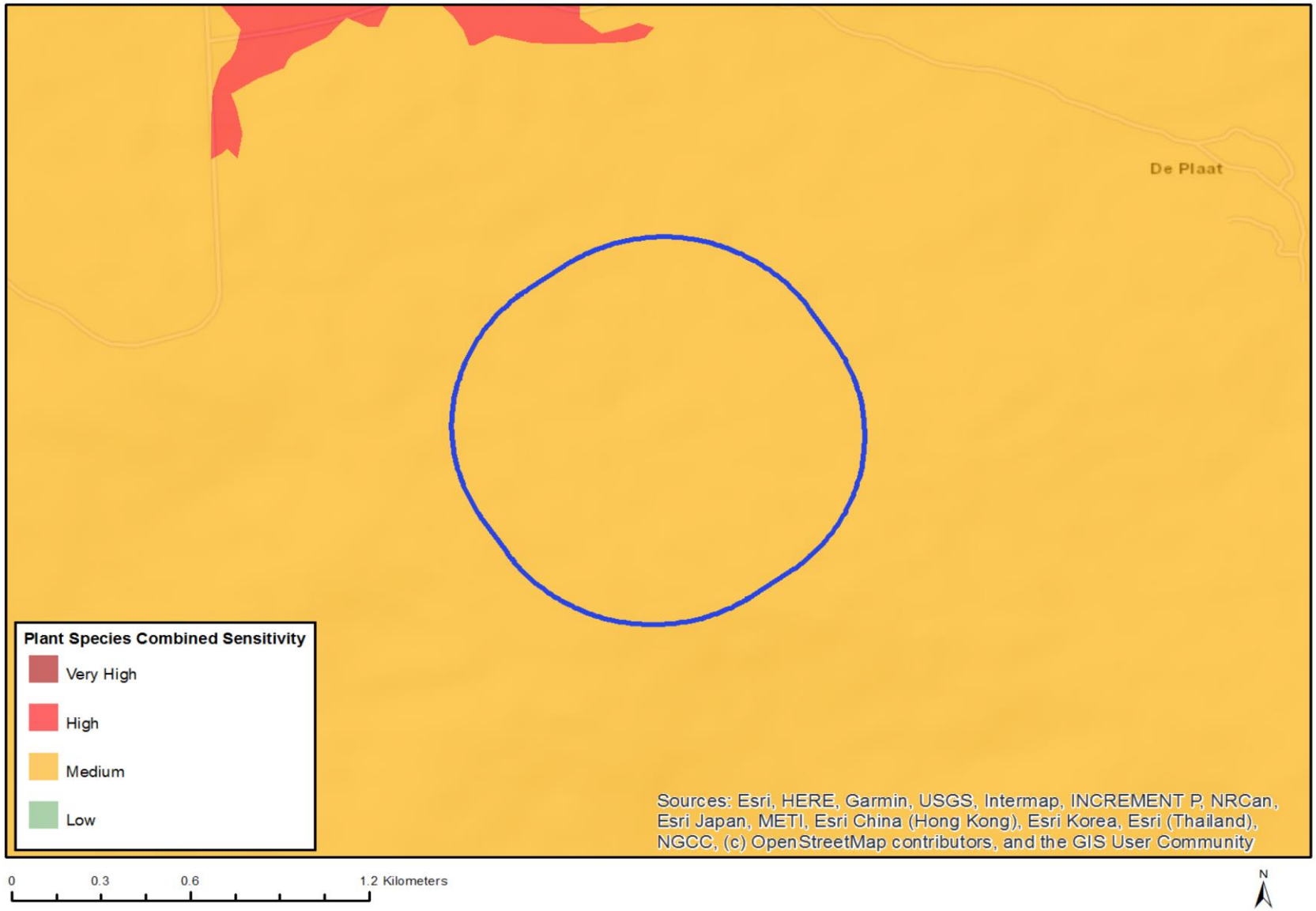

Figure 9: Map of relative plant species theme sensitivity

Figure 10: Map of relative defence theme sensitivity

Figure 11: Map of relative terrestrial biodiversity theme sensitivity

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 day 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:

This declaration will be signed by the proponent/applicant/holder of the EA once the contractor is appointed and has provided inputs to this Generic EMPr as per the requirements of this template.

The contractor would be required to develop the following site-specific plans in accordance with the specialist recommendation contained in Section C of this EMPr:

- **Invasive Alien Plant Management Plan (Refer Appendix 4 of this EMPr)**
- **Stormwater Management Plan**
- **Rehabilitation Management Plan (Refer Appendix 3 of this EMPr)**
- **Pest control plan**
- **Fire management plan**
- **A site plan (layout plan)**
- **Action plans for management and response to events of sewage spills, leaks and hazardous chemical spills to the surrounding environment.**

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 actions, not included in the pre-approved generic EMPr template, to manage impacts, those impact management outcomes and impact management 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 EMPr 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 EMPr for the site and is legally binding.

This section will **not be required** should the site contain no specific environmental sensitivities or attributes.

CONSTRUCTION PHASE OUTCOMES AND ACTIONS

Ecological

Impact management outcome: CONSTRUCTION: Minimise loss of vegetation with the clearance of the development footprint

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Pre-construction walk-through of the final layout and corridor in order to locate species of conservation concern that can be translocated.	dEO, specialist	Visual inspection of the layout and corridor with walk-through report produced	Prior to construction	cEO, ECO	Once, prior to commencement of construction	Walk-through report produced and kept on file during construction
Vegetation clearing to commence only after walk-through has been conducted and necessary permits obtained.	Contractor	Submit and obtain necessary permits prior to clearance and keep on file	Prior to construction	cEO, ECO	Once, prior to commencement of construction	Necessary permits obtained prior to clearance and keep on file during construction
Environmental Officer (EO) to provide supervision and oversight of vegetation clearing activities within sensitive areas such as in/near the drainage lines.	cEO	Visual inspection of the vegetation clearing within sensitive areas	Duration of construction phase	ECO	Monthly	No evidence of degradation of sensitive areas caused by clearing conducted within sensitive areas, as observed during audits
Pre-construction environmental induction for all construction staff on site to ensure that basic	cEO	Requirement for induction of all staff prior to entry, as well as the	Duration of construction phase	ECO	Monthly	Induction roster of all staff completed, maintained and

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
environmental principles are adhered to.		development and application of an induction programme				available on site, induction programme material observed and on file on site during audits

Impact management outcome: CONSTRUCTION: Minimise loss of surrounding natural habitat including CBAs and NPAES areas

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
Pre-construction environmental induction and awareness training for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness of no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, remaining within demarcated construction areas etc.	cEO	Requirement for induction of all staff prior to entry, as well as the development and application of an induction programme	Duration of construction phase	ECO	Monthly	Induction roster of all staff completed, maintained and available on site, induction programme material observed and on file on site during audits
All construction activity and roads to be within the clearly defined and demarcated areas.	cEO	Visual inspection of the construction clearing activities and if they remain within defined and demarcated areas	Duration of construction phase	ECO	Monthly	No evidence of clearing conducted outside of defined or demarcated areas as observed during audits
Temporary laydown areas should be located within areas that have been	Contractor, cEO	Identification of low sensitivity areas, along with planning and	Prior to construction	ECO	Monthly	No evidence of laydown areas within

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
identified as being of moderate ecological sensitivity. These areas should be rehabilitated after use.		implementation of laydown areas only within these regions	commencing and for the duration of construction phase			sensitive areas other than low ecological sensitivity as observed during audits
Appropriate dust control measures to be implemented.	Contractor	Identification of suitable dust control measures, and implementation of these measures	For the duration of construction phase	ECO	Monthly	Dust control measures evident or observed during audit
Suitable sanitary facilities to be provided for construction staff.	Contractor	Sufficient supply of temporary, portable sanitary facilities (portable toilets) provided and placed at strategic location on site, with consideration of the number of construction staff likely to be present on site	Prior to construction commencing and for the duration of construction phase	ECO	Monthly	Sufficient number of sanitary facilities, placed at appropriate locations observed during audit, with no complaints received towards insufficient number or evidence of ablutions outside of provided sanitary facilities
Access roads and crossings (if applicable) should have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.	DPM, contractor	Designs of roads to include the requirement for run-off control features, and construction of the roads to be in accordance with approved designs	Prior to the commencement of construction, and for the duration of construction	ECO	Once prior to the commence of construction to observe run-off measures in designs, and monthly during the construction phase (for	Evidence of run-off control measures in designs observed in the site file, and visual evidence of run-off control measures constructed for the access roads on site.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
					implementation)	
Prior to construction activity an ecological walk-through survey must be undertaken to tag/mark flora species to be relocated. Appropriate permits must be obtained prior to relocation of the identified species.	dEO, specialist	Visual inspection of the layout and corridor with walk-through report produced	Prior to construction	cEO, ECO	Once, prior to commencement of construction	Walk-through report produced and kept on file during construction
Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited.	cEO	Requirement for induction of all staff prior to entry, as well as the development and application of an induction programme. Prohibit harming animals on site.	Duration of construction phase	ECO	Monthly	Induction roster of all staff completed, maintained and available on site, induction programme material observed and on file on site during audits. No incidents of animals being harmed determined on site.
Appropriate measures must be implemented to prevent excessive noise and vibration. No construction is to occur at night to avoid disturbance to amphibians.	Contractor, cEO	Restrict construction activities near drainage lines to daylight hours to avoid amphibian disturbance	Duration of construction phase	ECO	Monthly	No evidence of construction activities near drainage lines after hours
Effective and sustainable stormwater designs must be incorporated into the road design – as appropriate - to prevent excessive runoff into the surrounding natural environment and thereby, causing erosion.	DPM, contractor	Designs of roads to include the requirement for run-off control features, and construction of the roads to be in accordance with approved designs	Prior to the commencement of construction, and for the	ECO	Once prior to the commence of construction to observe stormwater measures in	Evidence of stormwater control measures in designs observed in the site file, and visual evidence of run-off control measures

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
			duration of construction		designs, and monthly during the construction phase (for implementation)	constructed for the access roads on site.
A fire management plan must be in place for the areas surrounding the project area to restrict the impact from fire on the natural flora and fauna communities. A fire expert should be consulted for suitable guidelines for the area and project requirements.	Contractor, cEO, specialist	Compile and implement a fire management plan	Prior to the commencement of construction, and for the duration of construction	ECO	Once prior to the commence of construction to observe plan, and monthly during the construction phase (for implementation)	Fire management plan in the site file, and visual evidence of the implementation thereof (as per the requirements of the plan) observed on site
It should be made an offence for any staff to bring or plant any plant species into any portion of the project area, unless undertaken in line with the required/approved rehabilitation. No plant species whether indigenous (unless undertaken in line with the required/approved rehabilitation) or exotic should be brought into the project area, to prevent the spread of exotic or invasive species.	cEO, Contractor	Prohibit plants or animals to be brought onto site by staff unless specifically required as per the rehabilitation plan.	Duration of construction phase	ECO	Monthly	No records of plant or animals having been introduced to the site by staff unless required as per the rehabilitation plan.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
An extensive alien plant management plan must be compiled to remove the alien vegetation from within the project footprint. The use of herbicides needs to be monitored and only be used by a qualified person.	cEO, specialist	Invasive Alien Plant species plant developed for the construction phase of the project, detailing monitoring required, control methods and frequency.	Prior to commencement of construction (for plan development), and for the duration of the construction and operation phases (for implementation of plan)	ECO	Once prior to construction and monthly for the duration of construction and operation	IAP management plan observed in the site file, along with monitoring records and control efforts evidence during the audit. Further evidence includes negligible or low levels of encroachment as observed and determined by the ECO.
Areas of indigenous vegetation, even secondary communities, should under no circumstances be fragmented or disturbed further or used as an area for dumping of waste.	cEO	Visual inspection of the construction clearing activities and if they remain within defined and demarcated areas	Duration of construction phase	ECO	Monthly	No evidence of clearing conducted outside of defined or demarcated areas as observed during audits
A site plan of the area must be made available onsite for all contractors and personnel indicating parking & storage areas, site offices and placement of ablution facilities	cEO	Develop site plan and make the plan available in hard copy on site	Prior to commencement of construction (for plan development), and for the duration of the construction and operation phases (for implementation of plan)	ECO	Monthly	Plan evident on site in hard copy format during inspections

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
The Contractor should 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. Toilets must be provided as per the relevant Health & Safety legislation.	Contractor, cEO	Ensure adequate ablution supplied on site and placed strategically throughout construction for staff use, as per the requirements of health and safety legislation	Duration of construction phase	ECO	Monthly	Sufficient supply of ablution facilities well placed throughout the construction site, as determined by the ECO
The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed recycling or disposal facility.	Contractor, cEO	Ensure adequate domestic waste collection bins available and placed strategically throughout construction for staff use. Dispose of all solid waste at an appropriately licenced facility.	Duration of construction phase	ECO	Monthly	Sufficient supply of domestic waste facilities well placed throughout the construction site, as determined by the ECO
Where a registered disposal facility is not available close to the site, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site. Temporary storage of domestic waste shall be in covered waste skips.	Contractor, cEO	Prohibit waste burning on site and dispose of all domestic waste in accordance with an approved method statement or at an appropriately licenced site.	Duration of construction phase	ECO	Monthly	Evidence of disposal at a registered facility (slips) or an approved method statement being implemented during site visits
Any topsoil that is removed during construction must be appropriately removed and stored according to the national and provincial guidelines. This includes on-going maintenance of such topsoil piles so	Contractor, cEO	Store topsoil as per national and provincial guidelines.	Duration of construction phase	ECO	Monthly	Evidence of appropriate topsoil storage on site as per the national and provincial guidelines.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
that they can be utilised during decommissioning phases and re-vegetation.						
All livestock must always be kept out of the project area during construction and rehabilitation, especially areas that have been recently re-planted	Contractor, cEO	Demarcate regions that must be rehabilitated and fence off using temporary fencing to ensure no livestock hamper rehabilitation efforts	Duration of construction phase	ECO	Monthly	Areas for rehabilitation appropriately demarcated and fenced off during rehabilitation efforts
Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and dumps especially. This includes wetting of exposed soft soil surfaces and not conducting activities on windy days which will increase the likelihood of dust being generated.	Contractor, cEO	Apply recognised dust control measures during construction, where excessive dust is likely to occur	Duration of construction phase	ECO	Monthly	Dust control measures implemented in regions where excessive dust is likely to occur, as determined by ECO
Stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised and be surrounded by bunds, if necessary to prevent loss of soil material through erosion	Contractor, cEO	Employ recognised measures to minimise stockpile erosion (coverings, revegetation, etc).	Duration of construction phase	ECO	Monthly	Erosion control measures implemented where evidence of stockpile erosion is evident
Have action plans on site, and training for contactors and employees in the event of sewage spills, leaks and hazardous chemical spills to the surrounding environment. A specialist Contractor shall be used for the bio-remediation of contaminated soil where the	Contractor, cEO, specialist	Draft actions plans or method statements for implementation of sewage spills, leaks and hazardous chemical spills to the environment. Ensure all staff made aware of the content of these plans during induction.	Duration of construction phase	ECO	Monthly	Action plans or method statement evident and induction material includes these plans. Records kept of inductions

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
required remediation material and expertise is not available on site.						

Impact management outcome: CONSTRUCTION: Reduce direct mortality or disturbance of fauna

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
All personnel should undergo environmental induction with regards to fauna and awareness about not harming or collecting species, especially tortoises and snakes.	cEO	Requirement for induction of all staff prior to entry, as well as the development and application of an induction programme	Duration of construction phase	ECO	Monthly	Induction roster of all staff completed, maintained and available on site, induction programme material observed and on file on site during audits
Prior to commencing work each day, two individuals should traverse the working area in order to disturb (flush out) any fauna so they have a chance to vacate.	Contractor, cEO	Visual inspection of work area daily prior to commencement of work with any notes taken of fauna requiring relocation or further action	Duration of construction phase	ECO	Monthly	Note evidence of fauna requiring relocation or negligible (very infrequent) evidence of any harmed fauna due to construction activities, as determined by ECO
Any fauna threatened by the construction activities should be removed safely by an appropriately qualified environmental officer or removal specialist.	Contractor, cEO, ECO, specialist	Physical relocation of threatened fauna prior to construction activities in the vicinity of the fauna, along with written record of actions taken (including persons involved, date and time, end result and status of fauna after release)	Duration of construction phase	ECO	Monthly	Written evidence of fauna requiring relocation observed on site and negligible (very infrequent) evidence of any harmed fauna due to construction activities, as determined by ECO

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
All construction vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions.	Contractor, cEO	Install speed signature throughout site, include speed limit into induction and ensure all staff entering site is aware of the requirement to implement speed limits. Institute verbal and written warnings for violations and appropriate fines for repeat contraventions. Written log of fines and warning issued kept on site	Duration of construction phase	ECO	Monthly	Minimal instances of speeding as observed on site during audits and as evidenced in the written log of warnings and fines issued for contraventions
All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.	Contractor	Suitable bunding and containment, demarcation and access control measures implemented for hazardous materials at on site stores. Spill prevention plan developed and spill kits made available, as well as all staff inducted with spill response procedure and a log of inductions kept on file. Written record of spills and clean up actions kept on site	Duration of construction phase	ECO	Monthly	Effective bunding and containment of hazardous materials as evidenced on site, along with suitable access control and demarcation provided at hazardous materials stores. Written log of spills and clean up actions implemented observed and kept on file at site.
If holes or trenches need to be dug for pylons or electrical cabling, these should not be left open for extended periods of time as fauna may fall in and become trapped in them. Holes should only be dug when they are required and should be used and	Contractor, cEO, specialist	Trenches or holes required for construction closed up immediately once they are no longer in use. Period inspections to ensure no trapped fauna is observed and if so to be rescued by specialist (if required) or	Duration of construction phase	ECO	Monthly	No unused trenches or holes observed on site during audit, and the written log kept and observed on site containing all instances of

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
filled shortly thereafter. Alternately, open excavations must be monitored daily to release any fauna that become trapped.		construction staff. Written log of trapped fauna and relocation efforts kept on file				trapped and relocated fauna.

Avifaunal

Impact management outcome: CONSTRUCTION: Minimise habitat loss and degradation

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Construction activity to only be within the project footprint and the area is to be well demarcated.	cEO	Visual inspection of the vegetation clearing to ensure these remain within demarcated areas	Duration of construction phase	ECO	Monthly	No evidence of clearing conducted outside of demarcated areas as observed during site audit
Areas where vegetation has been cleared must be re-vegetated within local indigenous plant species.	Contractor, cEO, specialist	Indigenous plant species seedling or seed obtained and planted/seeded as per the specialist instructions within cleared regions that are to be rehabilitated	Duration of construction phase	ECO	Monthly	Evidence of revegetation observed, where required, on site during audits.
The affected area must be monitored for invasive plant encroachment and erosion and must be controlled.	Contractor, cEO	Visual inspection of working areas to determine if erosion has occurred or is likely to occur. Visual inspection of construction areas for signs of invasive plant encroachment and where	Duration of construction phase	ECO	Monthly	Evidence of invasive species control actions or negligible invasive species encroachment observed on site.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
		evident, control actions of these invasive plants				
Unnecessary damage to important habitats such as drainage lines and cliffs must not occur. Appropriate crossings must be constructed where the access road traverses drainage lines.	cEO	Visual inspection of the vegetation clearing to ensure these remain within demarcated areas	Duration of construction phase	ECO	Monthly	No evidence of clearing conducted outside of demarcated areas as observed during site audit, where such clearing has caused unnecessary damage to these important habitats
The use of laydown areas within the footprint of the development should be used where feasible, to avoid habitat loss and disturbance to adjoining areas.	Contractor, cEO	Identification of suitable areas, along with planning and implementation of laydown areas only within these regions	Prior to construction commencing and for the duration of construction phase	ECO	Monthly	No evidence of laydown areas within sensitive areas other than low ecological sensitivity as observed during audits
Prior to construction activity a walk-through survey must be undertaken to tag/mark flora species to be relocated.	Contractor, cEO, specialist	Visual inspection of the construction area prior to commencement of construction by the specialist, with a report produced and communicated to the contractor with regards to where the diverters must be placed and areas to be avoided	Once prior to construction commencing, and for the duration of construction phase	ECO	Monthly	Specialist walk-through report produced and observed on file on site indicating resources observed (if any) as well as communications made to the contractor and corrective actions taken, if any.
The design of the proposed power line must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds	DPM, contractor	Designs of facility to include consideration of the guidelines recommended by Birdlife South Africa and the Eskom-EWT	Prior to the commencement of construction,	ECO	Once prior to the commence of construction to observe	Designs have adequately considered the best practice guidelines towards minimising

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
and Energy, considering the mitigation guidelines recommended by Birdlife South Africa.		Strategic Partnership on Birds and Energy	and for the duration of construction		designs, and monthly during the construction phase (for implementation)	avifaunal impact, as observed by the ECO
A pest control plan must be put in place and implemented. It is imperative that poisons not be used.	Contractor, cEO	Development and implement a pest control plan, which does not employ poisons, for implementation during the construction phase	Prior to construction commencing and for the duration of construction phase	ECO	Monthly	Pest control plan evident in site file and implementation thereof observed on site
Construction activities and vehicles could cause spillages of lubricants, fuels and waste material potentially negatively affecting the functioning of the ecosystem. All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area.	Contractor, cEO	Written logs of maintenance to be kept on file and Construction vehicles and equipment must be inspected daily for signs of leakages. Repair/ maintenance of vehicles and equipment to take place within a demarcated area. Repairs may only take place within the project area in emergencies, or if the vehicle/ equipment to be repaired cannot be removed to the demarcated maintenance area for practical reasons. In such instances appropriate impermeable ground covering or	Duration of construction phase	ECO	Monthly	Written logs of maintenance to be kept on file and Construction vehicles and equipment must be inspected daily for signs of leakages, as observed during audits

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
		drip trays must be used to prevent contamination				
Where possible, work should be restricted to one area at a time. This will give the birds a chance to vacate the area. Alternately, prior to commencing work each day, two individuals should traverse the working area in order to disturb (flush out) any fauna so they have a chance to vacate.	Contractor, cEO	Plan and implement construction work in a systematic manner	Prior to construction commencing and for the duration of construction phase	ECO	Once-off	Evidence of work scheduling observed on site

Impact management outcome: CONSTRUCTION: Limit direct avifaunal mortality

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
All personnel should undergo environmental induction and awareness training with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g. bustards, korhaans, francolin), and owls, which are often persecuted out of superstition.	cEO	Requirement for induction of all staff prior to entry, as well as the development and application of an induction programme and an environmental awareness training programme	Duration of construction phase	ECO	Monthly	Induction roster of all staff completed, maintained and available on site, induction & awareness programme material observed and on file on site during audits

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area.	cEO	Visual inspection of the construction activities and if they remain within defined and demarcated areas	Duration of construction phase	ECO	Monthly	No evidence of vehicle outside of outside of defined or demarcated areas as observed during audits
All vehicles (construction or other) accessing the site should adhere to a low speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g. nightjars and owls) which sometimes forage or rest on roads, especially at night.	Contractor, cEO	Install speed signature throughout site, include speed limit into induction and ensure all staff entering site is aware of the requirement to implement speed limits. Institute verbal and written warnings for violations and appropriate fines for repeat contraventions. Written log of fines and warning issued kept on site	Duration of construction phase	ECO	Monthly	Minimal instances of speeding as observed on site during audits and as evidenced in the written log of warnings and fines issued for contraventions
The power line should be marked with bird diverters along all high-priority sections in order to make the lines as visible as possible to collision-susceptible species. Recommended bird diverters such as brightly coloured 'aviation' balls, thickened wire spirals and flapping devices that increase the visibility of the lines should be fitted where considered necessary (collision hot-spots). These should be identified during the preconstruction walk-through.	Contractor	Bird flight diverters installed as per the avifaunal pre-construction walk through report results	Duration of construction phase	ECO	Monthly	Evidence of bird flight diverters installed as per the pre-construction walkthrough requirements, where these were determined necessary

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
Bird Strike Indicators may be installed to assist in monitoring collisions, however this is an optional measure and is not a requirement.	Contractor	Install of bird strike indicators on power line as required by pre-construction avifaunal walkthrough	Duration of construction and operation phase	ECO	Monthly	Evidence of bird strike indicators installed and maintained during construction and operation

Soils

Impact management outcome: CONSTRUCTION: Conservation of soil resources

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
In cases of erosion, erosion berms must be implemented to minimise any further erosion;	Contractor, cEO	Visual inspection of working areas to determine if erosion has occurred or is likely to occur.	Duration of construction phase	ECO	Monthly	Negligible evidence of erosion observed on site, or where evident that measures for control have been implemented.
Compacted areas are to be ripped to loosen the soil structure.	Contractor	Ripping, where required, of compacted soils due to the construction activities	Duration of construction phase	ECO	Monthly	Evidence of ripped soil where compaction was evident, or evidence of no ripping required as no compacted soils are prevalent.
Existing roads should be used as much as possible during construction	Contractor, cEO	Induct staff to be aware that off-road driving is not permitted unless unavoidable for construction work	Duration of construction phase	ECO	Monthly	Negligible evidence of erosion observed on site, or where evident that

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
						measures for control have been implemented.
All laydown yards must be constructed within the Glenrosa, Mispah or Bare Rock areas due to the fact that this soil form is characterised by a lower land capability and land potential than the other soil forms;	Contractor, cEO	Identification of these areas suitable for laydown prior to construction commencing, and visual inspection of the construction laydown areas and specific instruction to contractors to remain within defined and demarcated areas	Duration of construction phase	ECO	Monthly	Laydown areas placed within demarcated areas suitable for laydown based on the soil type, and no evidence of laydown areas outside of these areas as observed on site
A stormwater management plan must be compiled for the proposed switching station, focussing on stormwater and considering erosion that might be caused as a result thereof;	Contractor, cEO	Develop and implement a stormwater management plan for the facility, which specifically includes consideration	Prior to construction commencing, and for the duration of construction and operation phase	ECO	Monthly	Stormwater plan evident within the onsite environmental file prior to construction commencing, and evidence of stormwater measures implanted as observed on site during audit
Prevent any spills from occurring. Machines must be parked within hard park areas or dedicated storage areas and must be checked daily for fluid leaks.	Contractor, cEO	Implement drip trays under stationary vehicles (overnight) and a maintenance schedule for all vehicles on site. Written logs of maintenance to be kept on file and daily inspections for signs of leakages	Duration of construction phase	ECO	Monthly	Spills kits observed and implemented on site for overnight stationary vehicles, as well as written log observed of maintenance on vehicles.

Heritage (Archaeology & Palaeontology)

Impact management outcome: CONSTRUCTION: Limit impacts to archaeological, built environment and palaeontological heritage resources

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
A stone packed feature was identified along the Soetwater OHL corridor during the walkdown for that project, and in response SAHRA issued certain recommendations for the Soetwater OHL project (SAHRA Case ID: 15452 dated 23 September 2020). Given that the Great Karoo OHL corridor runs parallel to the Soetwater OHL, the recommendations made by SAHRA in respect of the stone-packed feature should be noted and applied as relevant to the construction of the Great Karoo OHL: The stone packed feature (possible grave) should be fenced with an entry gate and clearly demarcated prior to the construction activities along the north-south length of the powerline.	Contractor, cEO	Fence the stone packed features prior to construction activities along the north-south length of the powerline.	Prior to construction commencing	ECO	Once prior to the commence of construction	Fencing around the stone packed feature evident in accordance with the heritage impact assessment requirements
SAHRA's previous recommendations (26 May 2014) stipulate that the fence be placed 5 meters away from the perimeter of the graves and that no development is allowed within 30 meters of the fence line	Contractor, cEO	Fence the stone packed features prior to construction activities along the north-south length of the powerline. Place the fence 5m from the stone packed feature, and restrict all	Prior to construction commencing, and for the duration of the construction phase	ECO	Monthly	Fencing around the stone packed feature evident in accordance with the heritage impact assessment requirements (5m from feature) and no

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
surrounding the graves. This must be implemented for the entirety of the construction phase. General fencing materials may be used, mesh fencing approximately 1.2 m in height, and treated wooden droppers as the corner posts, approximately 5 cm in width, or similar alternative materials.		construction activities or project infrastructure within 30m of the fence				infrastructure or construction activities within 30m of the fence, as observed on site
The environmental control officers (ECOs) must liaise with the archaeologist regarding the fencing materials being used for the erection of the fence, the planned area for the establishment of the fence, during the erection and completion of the fence, as well as during the construction of pylons in the vicinity of the fenced-in feature. At this point it is not necessary for the archaeologist to be on-site during the construction of the fence and pylon if the ECO keeps in contact with the archaeologist, as in recommendation 3.	Contractor, cEO, ECO	ECO to obtain advice on the fencing material to be employed and fencing type to be informed by the advice	Prior to construction commencing, and for the duration of the construction phase	ECO	Monthly	Fencing around the stone packed feature evident in accordance with the heritage impact assessment requirements
No material may be deposited on the stone feature during the	Contractor, cEO	Fence the stone packed features prior to construction activities along the north-south length of	Prior to construction commencing, and for the	ECO	Monthly	Fencing around the stone packed feature evident in accordance with the

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
construction i.e. material from excavation for pylon foundation.		the powerline. Place the fence 5m from the stone packed feature, and restrict all construction activities or project infrastructure within 30m of the fence	duration of the construction phase			heritage impact assessment requirements (5m from feature) and no infrastructure or construction activities within 30m of the fence, as observed on site
Care must be taken during the lifting of the pylon and stringing of the line in the vicinity of the stone feature.	Contractor, cEO	Fence the stone packed features prior to construction activities along the north-south length of the powerline. Place the fence 5m from the stone packed feature, and restrict all construction activities or project infrastructure within 30m of the fence	Prior to construction commencing, and for the duration of the construction phase	ECO	Monthly	Fencing around the stone packed feature evident in accordance with the heritage impact assessment requirements (5m from feature) and no infrastructure or construction activities within 30m of the fence, as observed on site
A monitoring report must be submitted to the SAHRIS Case Application once the construction phase of the pylon in question has been concluded. This monitoring report must include before and after photographs of the feature, the fence and the surrounding area.	Contractor, cEO, specialists (if required)	Take pictures of the fencing, the stone feature and the surrounding area as proof of preservation of the stone feature. Compile a monitoring report and submit to SAHRIS case once construction has been completed.	Prior to construction commencing, and for the duration of the construction phase, and following completion of construction works within the vicinity of the stone feature	ECO	Monthly	Fencing around the stone packed feature evident in accordance with the heritage impact assessment requirements, photograph record and monitoring report produced following construction completed in the vicinity of the stone feature
An archaeological walk-down of the proposed OHL and switching station	Contractor, cEO, specialist	Visual inspection of the construction area prior to	Once prior to construction commencing,	ECO	Monthly	Specialist walk-through report produced and

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
area is required prior to construction. This must be conducted by a qualified archaeologist to ensure that no heritage resources are to be impacted by the development. If heritage resources are identified at or near any proposed infrastructure, an assessment of the significance of the heritage resources and the impact to the identified heritage resource must be completed. A report detailing the results of the survey must be submitted to SAHRA before construction commences. This walkthrough does not affect the layout, but is rather intended to inform whether any additional mitigation measures (e.g. sampling) may be required before construction commences.		commencement of construction by the specialist, with a heritage report produced and communicated to the SAHRA case officer in the event of a heritage resource being identified within the construction footprint	and for the duration of construction phase			observed on file on site indicating resources observed (if any) as well as communications made to the authorities and corrective actions taken, if any.
Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.	cEO	Requirement for induction of all staff prior to entry, as well as the development and application of an induction programme which specifically included the potential heritage features that may be encountered, as well as the procedure/protocol for finds	Duration of construction phase	ECO	Monthly	Induction roster of all staff completed, maintained and available on site, induction programme material observed and on file on site during audits, which must specifically include the potential heritage features that may be encountered, as

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
						well as the procedure/protocol for finds
If concentrations of archaeological heritage material and human remains are uncovered during construction, all work must cease immediately in the vicinity of the finds and be reported to the Albany Museum (046 622 2312) and/or the South African Heritage Resources Agency (SAHRA) (021 642 4502) so that systematic and professional investigation/ excavation can be undertaken	Contractor, cEO, specialist (if required)	If concentrations of archaeological heritage material and human remains are uncovered during construction, all work must cease immediately and be reported to SAHRA	Duration of construction phase	ECO	Monthly	Evidence of communication with SAHRA where archaeological heritage material and human remains are uncovered.
Construction managers/foremen should be informed before construction starts on the possible types of palaeontological material they may encounter and the procedures to follow when they find sites.	cEO	Requirement for induction of all staff prior to entry, as well as the development and application of an induction programme which specifically included the potential palaeontological material that may be encountered, as well as the procedure/protocol for finds	Duration of construction phase	ECO	Monthly	Induction roster of all staff completed, maintained and available on site, induction programme material observed and on file on site during audits, which must specifically include the potential palaeontological material that may be encountered, as well as

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
						the procedure/protocol for finds
A map of the identified palaeontological resources relative to the layout of the proposed development must be emailed to the SAHRA case officer and the EO must monitor all excavations associated with the OHL and switching station	cEO, specialist	Specialist to produce the required map and communicate to the SAHRA case officer prior to commencement of construction. Frequent, visual inspection of the construction excavations for signs of palaeontological resources.	Duration of construction phase	ECO	Monthly	Evidence of the map produced and communicated to SAHRA prior to construction observed in the site file and reports or records of palaeontological resources (if any found) kept on file, along with any corrective action taken.
If concentrations of palaeontological material are uncovered during construction, all work must cease immediately and be reported to the Albany Museum (046 622 2312) and/or the South African Heritage Resources Agency (SAHRA) (021 642 4502) so that systematic and professional investigation/ excavation can be undertaken.	Contractor, cEO, specialist (if required)	If concentrations of palaeontological material are uncovered during construction, all work must cease immediately and be reported to the Albany Museum	Duration of construction phase	ECO	Monthly	Evidence of communication with SAHRA where palaeontological material was uncovered.
A Palaeontological Chance Finds Procedure must be implemented for all excavation activities.	Contractor, cEO, specialist (if required)	Develop and implement a chance find procedure for the duration of excavation activities	Duration of construction phase	ECO	Monthly	Chance find procedure developed and implemented for the duration of the construction phase.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;	Contractor, cEO, specialist (if required)	If any evidence of archaeological sites or remains are found, all work must cease immediately within the vicinity of the find and the find be reported to the SAHRA APM Unit	Duration of Construction Phase	ECO, cEO	Ongoing (cEO), Monthly (ECO)	Evidence of communication with SAHRA APM Unit where any evidence of archaeological sites or remains was uncovered.
If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule;	Contractor, cEO, specialist (if required)	If any evidence of unmarked human burials are found, all work must cease immediately within the vicinity of the find and the find be reported to the SAHRA Burial Grounds and Graves (BGG) Unit	Duration of Construction Phase	ECO, cEO	Ongoing (cEO), Monthly (ECO	Evidence of communication with SAHRA Burial Grounds and Graves (BGG) Unit where any evidence of unmarked human burials are found
The following conditions apply with regards to the appointment of specialists:	Contractor, cEO, specialist (if required)	Appointment of heritage specialist must be conducted if heritage resources are	Duration of Construction Phase	ECO, cEO	Ad Hoc	Evidence of specialist appointment where heritage resources were

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
i) If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;		uncovered during the course of the development.				uncovered. Written statement obtained from specialist towards the significance of the find and the need towards a Phase 2 rescue operation (if applicable).

OPERATION PHASE OUTCOMES AND ACTIONS

Ecological

Impact management outcome: OPERATION: Reduce habitat degradation

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
A rehabilitation plan must be written for the development area and ensured that it be adhered to.	DPM, specialist	Specialist to produce rehabilitation plan for implementation at areas which require rehabilitation	Prior to the commencement of operation, and for the duration of operation thereafter	ECO	Once prior to the commence of operation and monthly for the duration of operation thereafter	Rehabilitation plan evidenced within the site file and rehabilitation efforts observed in accordance with the rehabilitation plan, where required during operation
Access roads and crossings (if applicable) should have run-off control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.	DPM, contractor	Designs of roads to include the requirement for run-off control features, and construction of the roads to be in accordance with approved designs	Prior to the commencement of construction, and for the duration of construction	ECO	Once prior to the commence of construction to observe run-off measures in designs, and monthly during the construction phase (for implementation)	Evidence of run-off control measures in designs observed in the site file, and visual evidence of run-off control measures constructed for the access roads on site.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
All erosion observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.	Contractor, cEO	Visual inspection of infrastructure to determine if erosion has occurred or is likely to occur.	Duration of operation phase	ECO	Monthly	Negligible erosion observed on site, or where observed clear evidence of control measures put in place
There should be follow-up rehabilitation and re-vegetation of any remaining denuded areas with local indigenous perennial shrubs and succulents from the area.	Contractor, cEO, specialist	Indigenous plant species seedling or seed obtained and planted/seeded as per the specialist instructions within denuded areas that require follow up rehabilitation	Duration of operation phase	ECO	Monthly	Evidence of revegetation observed, where required, on site during audits.
An IAP management plan must be written and implemented for the development during operation.	dEO, specialist	Invasive Alien Plant species plant developed for the operational phase of the project, detailing monitoring required, control methods and frequency.	Prior to commencement of construction (for plan development), and for the duration of the construction and operation phases (for implementation of plan)	ECO	Once prior to construction and monthly for the duration of construction and operation	IAP management plan observed in the site file, along with monitoring records and control efforts evidence during the audit. Further evidence includes negligible or low levels of encroachment as observed and determined by the ECO.
Regular monitoring for IAP encroachment during the operation phase to ensure that no alien invasion problems have developed as result of the disturbance. This should be every 6 months during the	Contractor, cEO	Visual inspection of infrastructure for signs of invasive species encroachment and to inform control efforts required. Implementation of control actions against established	Every 3 months during the first two years of the operation phase, and annually	ECO	Monthly	Negligible evidence of invasive alien species observed on site or clear evidence of control actions implemented, in addition to evidence of

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
first two years of the operation phase and annually for the life of the project.		populations identified during monitoring.	thereafter for the life of the project thereafter			the written IAP management plan in the site file.
All IAP species must be removed/controlled using the appropriate techniques as indicated in the IAP management programme.	Contractor, cEO	Control methods employed to be guided by the IAP management programme and the methods provided for	Duration of operation phase	ECO	Monthly	Control measures implemented in accordance with the IAP management programme development plan, as determined by the ECO

Impact management outcome: OPERATION: Limit disturbance or persecution of fauna

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
Any fauna threatened by the maintenance and operational activities should be allowed to passively vacate the area or be removed to a safe location by an appropriate individual.	Contractor, ECO, cEO	Physical removal of fauna in accordance with recognised methods or specialist advice to a safe location. Written record of relocations kept on file with detail of how and where fauna moved to	Duration of operation phase	ECO	Monthly	Written record of relocations observed on site and negligible incidents of fauna being harmed

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner.	Contractor	Suitable bunding and containment, demarcation and access control measures implemented for hazardous materials at onsite stores. Spill prevention plan developed and spill kits made available, as well as all staff inducted with spill response procedure and a log of inductions kept on file. Written record of spills and clean up actions kept on site	Duration of operation phase	ECO	Monthly	Effective bunding and containment of hazardous materials as evidenced on site, along with suitable access control and demarcation provided at hazardous materials stores. Written log of spills and clean up actions implemented observed and kept on file at site.
All vehicles accessing the site should adhere to a max 40 km/h max to avoid collisions.	Contractor, cEO	Install speed signature throughout site, include speed limit into induction and ensure all staff entering site is aware of the requirement to implement speed limits. Institute verbal and written warnings for violations and appropriate fines for repeat contraventions. Written log of fines and warning issued kept on site	Duration of operation phase	ECO	Monthly	Minimal instances of speeding as observed on site during audits and as evidenced in the written log of warnings and fines issued for contraventions
If any holes or trenches are to be dug these must not be left open for more than a few hours and must be filled at night. Alternately, open excavations must be monitored daily and any entrapped fauna must be freed.	Contractor, cEO, specialist	Trenches or holes required for construction closed up immediately once they are no longer in use or daily inspections implemented. Written log of trapped fauna and relocation efforts kept on file	Duration of operation phase	ECO	Monthly	No unused trenches or holes observed on site during audit or daily inspections for trapped fauna evident, and the written log kept and observed on site

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
						containing all instances of trapped and relocated fauna.

Avifaunal

Impact management outcome: OPERATION: Reduce avifaunal powerline collisions and electrocution

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used. This would involve using existing/approved pylons and associated infrastructure for different lines.	DMP	Consider optimisation of infrastructure in design so as to minimise ground and air space required	Prior to construction commencing	ECO	Once prior to construction commencing	Designs informed by environmental sensitivies determined for the site and best practice towards reducing the amount of air and ground space required, as determined by ECO and observed in the onsite environmental file.
If lights are to be used at night for ensuring that infrastructure on site is lit, this should be done with downward-directed low-UV type lights (such as most HPS or LPS bulbs), which do not attract insects and their avian predators., so as to	Contractor	Install only low-UV types lights where outdoor night lighting is required	Duration of construction and operation phase	ECO	Monthly	Evidence of low-UV type lights installed during site audit

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
minimise disturbance to birds flying over the site at night.						
Ensure that monitoring is sufficiently frequent to detect collisions reliably and that any areas where regular collisions occur are fitted with flight diverters.	Specialist, cEO	Avifaunal monitoring conducted as per the latest BirdLife SA guidelines on operational monitoring	Duration of operation phase	ECO	Monthly	Avifaunal monitoring reports produced as per the frequency determined in the latest BirdLife SA guidelines on operational monitoring
During the first year of operation quarterly reports, summarising interim findings should be complied and submitted to BirdLife South Africa. If the findings indicate that collisions have not occurred or are minimal with no red-listed species, an annual report can be submitted.	Specialist, cEO	Avifaunal monitoring reports submitted to BirdLife South Africa quarterly during the first year, and annually thereafter	Duration of operation phase	ECO	Monthly	Evidence of avifaunal monitoring reports communicated to BirdLife South Africa quarterly for the first year, as observed in onsite environmental file, and annually thereafter
Ensure that monitoring is sufficiently frequent to detect electrocutions reliably and that any areas where regular collisions occur are fitted with flight diverters.	Specialist, cEO	Avifaunal monitoring to consider electrocution frequency and recommendations to the need for (and location of) bird flight diverters as determined by operational avifaunal monitoring programme	Duration of operation phase	ECO	Monthly	Evidence of avifaunal monitoring reports including consideration of bird flight diverters and where they are to be placed (if at all). Further evidence of installation of these features in accordance with the monitoring report results as observed during the audit and determined by the ECO

Impact management outcome: OPERATION: Reduce direct avifaunal mortality during maintenance procedures

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
All personnel should undergo environmental induction and awareness training with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g. bustards, korhaans, francolin), and owls, which are often persecuted out of superstition	cEO	Requirement for induction of all staff prior to entry, as well as the development and application of an induction programme. This programme must include consideration of avifaunal species and protocols for avoiding/handling of these species	Duration of operation phase	ECO	Monthly	Induction roster of all staff completed, maintained and available on site, induction programme material observed and on file on site during audits, to specifically also include avifaunal measures
All vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed.	cEO	Visual inspection of the operation activities and if they remain within defined and demarcated areas	Duration of operation phase	ECO	Monthly	No evidence of vehicle outside of outside of defined or demarcated areas as observed during audits
All vehicles accessing the site should adhere to a low speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g. nightjars and owls) which sometimes forage or rest on roads, especially at night.	Contractor, cEO	Install speed signature throughout site, include speed limit into induction and ensure all staff entering site is aware of the requirement to implement speed limits. Institute verbal and written warnings for violations and appropriate fines for repeat contraventions. Written log of fines and warning issued kept on site	Duration of operation phase	ECO	Monthly	Minimal instances of speeding as observed on site during audits and as evidenced in the written log of warnings and fines issued for contraventions

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
Monitoring of the OHL route must be undertaken to detect bird carcasses, to enable the identification of any potential areas of high impact to be marked with bird flappers if not already done so. Monitoring should be undertaken at least once a month for the first year of operation.	Specialist, Contractor	Conduct carcass searches along project infrastructure monthly for the first year of operation, and ensure a log if kept of the results	Monthly for the first year of operation	ECO	Monthly	Monitoring log kept of all monthly monitoring results and included in site environmental file
Appropriate induction of workers and/or appropriate speed reducing measures, such as speed bumps and/or speed limit signs (40 km/h), should be incorporated into the road design to reduce the chance of road-kills on site.	cEO	Requirement for induction of all staff prior to entry, as well as the development and application of an induction programme which includes the speed limit allowed on site	Duration of operational phase	ECO	Monthly	Induction roster of all staff completed, maintained and available on site, induction programme material observed and on file on site during audits

DECOMMISSIONING PHASE OUTCOMES AND ACTIONS

Ecological

Impact management outcome: DECOMMISSIONING: Limit continued habitat degradation

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
Rehabilitation in accordance with the Rehabilitation Plan for the development must be undertaken in areas disturbed during the decommissioning phase	Contractor, cEO	Implement rehabilitation measures as determined by the rehabilitation plan at areas requiring rehabilitation	Duration of decommissioning phase	ECO	Monthly	Rehabilitation measures implemented as as determined by the rehabilitation plan at areas requiring rehabilitation, as evidenced on site during audit
Monitoring of the rehabilitated area must be undertaken for a minimum of 3 years after the decommissioning phase.	Contractor, cEO	Monitoring reports produced in accordance with the frequency determined in the rehabilitation plan, for a period of three years after the decommissioning phase, and kept on file for inspection upon request	Duration of decommissioning phase and for three years thereafter	ECO	Annually	Monitoring reports produced in accordance with the frequency determined in the rehabilitation plan, for a period of three years after the decommissioning phase, and as observed in monitoring reporting provided on request

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.	Contractor, cEO	Visual inspection of remaining infrastructure and decommissioned areas to determine if erosion has occurred or is likely to occur.	Duration of decommissioning phase	ECO	Monthly	Negligible erosion observed on site, or where observed clear evidence of control measures put in place
There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora.	Contractor, cEO, specialist	Indigenous plant species seedling or seed obtained and planted/seeded as per the specialist instructions within denuded areas that require follow up rehabilitation	Duration of decommissioning phase	ECO	Monthly	Evidence of revegetation observed, where required, on site during audits.
IAP management must occur annually for at least 2 years after decommissioning. A further 1-3 years of monitoring and control may be required, depending on the condition of the site at the end of year 2. Woody aliens should be controlled using the appropriate alien control techniques as determined by the species present. This might include use of herbicides where no practical manual means are feasible.	Contractor, cEO	Visual inspection of decommissioning areas for signs of invasive plant encroachment and where evident, control actions of these invasive plants	Duration of decommissioning phase	ECO	Monthly	Evidence of invasive species control actions or negligible invasive species encroachment observed on site.

Avifaunal

Impact management outcome: DECOMMISSIONING: Limit avifaunal disturbance and direct mortality

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
All personnel should undergo environmental induction and awareness training with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g. bustards, korhaans, francolin), and owls, which are often persecuted out of superstition.	cEO	Requirement for induction of all staff prior to entry, as well as the development and application of an induction programme. This programme must include consideration of avifaunal species and protocols for avoiding/handling of these species	Duration of operation phase	ECO	Monthly	Induction roster of all staff completed, maintained and available on site, induction programme material observed and on file on site during audits, to specifically also include avifaunal measures
All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving to be allowed outside of the construction area.	cEO	Visual inspection of the decommissioning activities and if they remain within defined and demarcated areas	Duration of decommissioning phase	ECO	Monthly	No evidence of vehicle outside of outside of defined or demarcated areas as observed during audits
All vehicles (construction or other) accessing the site should adhere to a low speed limit on site (40 km/h max) to avoid collisions with susceptible avifauna, such as nocturnal and crepuscular species (e.g. nightjars and owls) which sometimes forage or rest on roads, especially at night.	Contractor, cEO	Install speed signature throughout site, include speed limit into induction and ensure all staff entering site is aware of the requirement to implement speed limits. Institute verbal and written warnings for violations and appropriate fines for repeat contraventions. Written log of fines and warning issued kept on site	Duration of decommissioning phase	ECO	Monthly	Minimal instances of speeding as observed on site during audits and as evidenced in the written log of warnings and fines issued for contraventions

Impact management outcome: DECOMMISSIONING: Limit avifaunal habitat degradation

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
Rehabilitation in accordance with the Rehabilitation Plan for the development must be undertaken in areas disturbed during the decommissioning phase.	Contractor, cEO	Implement rehabilitation measures as determined by the rehabilitation plan at areas requiring rehabilitation	Duration of decommissioning phase	ECO	Monthly	Rehabilitation measures implemented as as determined by the rehabilitation plan at areas requiring rehabilitation, as evidenced on site during audit
Monitoring of the rehabilitated area must be undertaken for a minimum of 3 years after the decommissioning phase	Contractor, cEO	Monitoring reports produced in accordance with the frequency determined in the rehabilitation plan, for a period of three years after the decommissioning phase, and kept on file for inspection upon request	Duration of decommissioning phase and for three years thereafter	ECO	Annually	Monitoring reports produced in accordance with the frequency determined in the rehabilitation plan, for a period of three years after the decommissioning phase, and as observed in monitoring reporting provided on request
All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.	Contractor, cEO	Visual inspection of remaining infrastructure and decommissioned areas to determine if erosion has occurred or is likely to occur.	Duration of decommissioning phase	ECO	Monthly	Negligible erosion observed on site, or where observed clear evidence of control measures put in place
There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous flora.	Contractor, cEO, specialist	Indigenous plant species seedling or seed obtained and planted/seeded as per the specialist instructions within denuded areas that require follow up rehabilitation	Duration of decommissioning phase	ECO	Monthly	Evidence of revegetation observed, where required, on site during audits.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
IAP management must occur annually for at least 2 years after decommissioning. A further 1-3 years of monitoring and control may be required, depending on the condition of the site at the end of year 2. Woody aliens should be controlled using the appropriate alien control techniques as determined by the species present. This might include use of herbicides where no practical manual means are feasible.	Contractor, cEO	Visual inspection of decommissioning areas for signs of invasive plant encroachment and where evident, control actions of these invasive plants as per the frequency specified	Duration of decommissioning phase	ECO	Monthly	Evidence of invasive species control actions or negligible invasive species encroachment observed on site.

Soils

Impact management outcome: DECOMMISSIONING: Conservation of soil resources

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
Compacted areas are to be ripped to loosen the soil structure;	Contractor	Compacted areas are to be ripped to loosen the soil structure utilising recognised methods	Duration of decommissioning phase	ECO	Monthly	Evidence of compacted areas having been ripped, where required
Temporarily cleared areas should be revegetated with indigenous species after the construction phase	Contractor, cEO, specialist	Indigenous plant species seedling or seed obtained and planted/seeded as per the specialist instructions within	Duration of decommissioning phase	ECO	Monthly	Evidence of revegetation observed, where required, on site during audits.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
		denuded areas that require follow up rehabilitation				

CUMULATIVE OUTCOMES AND ACTIONS

Ecological

Impact management outcome: CUMULATIVE : Limit cumulative habitat loss

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
Ensure that sensitive habitats such as drainage lines, pans and quartz patches are not within the development footprint. Where crossings of drainage lines are unavoidable, the disturbance footprint must be minimized and formal crossings be developed.	Contractor, cEO	Identification of areas unsuitable for development prior to construction commencing, and visual inspection of the construction areas and specific instruction to contractors to remain within defined and demarcated areas	Prior to commencement of construction and for the duration of construction phase	ECO	Monthly	Design responds to identified environmental sensitivities as per the approved layout.
Ensure that a rehabilitation plan and IAP management plan be compiled for each development and are effectively implemented.	Contractor, cEO	Implement rehabilitation measures and invasive alien plant control as determined by the rehabilitation and invasive alien management plan at areas requiring rehabilitation and control actions	Duration of construction phase	ECO	Monthly	Rehabilitation measures implemented as determined by the rehabilitation plan at areas requiring rehabilitation, as evidenced on site during audit. Evidence of invasive species control actions or negligible invasive

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
						species encroachment observed on site.

Avifaunal

Impact management outcome: CUMULATIVE : Limit cumulative avifaunal impacts

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
The design of the proposed power facilities must be congruent with best-practice guidelines as indicated by the Endangered Wildlife Trust and BirdLife South Africa.	DPM, contractor	Designs of facility to include consideration of the guidelines recommended by Birdlife South Africa and the Eskom-EWT Strategic Partnership on Birds and Energy	Prior to the commencement of construction, and for the duration of construction	ECO	Once prior to the commence of construction to observe designs, and monthly during the construction phase (for implementation)	Designs have adequately considered the best practice guidelines towards minimising avifaunal impact, as observed by the ECO
Ensure that monitoring is sufficiently frequent to detect fatalities reliably and that any areas where regular electrocutions or collisions occur are fitted with the appropriate mitigation measures. Reports should be	Specialist, cEO	Avifaunal monitoring conducted as per the latest BirdLife SA guidelines on operational monitoring, and reported to BirdLife South Africa.	Duration of operation phase	ECO	Monthly	Avifaunal monitoring reports produced as per the frequency determined in the latest BirdLife SA guidelines on operational monitoring

Impact Management Actions	Implementation			Monitoring		
	Responsible person	**Method of implementation**	**Timeframe for implementation**	**Responsible person**	**Frequency**	**Evidence of compliance**
complied and submitted to BirdLife South Africa.						
Rehabilitation of disturbed areas must occur throughout the landscape to mitigate against habitat degradation within the broader southern Roggeveld area.	Contractor, cEO	Implement rehabilitation measures as determined by the rehabilitation plan at areas requiring rehabilitation	Duration of decommissioning phase	ECO	Monthly	Rehabilitation measures implemented as determined by the rehabilitation plan at areas requiring rehabilitation, as evidenced on site during audit

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 EAP

savannah environmental

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CURRICULUM VITAE OF JO-ANNE THOMAS

Profession:	Environmental Management and Compliance Consultant; Environmental Assessment Practitioner
Specialisation:	Environmental Management; Strategic environmental advice; Environmental compliance advice & monitoring; Environmental Impact Assessments; Policy, strategy & guideline formulation; Project Management; General Ecology
Work experience:	Twenty one (21) years in the environmental field

VOCATIONAL EXPERIENCE

Provide technical input for projects in the environmental management field, specialising in Strategic Environmental Advice, Environmental Impact Assessment studies, environmental auditing and monitoring, environmental permitting, public participation, Environmental Management Plans and Programmes, environmental policy, strategy and guideline formulation, and integrated environmental management. Key focus on integration of the specialist environmental studies and findings into larger engineering-based projects, strategic assessment, and providing practical and achievable environmental management solutions and mitigation measures. Responsibilities for environmental studies include project management (including client and authority liaison and management of specialist teams); review and manipulation of data; identification and assessment of potential negative environmental impacts and benefits; review of specialist studies; and the identification of mitigation measures. Compilation of the reports for environmental studies is in accordance with all relevant environmental legislation.

Undertaking of numerous environmental management studies has resulted in a good working knowledge of environmental legislation and policy requirements. Recent projects have been undertaken for both the public- and private-sector, including compliance advice and monitoring, electricity generation and transmission projects, various types of linear developments (such as National Road, local roads and power lines), waste management projects (landfills), mining rights and permits, policy, strategy and guideline development, as well as general environmental planning, development and management.

SKILLS BASE AND CORE COMPETENCIES

- Project management for a range of projects
- Identification and assessment of potential negative environmental impacts and benefits through the review and manipulation of data and specialist studies
- Identification of practical and achievable mitigation and management measures and the development of appropriate management plans
- Compilation of environmental reports in accordance with relevant environmental legislative requirements
- External and peer review of environmental reports & compliance advice and monitoring
- Formulation of environmental policies, strategies and guidelines
- Strategic and regional assessments; pre-feasibility & site selection
- Public participation processes for a variety of projects
- Strategic environmental advice to a wide variety of clients both in the public and private sectors
- Working knowledge of environmental planning processes, policies, regulatory frameworks and legislation

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc Earth Sciences, University of the Witwatersrand, Johannesburg (1993)
- B.Sc Honours in Botany, University of the Witwatersrand, Johannesburg (1994)
- M.Sc in Botany, University of the Witwatersrand, Johannesburg (1996)

Short Courses:

- Environmental Impact Assessment, Potchefstroom University (1998)
- Environmental Law, Morgan University (2001)
- Environmental Legislation, IMBEWU (2017)
- Mining Legislation, Cameron Cross & Associates (2013)
- Environmental and Social Risk Management (ESRM), International Finance Corporation (2018)

Professional Society Affiliations:

- Registered with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Scientist (400024/00)
- Registered with the International Associated for Impact Assessment South Africa (IAIAsa): 5601
- Member of the South African Wind Energy Association (SAWEA)

EMPLOYMENT

Date	Company	Roles and Responsibilities
January 2006 - Current	Savannah Environmental (Pty) Ltd	Director Project manager Independent specialist environmental consultant, Environmental Assessment Practitioner (EAP) and advisor.
1997 – 2005	Bohlweki Environmental (Pty) Ltd	Senior Environmental Scientist at. Environmental Management and Project Management
January – July 1997	Sutherland High School, Pretoria	Junior Science Teacher

PROJECT EXPERIENCE

Project experience includes large infrastructure projects, including electricity generation and transmission, wastewater treatment facilities, mining and prospecting activities, property development, and national roads, as well as strategy and guidelines development.

RENEWABLE POWER GENERATION PROJECTS: PHOTOVOLTAIC SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Christiana PV 2 SEF, North West	Solar Reserve South Africa	Project Manager & EAP
De Aar PV facility, Northern Cape	iNca Energy	Project Manager & EAP
Everest SEF near Hennenman, Free State	FRV Energy South Africa	Project Manager & EAP
Graafwater PV SEF, Western Cape	iNca Energy	Project Manager & EAP
Grootkop SEF near Allanridge, Free State	FRV Energy South Africa	Project Manager & EAP
Hertzogville PV 2 SEF with 2 phases, Free State	SunCorp / Solar Reserve	Project Manager & EAP
Karoshoek CPV facility on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Project Name & Location	Client Name	Role
Kgabalatsane SEF North-East for Brits, North West	Built Environment African Energy Services	Project Manager & EAP
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy Global	Project Manager & EAP
Lethabo Power Station PV Installation, Free State	Eskom Holdings SoC Limited	Project Manager & EAP
Majuba Power Station PV Installation, Mpumalanga	Eskom Holdings SoC Limited	Project Manager & EAP
Merapi PV SEF Phase 1 – 4 South-East of Excelsior, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Sannaspos Solar Park, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Ofir-Zx PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV Energy South Africa	Project Manager & EAP
Project Blue SEF North of Kleinsee, Northern Cape	WWK Development	Project Manager & EAP
S-Kol PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Sonnenberg PV Plant near Keimoes, Northern Cape	S28 Degrees Energy	Project Manager & EAP
Tutuka Power Station PV Installation, Mpumalanga	Eskom Transmission	Project Manager & EAP
Two PV sites within the Northern Cape	MedEnergy Global	Project Manager & EAP
Two PV sites within the Western & Northern Cape	iNca Energy	Project Manager & EAP
Upington PV SEF, Northern Cape	MedEnergy Global	Project Manager & EAP
Vredendal PV facility, Western Cape	iNca Energy	Project Manager & EAP
Waterberg PV plant, Limpopo	Thupela Energy	Project Manager & EAP
Watershed Phase I & II SEF near Litchtenburg, North West	FRV Energy South Africa	Project Manager & EAP
Alldays PV & CPV SEF Phase 1, Limpopo	BioTherm Energy	Project Manager & EAP
Hyperion PV Solar Development 1, 2, 3, 4, 5 & 6	Building Energy	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Aberdeen PV SEF, Eastern Cape	BioTherm Energy	Project Manager & EAP
Christiana PV 1 SEF on Hartebeestpan Farm, North-West	Solar Reserve South Africa	Project Manager & EAP
Heuningspruit PV1 & PV 2 facilities near Koppies, Free State	Sun Mechanics	Project Manager & EAP
Kakamas PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Kakamas II PV Facility, Northern Cape	iNca Energy	Project Manager & EAP
Machadodorp 1 PV SEF, Mpumalanga	Solar To Benefit Africa	Project Manager & EAP
PV site within the Northern Cape	iNca Energy	Project Manager & EAP
PV sites within 4 ACSA airports within South Africa, National	Airports Company South Africa (ACSA)	Project Manager & EAP
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo3 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
RustMo4 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
Sannaspos PV SEF Phase 2 near Bloemfontein, Free State	SolaireDirect Southern Africa	Project Manager & EAP
Solar Park Expansion within the Rooiwal Power Station, Gauteng	AFRKO Energy	Project Manager & EAP
Steynsrus SEF, Free State	SunCorp	Project Manager & EAP

Project Name & Location	Client Name	Role
Sirius Solar PV Project Three and Sirius Solar PV Project Four (BA in terms of REDZ regulations), Northern Cape	SOLA Future Energy	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Allemans Fontein SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Amandel SEF near Thabazimbi, Limpopo	iNca Energy	Project Manager & EAP
Arola/Doornplaat SEF near Ventersdorp, North West	FRV & iNca Energy	Project Manager & EAP
Bloemfontein Airport PV Installation, Free State	The Power Company	Project Manager & EAP
Brakspruit SEF near Klerksorp, North West	FRV & iNca Energy	Project Manager & EAP
Carolus Poort SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Damfontein SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Everest SEF near Welkom, Free State	FRV & iNca Energy	Project Manager & EAP
Gillmer SEF near Noupoort, Northern Cape	Fusion Energy	Project Manager & EAP
Grootkop SEF near Allansridge, Free State	FRV & iNca Energy	Project Manager & EAP
Heuningspruit PV1 & PV 2 near Koppies, Free State	Cronimat	Project Manager & EAP
Kimberley Airport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Kolonnade Mall Rooftop PV Installation in Tshwane, Gauteng	Momentous Energy	Project Manager & EAP
Loskop SEF near Groblersdal, Limpopo	S&P Power Unit	Project Manager & EAP
Marble SEF near Marble Hall, Limpopo	S&P Power Unit	Project Manager & EAP
Morgenson PV1 SEF South-West of Windsorton, Northern Cape	Solar Reserve South Africa	Project Manager & EAP
OR Tambo Airport PV Installation, Gauteng	The Power Company	Project Manager & EAP
Oryx SEF near Virginia, Free State	FRV & iNca Energy	Project Manager & EAP
Rhino SEF near Vaalwater, Limpopo	S&P Power Unit	Project Manager & EAP
Rustmo2 PV Plant near Buffelspoort, North West	Momentous Energy	Project Manager & EAP
Spitskop SEF near Northam, Limpopo	FRV & iNca Energy	Project Manager & EAP
Steynsrus PV, Free State	Suncorp	Project Manager & EAP
Tabor SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
UpingtonAirport PV Installation, Northern Cape	The Power Company	Project Manager & EAP
Valeria SEF near Hartebeestpoort Dam, North West	Solar to Benefit Africa	Project Manager & EAP
Watershed SEF near Lichtenburg, North West	FRV & iNca Energy	Project Manager & EAP
Witkop SEF near Polokwane, Limpopo	FRV & iNca Energy	Project Manager & EAP
Woodmead Retail Park Rooftop PV Installation, Gauteng	Momentous Energy	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Adams Solar PV Project Two South of Hotazel, Northern Cape	Enel Green Power	Project Manager
ECO for the construction of the Kathu PV Facility, Northern Cape	REISA	Project Manager
ECO and bi-monthly auditing for the construction of the Pulida PV Facility, Free State	Enel Green Power	Project Manager
ECO for the construction of the RustMo1 SEF, North West	Momentous Energy	Project Manager
ECO for the construction of the Sishen SEF, Northern	Windfall 59 Properties	Project Manager

Project Name & Location	Client Name	Role
Cape		
ECO for the construction of the Upington Airport PV Facility, Northern Cape	Sublanary Trading	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Kathu PV facility, Northern Cape	REISA	Project Manager
ECO for the construction of the Konkoonsies II PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
ECO for the construction of the Aggeneys PV SEF and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager

Compliance Advice and ESAP Reporting

Project Name & Location	Client Name	Role
Aggeneys Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Airies II PV Facility SW of Kenhardt, Northern Cape	BioTherm Energy	Environmental Advisor
Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Environmental Advisor
Kathu PV Facility, Northern Cape	Building Energy	Environmental Advisor
Kenhardt PV Facility, Northern Cape	BioTherm Energy	Environmental Advisor
Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Environmental Advisor
Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Environmental Advisor
Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Environmental Advisor
Lephalale SEF, Limpopo	Exxaro	Environmental Advisor
Pixley ka Seme PV Park, South-East of De Aar, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
RustMo1 PV Plant near Buffelspoort, North West	Momentous Energy	Environmental Advisor
Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Environmental Advisor
Sirius PV Plants, Northern Cape	Aurora Power Solutions	Environmental Advisor
Upington Airport PV Power Project, Northern Cape	Sublunary Trading	Environmental Advisor
Upington SEF, Northern Cape	Abengoa Solar	Environmental Advisor
Ofir-ZX PV SEF near Keimoes, Northern Cape	Networx S28 Energy	Environmental Advisor
Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Environmental Advisor
Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
5 PV SEF projects in Lephalale, Limpopo	iNca Energy	Environmental Advisor
Prieska PV Plant, Northern Cape	SunEdison Energy India	Environmental Advisor
Sirius Phase One PV Facility near Upington, Northern Cape	Aurora Power Solutions	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Biodiversity Permit & WULA for the Aggeneys SEF near Aggeneys, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permit for the Konkoonises II SEF near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Biodiversity Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP

Project Name & Location	Client Name	Role
Environmental Permitting for the Kleinbegin PV SEF West of Groblershoop, Northern Cape	MedEnergy	Project Manager & EAP
Environmental Permitting for the Upington SEF, Northern Cape	Abengoa Solar	Project Manager & EAP
Environmental Permitting for the Kathu PV Facility, Northern Cape	Building Energy	Project Manager & EAP
Environmental Permitting for the Konkoonsies Solar Farm, Northern Cape	BioTherm Energy	Project Manager & EAP
Environmental Permitting for the Lephalale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
Environmental Permitting for the Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo	Building Energy	Project Manager & EAP
Environmental Permitting for the Sirius PV Plant, Northern Cape	Aurora Power Solutions	Project Manager & EAP
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Permits for the Kleinbegin and UAP PV Plants, Northern Cape	MedEnergy Global	Project Manager & EAP
S53 Application for Arriesfontein Solar Park Phase 1 – 3 near Danielskuil, Northern Cape	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for Hertzogville PV1 & PV 2 SEFs, Free State	Solar Reserve / SunCorp	Project Manager & EAP
S53 Application for the Bloemfontein Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
S53 Application for the Kimberley Airport PV Facility, Northern Cape	Sublunary Trading	Project Manager & EAP
S53 Application for the Project Blue SEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 Application for the Upington Airport PV Facility, Free State	Sublunary Trading	Project Manager & EAP
WULA for the Kalahari SEF Phase II in Kathu, Northern Cape	Engie	Project Manager & EAP
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Project Manager & EAP
Environmental Permitting for the Heuningspruit PV SEF, Northern Cape	Cronimet Power Solutions	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ilanga CSP 2, 3, 4, 5, 7 & 9 Facilities near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Ilanga CSP near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP
Ilanga Tower 1 Facility near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Karoshoek CPVPD 1-4 facilities on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshoek CSP facilities on sites 1.4; 4 & 5 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshoek Linear Fresnel 1 Facility on site 1.1 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the !Khi CSP Facility, Northern Cape	Abengoa Solar	Project Manager
ECO for the construction of the Ilanga CSP 1 Facility near Upington, Northern Cape	Karoshoek Solar One	Project Manager
ECO for the construction of the folar Park, Northern Cape	Kathu Solar	Project Manager
ECO for the construction of the KaXu! CSP Facility, Northern Cape	Abengoa Solar	Project Manager
Internal audit of compliance with the conditions of the IWUL issued to the Karoshoek Solar One CSP Facility, Northern Cape	Karoshoek Solar One	Project Manager

Screening Studies

Project Name & Location	Client Name	Role
Upington CSP (Tower) Plant near Kanoneiland, Northern Cape	iNca Energy and FRV	Project Manager & EAP

Compliance Advice and ESAP reporting

Project Name & Location	Client Name	Role
Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Environmental Advisor
Ilangalethu CSP 2, Northern Cape	FG Emvelo	Environmental Advisor
Kathu CSP Facility, Northern Cape	GDF Suez	Environmental Advisor
Lephalale SEF, Limpopo	Cennergi	Environmental Advisor
Solis I CSP Facility, Northern Cape	Brightsource	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Environmental Permitting for the Ilanga CSP Facility near Upington, Northern Cape	Ilangethu Energy	Project Manager & EAP
Environmental Permitting for the Kathu CSP, Northern Cape	GDF Suez	Project Manager & EAP
WULA for the Solis I CSP Facility, Northern Cape	Brightsource	Project Manager & EAP

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Sere WEF, Western Cape	Eskom Holdings SoC Limited	EAP

Project Name & Location	Client Name	Role
Aberdeen WEF, Eastern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Amakhala Emoyeni WEF, Eastern Cape	Windlab Developments	Project Manager & EAP
EXXARO West Coast WEF, Western Cape	EXXARO Resources	Project Manager & EAP
Goereesoe Wind Farm near Swellendam, Western Cape	iNca Energy	Project Manager & EAP
Hartneest WEF, Western Cape	Juwi Renewable Energies	Project Manager & EAP
Hopefield WEF, Western Cape	Umoya Energy	EAP
Kleinsee WEF, Northern Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Klipheuwel/Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Moorreesburg WEF, Western Cape	iNca Energy	Project Manager & EAP
Oyster Bay WEF, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Project Blue WEF, Northern Cape	Windy World	Project Manager & EAP
Rheboksfontein WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Spitskop East WEF near Riebeeck East, Eastern Cape	Renewable Energy Resources Southern Africa	Project Manager & EAP
Suurplaat WEF, Western Cape	Moyeng Energy	Project Manager & EAP
Swellendam WEF, Western Cape	IE Swellendam	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro	Project Manager & EAP
West Coast One WEF, Western Cape	Moyeng Energy	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Amakhala Emoyeni Wind Monitoring Masts, Eastern Cape	Windlab Developments	Project Manager & EAP
Beaufort West Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
Koekenaap Wind Monitoring Masts, Western Cape	EXXARO Resources	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Palm Tree Power	Project Manager & EAP
Laingsburg Area Wind Monitoring Masts, Western Cape	Umoya Energy	Project Manager & EAP
Overberg Area Wind Monitoring Masts, Western Cape	BioTherm Energy	Project Manager & EAP
Oyster Bay Wind Monitoring Masts, Eastern Cape	Renewable Energy Systems Southern Africa (RES)	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Albertinia WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Koingnaas WEF, Northern Cape	Just Pal Tree Power	Project Manager & EAP
Napier Region WEF Developments, Western Cape	BioTherm Energy	Project Manager & EAP
Tsitsikamma WEF, Eastern Cape	Exxarro Resources	Project Manager & EAP
Various WEFs within an identified area in the Overberg area, Western Cape	BioTherm Energy	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Investec Bank Limited	Project Manager & EAP
Various WEFs within an identified area on the West Coast, Western Cape	Eskom Holdings Limited	Project Manager & EAP

Project Name & Location	Client Name	Role
Various WEFs within the Western Cape	Western Cape Department of Environmental Affairs and Development Planning	Project Manager & EAP
Velddrift WEF, Western Cape	VentuSA Energy	Project Manager & EAP
Wind 1000 Project	Thabo Consulting on behalf of Eskom Holdings	Project Manager & EAP
Wittekleibosch, Snylip & Doriskraal WEFs, Eastern Cape	Exxarro Resources	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager
ECO for the construction of the Gouda WEF, Western Cape	Blue Falcon	Project Manager
EO for the Dassiesklip Wind Energy Facility, Western Cape	Group 5	Project Manager
Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Gouda Wind Energy facility near Gouda, Western Cape	Blue Falcon	Project Manager
Annual auditing of compliance with all environmental licenses for the operation activities at the West Coast One Wind Energy facility near Vredenburg, Western Cape	Aurora Wind Power	Project Manager
External environmental and social audit for the Amakhala Wind Farm, Eastern Cape	Cennergi	Project Manager
External environmental and social audit for the Tsitsikamma Wind Farm, Eastern Cape	Cennergi	Project Manager
ECO for the construction of the Excelsior Wind Farm and associated infrastructure, Northern Cape	BioTherm Energy	Project Manager
External compliance audit of the Dassiesklip Wind Energy Facility, Western Cape	BioTherm Energy	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Amakhala Phase 1 WEF, Eastern Cape	Cennergi	Environmental Advisor
Dassiesfontein WEF within the Overberg area, Western Cape	BioTherm Energy	Environmental Advisor
Excelsior Wind Farm, Western Cape	BioTherm Energy	Environmental Advisor
Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Hopefield Community WEF, Western Cape	African Clean Energy Developments (ACED)	Environmental Advisor
Rheboksfontein WEF, Western Cape	Moyeng Energy	Environmental Advisor
Tiqua WEF, Western Cape	Cennergi	Environmental Advisor
Tsitsikamma WEF, Eastern Cape	Cennergi	Environmental Advisor
West Coast One WEF, Western Cape	Moyeng Energy	Environmental Advisor

Due Diligence Reporting

Project Name & Location	Client Name	Role
Witteberg WEF, Western Cape	EDPR Renewables	Environmental Advisor
IPD Vredenburg WEF within the Saldanha Bay area, Western Cape	IL&FS Energy Development Company	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Biodiversity Permitting for the Power Line between the Tsitikamma Community WEF & the Diep River Substation, Eastern Cape	Cennergi	Project Manager & EAP
Biodiversity Permitting for the West Coast One WEF, Western Cape	Aurora Wind Power	Project Manager & EAP
Environmental Permitting for the Excelsior WEF, Western Cape	BioTherm Energy	Project Manager & EAP
Plant Permits & WULA for the Tsitsikamma Community WEF, Eastern Cape	Cennergi	Project Manager & EAP
S24G and WULA for the Rectification for the commencement of unlawful activities on Ruimsig AH in Honeydew, Gauteng	Hossam Soror	Project Manager & EAP
S24G Application for the Rheboksfontein WEF, Western Cape	Ormonde - Theo Basson	Project Manager & EAP
S53 Application & WULA for Suurplaat and Gemini WEFs, Northern Cape	Engie	Project Manager & EAP
S53 Application for the Hopefield Community Wind Farm near Hopefield, Western Cape	Umoya Energy	Project Manager & EAP
S53 Application for the Project Blue WEF, Northern Cape	WWK Developments	Project Manager & EAP
S53 for the Oyster Bay WEF, Eastern Cape	RES	Project Manager & EAP
WULA for the Great Karoo Wind Farm, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (COAL)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Mutsho Power Station near Makhado, Limpopo	Mutsho Consortium	Project Manager & EAP
Coal-fired Power Station near Ogies, Mpumalanga	Ruukki SA	Project Manager & EAP
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Project Manager & EAP
Transalloys Coal-fired Power Station, Mpumalanga	Transalloys	Project Manager & EAP
Tshivasho IPP Coal-fired Power Station (with WML), near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Umbani Coal-fired Power Station, near Kriel, Mpumalanga	ISS Global Mining	Project Manager & EAP
Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Coal Stockyard on Medupi Ash Dump Site, Limpopo	Eskom Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Biomass Co-Firing Demonstration Facility at Arnot Power Station East of Middleburg, Mpumlanaga	Eskom Holdings	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Baseload Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP
Coal-Fired Power Plant near Delmas, Mpumalanga	Exxaro Resources	Project Manager & EAP
Makhado Power Station, Limpopo	Mutsho Consortium, Limpopo	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the Camden Power Station, Mpumalanga	Eskom Holdings	Project Manager

Compliance Advice

Project Name & Location	Client Name	Role
Thabametsi IPP Coal-fired Power Station, near Lephalale, Limpopo	Axia	Environmental Advisor

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Permit application for the Thabametsi Bulk Water Pipeline, near Lephalale, Limpopo	Axia	Project Manager & EAP
S53 & WULA for the Waterberg IPP Coal-Fired Power Station near Lephalale, Limpopo	Exxaro Resources	Project Manager & EAP
S53 Application for the Tshivasho Coal-fired Power Station near Lephalale, Limpopo	Cennergi	Project Manager & EAP

CONVENTIONAL POWER GENERATION PROJECTS (GAS)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Ankerlig OCGT to CCGT Conversion project &400 kV transmission power line between Ankerlig and the Omega Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Gourikwa OCGT to CCGT Conversion project & 400 kV transmission power line between Gourikwa & Proteus Substation, Western Cape	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP
Richards Bay Gas to Power Plant, KwaZulu-Natal	Richards Bay Gas	Project Manager & EAP
Decommissioning & Recommissioning of 3 Gas Turbine Units at Acacia Power Station & 1 Gas Turbine Unit at Port Rex Power Station to the existing Ankerlig Power Station in Atlantis Industria, Western Cape	Eskom Holdings	Project Manager & EAP
Two 132kV Chickadee Lines to the new Zonnebloem Switching Station, Mpumalanga	Eskom Holdings	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Fatal Flaw Analysis for 3 area identified for the establishment of a 500MW CCGT Power Station	Globeleq Advisors Limited	Project Manager & EAP
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	Project Manager & EAP

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Aggeneis-Oranjemond Transmission Line & Substation Upgrade, Northern Cape	Eskom Transmission	Project Manager & EAP
Ankerlig-Omega Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Koeberg-Omega Transmission Power Lines,, Western Cape	Eskom Transmission	Project Manager & EAP
Koeberg-Stikland Transmission Power Lines, Western Cape	Eskom Transmission	Project Manager & EAP
Kyalami Strengthening Project, Gauteng	Eskom Transmission	Project Manager & EAP
Mokopane Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Saldanha Bay Strengthening Project, Western Cape	Eskom Transmission	Project Manager & EAP
Steelpoort Integration Project, Limpopo	Eskom Transmission	Project Manager & EAP
Transmission Lines from the Koeberg-2 Nuclear Power Station site, Western Cape	Eskom Transmission	Project Manager & EAP
Tshwane Strengthening Project, Phase 1, Gauteng	Eskom Transmission	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Dassenberg-Koeberg Power Line Deviation from the Koeberg to the Ankerlig Power Station, Western Cape	Eskom Holdings	Project Manager & EAP
Golden Valley II WEF Power Line & Substation near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Golden Valley WEF Power Line near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Konkoonsies II PV SEF Power Line to the Paulputs Substation near Pofadder, Northern Cape	BioTherm Energy	Project Manager & EAP
Perdekraal West WEF Powerline to the Eskom Kappa Substation, Westnern Cape	BioTherm Energy	Project Manager & EAP
Rheboksfontein WEF Powerline to the Aurora Substation, Western Cape	Moyeng Energy	Project Manager & EAP
Soetwater Switching Station near Sutherland, Northern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP

Solis Power I Power Line & Switchyard Station near Upington, Northern Cape	Brightsource	Project Manager & EAP
Stormwater Canal System for the Ilanga CSP near Upington, Northern Cape	Karoshoek Solar One	Project Manager & EAP
Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape	Eskom Holdings	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Ferrum-Mookodi Transmission Line, Northern Cape and North West	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section A Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Gamma-Kappa Section B Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Hydra IPP Integration project, Northern Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Kappa-Sterrekus Section C Transmission Line, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
EO for the construction of the Namaqualand Strengthening project in Port Nolloth, Western Cape	Trans-Africa Projects on behalf of Eskom	Project Manager
ECO for the construction of the Neptune Substation Soil Erosion Mitigation Project, Eastern Cape	Eskom	Project Manager
ECO for the construction of the Ilanga-Gordonia 132kV power line, Northern Cape	Karoshoek Solar One	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Environmental Permitting and WULA for the Rockdale B Substation & Loop in Power Lines,	Eskom Holdings	Project Manager & EAP
Environmental Permitting and WULA for the Steelpoort Integration project, Limpopo	Eskom Holdings	Project Manager & EAP
Environmental Permitting for Solis CSP near Upington, Northern Cape	Brightsource	Project Manager & EAP

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Elitheni Coal Mine near Indwe, Eastern Cape	Elitheni Coal	Project Manager & EAP
Groot Letaba River Development Project Borrow Pits	liso	Project Manager & EAP
Grootegeluk Coal Mine for coal transportation infrastructure between the mine and Medupi Power Station (EMPr amendment) , Limpopo	Eskom Holdings	Project Manager & EAP
Waterberg Coal Mine (EMPr amendment), Limpopo	Seskoko Resources	Project Manager & EAP
Aluminium Plant WML & AEL, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP

Decommissioning and Demolition of Kilns 5 & 6 at the Slurry Plant, Kwa-Zulu Natal	PPC	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO for the construction of the Duhva Mine Water Recovery Project, Mpumalanga	Eskom Holdings SoC Limited	Project Manager
External compliance audit of Palesa Coal Mine's Integrated Water Use License (IWUL), near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Palesa Coal Mine's Waste Management License (WML) and EMP, near KwaMhlanga, Mpumalanga	HCI Coal	Project Manager
External compliance audit of Mbali Coal Mine's Integrated Water Use License (IWUL), near Ogies, Mpumalanga	HCI Coal	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mining Operations (Brand se Baai), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Mineral Separation Plant (MSP), Western Cape	Tronox Namakwa Sands	Project Manager
Independent External Compliance Audit of Water Use License (WUL) for the Tronox Namakwa Sands (TNS) Smelter Operations (Saldanha), Western Cape	Tronox Namakwa Sands	Project Manager
Compliance Auditing of the Waste Management Licence for the PetroSA Landfill Site at the GTL Refinery, Western Cape	PetroSA	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Waste Licence Application for the Rare Earth Separation Plant in Vredendal, Western Cape	Rareco	Project Manager & EAP
WULA for the Expansion of the Landfill site at Exxaro's Namakwa Sands Mineral Separation Plant, Western Cape	Exxaro Resources	Project Manager & EAP
S24G & WML for an Aluminium Plant, Gauteng	GfE-MIR Alloys & Minerals	Project Manager & EAP

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Bridge across the Ngotwane River, on the border of South Africa and Botswana	Eskom Holdings	Project Manager & EAP
Chemical Storage Tanks, Metallurgical Plant Upgrade & Backfill Plant upgrade at South Deep Gold Mine, near Westornaria, Gauteng	Goldfields	Project Manager & EAP
Expansion of the existing Welgedacht Water Care Works, Gauteng	ERWAT	Project Manager & EAP

Project Name & Location	Client Name	Role
Golden Valley WEF Access Road near Cookhouse, Eastern Cape	BioTherm Energy	Project Manager & EAP
Great Fish River Wind Farm Access Roads and Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Ilanga CSP Facility Watercourse Crossings near Upington, Northern Cape	Karoshoek Solar one	Project Manager & EAP
Modification of the existing Hartebeestfontein Water Care Works, Gautng	ERWAT	Project Manager & EAP
N10 Road Realignment for the Ilanga CSP Facility, East of Upington, Northern Cape	SANRAL	Project Manager & EAP
Nxuba (Bedford) Wind Farm Watercourse Crossings near Cookhouse, Eastern Cape	African Clean Energy Developments (ACED)	Project Manager & EAP
Pollution Control Dams at the Medupi Power Station Ash Dump & Coal Stockyard, Limpopo	Eskom	Project Manager & EAP
Qoboshane borrow pits (EMPr only), Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Tsitsikamma Community WEF Watercourse Crossings, Eastern Cape	Cennergi	Project Manager & EAP
Clayville Central Steam Plant, Gauteng	Bellmall Energy	Project Manager & EAP
Msenge Emoyeni Wind Farm Watercourse Crossings and Roads, Eastern Cape	Windlab	Project Manager & EAP

Basic Assessments

Project Name & Location	Client Name	Role
Harmony Gold WWTW at Doornkop Mine, Gauteng	Harmony Doornkop Plant	Project Manager & EAP
Ofir-ZX Watercourse Crossing for the Solar PV Facility, near Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Qoboshane bridge & access roads, Eastern Cape	Emalahleni Local Municipality	Project Manager & EAP
Relocation of the Assay Laboratory near Carletonville, Gauteng	Sibanye Gold	Project Manager & EAP
Richards Bay Harbour Staging Area, KwaZulu-Natal	Eskom Holdings	Project Manager & EAP
S-Kol Watercourse Crossing for the Solar PV Facility, East of Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Sonnenberg Watercourse Crossing for the Solar PV Facility, West Keimoes, Northern Cape	Networx S28 Energy	Project Manager & EAP
Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
Masetjaba Water Reservoir, Pump Station and Bulk Supply Pipeline near Nigel, Gauteng	Naidu Consulting Engineers	Project Manager & EAP
Access Road for the Dwarsug Wind Farm, Northern Cape Province	South Africa Mainsteam Renewable Power	Project Manager & EAP
Upgrade of the Cooling Water Treatment Facility at the Kriel Power Station, Mpumalanga	Eskom	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Roodepoort Open Space Optimisation Programme (OSOP) Precinct, Gauteng	TIMAC Engineering Projects	Project Manager & EAP
Vegetable Oil Plant and Associated Pipeline, Kwa-Zulu Natal	Wilmar Oils and Fats Africa	Project Manager & EAP

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
ECO and bi-monthly auditing for the construction of the Olifants River Water Resources Development Project (ORWRDP) Phase 2A: De Hoop Dam, R555 realignment and housing infrastructure	Department of Water and Sanitation	Project Manager Auditor
ECO for the Rehabilitation of the Blaaupan & Storm Water Channel, Gauteng	Airports Company of South Africa (ACSA)	Project Manager
Due Diligence reporting for the Better Fuel Pyrolysis Facility, Gauteng	Better Fuels	Project Manager
ECO for the Construction of the Water Pipeline from Kendal Power Station to Kendal Pump Station, Mpumalanga	Transnet	Project Manager
ECO for the Replacement of Low-Level Bridge, Demolition and Removal of Artificial Pong, and Reinforcement the Banks of the Crocodile River at the Construction at Walter Sisulu National Botanical Gardens, Gauteng Province	South African National Biodiversity Institute (SANBI)	Project Manager
External Compliance Audit of the Air Emission Licence (AEL) for a depot in Bloemfontein, Free State Province and in Tzaneen, Mpumalanga Province	PetroSA	Project Manager

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
WULA for the Izubulo Private Nature Reserve, Limpopo	Kjell Bismeyer, Jann Bader, Laurence Saad	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Environmental Advisor
WULA for the Ezulwini Private Nature Reserve, Limpopo	Ezulwini Investments	Project Manager & EAP
WULA for the Masodini Private Game Lode, Limpopo	Masodini Private Game Lodge	Project Manager & EAP
WULA for the N10 Realignment at the Ilanga SEF, Northern Cape	Karoshoek Solar One	Project Manager & EAP
WULA for the Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP
S24G and WULA for the Ilegal construction of structures within a watercourse on EFF 24 Ruimsig Agricultural Holdings, Gauteng	Sorror Language Services	Project Manager & EAP

HOUSING AND URBAN PROJECTS

Basic Assessments

Project Name & Location	Client Name	Role
Postmasburg Housing Development, Northern Cape	Transnet	Project Manager & EAP

Compliance Advice and reporting

Project Name & Location	Client Name	Role
Kampi ya Thude at the Olifants West Game Reserve, Limpopo	Nick Elliot	Environmental Advisor

Project Name & Location	Client Name	Role
External Compliance Audit of WUL for the Johannesburg Country Club, Gauteng	Johannesburg Country Club	Project Manager

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Due Diligence Audit for the Due Diligence Audit Report, Gauteng	Delta BEC (on behalf of Johannesburg Development Agency (JDA))	Project Manager

ENVIRONMENTAL MANAGEMENT TOOLS

Project Name & Location	Client Name	Role
Development of the 3rd Edition Environmental Implementation Plan (EIP)	Gauteng Department of Agriculture and Rural Development (GDARD)	Project Manager & EAP
Development of Provincial Guidelines on 4x4 routes, Western Cape	Western Cape Department of Environmental Affairs and Development Planning	EAP
Compilation of Construction and Operation EMP for the Braamhoek Transmission Integration Project, Kwazulu-Natal	Eskom Holdings	Project Manager & EAP
Compilation of EMP for the Wholesale Trade of Petroleum Products, Gauteng	Munaca Technologies	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for Medupi Power Station, Limpopo	Eskom Holdings	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Dube TradePort Site Wide Precinct	Dube TradePort Corporation	Project Manager & EAP
Operational Environmental Management Programme (OEMP) for the Kusile Power Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Review of Basic Assessment Process for the Wittekleibosch Wind Monitoring Mast, Eastern Cape	Exxaro Resources	Project Manager & EAP
Revision of the EMPr for the Sirius Solar PV	Aurora Power Solutions	Project Manager & EAP
State of the Environment (SoE) for Emalahleni Local Municipality, Mpumalanga	Simo Consulting on behalf of Emalahleni Local Municipality	Project Manager & EAP
Aspects and Impacts Register for Salberg Concrete Products operations	Salberg Concrete Products	EAP
First State of Waste Report for South Africa	Golder on behalf of the Department of Environmental Affairs	Project Manager & EAP
Responsibilities Matrix and Gap Analysis for the Kruisvallei Hydroelectric Power Generation Scheme, Free State Province	Building Energy	Project Manager
Responsibilities Matrix and Gap Analysis for the Roggeveld Wind Farm, Northern & Western Cape Provinces	Building Energy	Project Manager

PROJECTS OUTSIDE OF SOUTH AFRICA

Project Name & Location	Client Name	Role
Advisory Services for the Zizabona Transmission Project, Zambia, Zimbabwe, Botswana & Namibia	PHD Capital	Advisor
EIA for the Semonkong WEF, Lesotho	MOSCET	Project Manager & EAP
EMP for the Kuvaninga Energia Gas Fired Power Project, Mozambique	ADC (Pty) Ltd	Project Manager & EAP
Environmental Screening Report for the SEF near Thabana Morena, Lesotho	Building Energy	EAP
EPBs for the Kawambwa, Mansa, Mwense and Nchelenge SEFs in Luapula Province, Zambia	Building Energy	Project Manager & EAP
ESG Due Diligence for the Hilton Garden Inn Development in Windhoek, Namibia	Vatange Capital	Project Manager
Mandahill Mall Rooftop PV SEF EPB, Lusaka, Zambia	Building Energy	Project Manager & EAP
Monthly ECO for the PV Power Plant for the Mocuba Power Station	Scatec	Project Manager

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CURRICULUM VITAE OF LISA OPPERMAN

Profession : Environmental Assessment Practitioner and GIS Consultant

Specialisation: Environmental Impact Assessments, Basic Assessments, Site Screening and Site Selection reporting, compilation of maps through the use of ArcGIS, Social Impact Assessments

Work Experience: 4 years and 10 months of experience in the environmental management and GIS field

VOCATIONAL EXPERIENCE

Lisa Opperman has four years and 10 months of experience in the environmental field. She has worked on a variety of EIA processes including renewable energy projects, as well as industrial developments. She has also been involved in the undertaking of public participation for projects located in South Africa which has included the undertaking of public meetings, focus group meetings and key stakeholder meetings in both Afrikaans and English. She also has experience in working with ArcGIS 10 for the compilation of maps, the manipulation of data and screening for environmental sensitivities within areas with the potential for development.

SKILLS BASE AND CORE COMPETENCIES

- GIS Mapping
- EIA Report Writing
- Social Impact Assessments
- Conducting of public involvement processes
- Administrative tasks
- Analysis and manipulation of geographical information and technical experience with the use of ArcGIS

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc. (Hons) Environmental Management (2014), North-West University, Potchefstroom
- B.A Psychology, Geography and Environmental Studies (2013), North-West University, Potchefstroom

Courses:

- Environmental Legal Compliance and Auditing (2017), Janice Tooley at the Protea Hotel OR Thambo, Johannesburg

EMPLOYMENT

Date	Company	Roles and Responsibilities
February 2015 – current	Savannah Environmental (Pty) Ltd	Environmental Assessment Practitioner and GIS Consultant *Tasks include: Compilation of Environmental Scoping Reports, Plan of Study, Environmental Impact Assessment Reports, Basic Assessments and Environmental management programmes; Environmental Screening Reports; Specialist management; project proposals and tenders; Client liaison and Marketing; Process EIA Applications, GIS Mapping, spatial data analysis and manipulation; Compilation of Social Impact Assessments*

PROJECT EXPERIENCE

Renewable Power Generation Projects: Solar Energy Facilities

Screening Studies

Project Name & Location	*Client Name*	*Role*
Pre-feasibility Desktop Screening and Fatal Flaw Scan for a Solar PV Project near Lichtenburg, North West Province	*ABO Wind AG*	*EAP and GIS Consultant*
Pre-feasibility Desktop Screening and Fatal Flaw Scan for a Solar PV Project neat Aggeneys, Northern Cape Province	*ABO Wind AG*	*EAP and GIS Consultant*

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	*Client Name*	*Role*
Buffels PV 1 & Buffels PV 2 Solar Energy Facilities near Orkney, North West	*Kabi Solar*	*EAP and GIS Consultant*
Woodhouse Solar 1 & Woodhouse Solar 2 PV Facilities near Vryburg, North West	*Genesis Eco-Energy Developments*	*EAP and GIS Consultant*
Orkney Solar Farm, North West	*Genesis Eco-Energy Developments*	*EAP and GIS Consultant*
Tewa Isitha Solar 1 & Tewa Isitha Solar 2 PV facilities near Upington, Northern Cape	*AfriCoast Energy*	*EAP and GIS Consultant*
Lichtenburg 1, Lichtenburg 2 and Lichtenburg 3 PV Facilities, near Lichtenburg, North West Province (EIA Phase)	*ABO Wind AG*	*EAP and GIS Consultant*

Basic Assessments

Project Name & Location	*Client Name*	*Role*
Harmony Gold 3x PV Facilities, Welkom, Free State	*BBEntropie*	*EAP and GIS Consultant*
Khunab Solar Development, consisting of Klip Punt PV1, McTaggarts PV1, McTaggarts PV2, McTaggarts PV3 and the Khunab solar Grid	*Atlantic Energy Partners and Abengoa*	*Project management, Social Impact Assessment*

Connection near Upington, Northern Cape Province		*Specialist and GIS Consultant*
Sirius Solar PV3 and PV4, near Upington, Northern Cape Province	*Solal*	*Co-author to Social Impact Assessments*

Renewable power generation projects: Wind Energy Facilities

Screening Studies

Project Name & Location	***Client Name***	***Role***
Juno Wind Farm Screening Assessment Report near Lamberts Bay, Western Cape Province	*AMDA Developments*	*EAP and GIS Consultant*
Lamberts Bay Wind Farm Screening Assessment Report near Lamberts Bay, Western Cape Province	*Windy World*	*EAP and GIS Consultant*
Pre-feasibility Desktop Screening and Fatal Flaw Scan for the Kudusberg and Rondekop Wind Energy Facilities, Northern Cape and Western Cape Provinces	*ABO Wind AG*	*EAP and GIS Consultant*
Pre-feasibility Desktop Screening and Fatal Flaw Scan for Wind Projects near Touws River, Western Cape Province	*ABO Wind AG*	*EAP and GIS Consultant*

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Boulders Wind Farm, Western Cape Province	*Vredenburg Windfarm*	*EAP and GIS Consultant*
Namas Wind Farm, Northern Cape Province	*Genesis Namas Wind (Pty) Ltd*	*EAP and GIS Consultant*
Zonnequa Wind Farm, Northern Cape Province	*Genesis Zonnequa Wind (Pty) Ltd*	*EAP and GIS Consultant*

Grid Infrastructure Projects

Basic Assessments

Project Name & Location	***Client Name***	***Role***
132/11kV Olifantshoek Substation and Power Line, Northern Cape	*Eskom*	*EAP and GIS Consultant*
Grid connection infrastructure for the Namas Wind Farm, Northern Cape Province	*Genesis Namas Wind (Pty) Ltd*	*EAP and GIS Consultant*
Grid connection infrastructure for the Zonnequa Wind Farm ,Northern Cape Province	*Genesis Zonnequa Wind (Pty) Ltd*	*EAP and GIS Consultant*
Khunab Solar Grid Connection, near Upington, Northern Cape Province	*Atlantic Energy Partners and Abengoa*	*Project management, Social Impact Assessment Specialist and GIS Consultant*

Gas Projects

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Richards Bay Combined Cycle Power Plant (CCPP) power plant, KwaZulu-Natal (Scoping Phase)	*Eskom*	*EAP (assistance) and GIS Consultant*

Basic Assessments

Project Name & Location	Client Name	Role
Neopak Combined Heat and Power (CHP) Plant, Rosslyn, Gauteng	*Neopak*	*EAP, Public Participation and GIS Consultant*

Screening Studies

Project Name & Location	Client Name	Role
Richards Bay Combined Cycle Power Plant (CCPP) power plant, near Richards Bay, KwaZulu-Natal	*Eskom*	*EAP and GIS Consultant*

Infrastructure Development Projects (bridges, pipelines, roads, etc)

Basic Assessments

Project Name & Location	Client Name	Role
Water Treatment Plant at the Neopak Facility, Rosslyn, Gauteng	*Neopak*	*EAP, Public Participation and GIS Consultant*

Housing and Urban Projects

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Metals Industrial Cluster near Kuruman, Northern Cape	*Northern Cape Department of Economic Development and Tourism*	*EAP and GIS Consultant*

Environmental Management Tools

Environmental Management Programmes

Project Name & Location	Client Name	Role
Environmental Management Programme (EMPr) for the Nxuba Wind Farm, Eastern Cape	*ACED*	*EAP*
Operation Environmental Management Programme (EMPr) for Phase 1 of the Amakhala Emoyeni Wind Energy Facility, Eastern Cape	*Cennergi*	*EAP*
Operation Environmental Management Programme (EMPr) for the Tsitsikamma Community Wind Energy Facility, Eastern Cape Province	*Cennergi*	*EAP*
Environmental Management Programme (EMPr) for the Skuitdrift 1 Solar PV Energy Facility near Augrabies, Northern Cape Province	*Building Energy South Africa*	*EAP and GIS Consultant*
Environmental Management Programme (EMPr) for the Skuitdrift 2 Solar PV Energy Facility near Augrabies, Northern Cape Province	*Building Energy South Africa*	*EAP and GIS Consultant*

Environmental and Social Management System (ESMS)

Project Name & Location	Client Name	Role
Preparation of Policies and Plans for the Kruisvallei Hydro Scheme, Free State Province	*Building Energy South Africa*	*EAP assistance*

savannah environmental

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CURRICULUM VITAE OF GIDEON RAATH

Profession : Environmental and Permitting Consultant

Specialisation: Environmental Impact Assessments, Water Use Licencing, Waste Licencing, Environmental Compliance Officer, Ecological Specialist, Wetland Specialist, GIS, MPRDA permitting

Work Experience: 4.5 years' experience in environmental management, National Water Act, Mineral and Petroleum Resources Development Act, ECO and compliance auditing, wetland and ecological specialist reporting

VOCATIONAL EXPERIENCE

Gideon holds an MSc (Geography and Environmental Management; SU), a BSc Honours (Ecology and Environmental Studies - Cum laude; Wits) and a BSc (Geography and Environmental Management; UJ). His MSc thesis focused on the hydrological impact on the spatial distribution of invasive Eucalyptus trees along the Breede River, while his honours thesis evaluated ethnobotanical relationships around the Rio Tinto copper mine in Phalaborwa. Most recently he has worked as an Environmental Consultant at EOH Coastal and Environmental Services (EOH CES), conducting environmental authorisations applications (NWA, NEMA, MPRDA), Public Participation Processes, GIS specialisation as well as Ecological and Wetland specialist studies. Previously, Gideon worked as the Monitoring & Evaluation Project Manager for the City of Cape Town's invasive species unit (Environmental Resources Management Department).

Gideon's GIS background includes the management of the City of Cape Town invasive species GIS database, involving the storage, management, recall and quality control off all sightings, clearance visits and known infestations. Further experience include mapping for various consulting projects, boundary verification through ground-truthing and the spatial mapping and delineation component of this MSc research. Gideon has further attended public participation workshops, and has been involved with IAP identification, translation, public meetings and engagement for a variety of projects, mainly within the Afrikaans speaking Northern Cape. Gideon is interested in invasion ecology, treatment of groundwater pollution through phytoremediation, botanical and wetland specialist studies, GIS application for ecology and environmental management, and the EIA processes in general.

SKILLS BASE AND CORE COMPETENCIES

- Environmental Management
- GIS data manipulation, storage, management and mapping
- EIA Impact Assessments and Basic Assessment
- Environmental Management Programmes
- Environmental Compliance Monitoring
- Mining Rights, Mining Permits, Prospecting Rights (and renewal) applications (MPRDA & NEMA)
- Public and Stakeholder Engagement (NEMA)
- Ecological/Botanical Specialist Studies

- Wetland Delineation, Functional and Impact Assessment studies
- Water Use Licence Applications (NWA)
- General Authorisations (NWA)

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- M.Sc. Geography and Environmental Science (2014), Stellenbosch University (2014)
- B.Sc. (Hons) Ecology, Environment and Conservation (Cum Laude), University of the Witwatersrand (2011)
- B.Sc. Life and Environmental Sciences, University of Johannesburg (2010)

Short Courses:

- GroundTruth SASS5 competency course, GroundTruth Aquatic Consulting (2017)
- DWS 21C&I GA training workshop, Department of Water and Sanitation (2016)
- IAIAsa Public Participation Process Workshop, IAIA South Africa (2016)
- EIA Theory and application, EOH Coastal and Environmental Services (2015)
- Water Safety Training, City of Cape Town Environmental Resources Department (2014)
- Herbicide safety and application for weed control, City of Cape Town Environmental Resources Department (2014)
- Snake awareness training, City of Cape Town Environmental Resources Department (2014)
- Habitable Planet Workshop, Applied Centre for Climate & Earth Systems Science, Cape Town (2011)

Professional Society Affiliations:

- Golden Key International Honour Society – University of the Witwatersrand Chapter
- South African Council for Scientific Natural Professionals (SACNASP): Certified Natural Scientist – Pr.Sci.Nat. (Membership No.: 117178)
- IAIAsa (Membership No.: 3619)

Other Relevant Skills:

- GPS use, spatial data capturing and ground truthing

EMPLOYMENT

Date	Company	Roles and Responsibilities
October 2018 - Current:	Savannah Environmental (Pty) Ltd	Environmental and Permitting Consultant <u>Tasks include</u>: Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, wetland assessments, botanical/ecological assessments, mining rights and permit applications, prospecting rights applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, client liaison and relationship management.

Date	Company	Roles and Responsibilities
February 2015 – September 2018	EOH Coastal and Environmental Services (Pty) Ltd	Senior Environmental Consultant Tasks included: Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, wetland assessments, botanical/ecological assessments, mining rights and permit applications, prospecting rights applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, client liaison and relationship management, public participation processes for environmental authorisations.
March 2014 – February 2015	Invasive Species Unit (ISU), Environmental Resources Management Department (ERMD), City of Cape Town	Professional Officer Tasks included: Managed the Monitoring & Evaluation project portfolio, entailing the establishment of an invasive species monitoring & evaluation system for the ISU, as well as GIS database management, quality assurance and reporting thereof. Position required managing a small staff compliment (dealing directly with GIS database management), managing time and budgets for the monitoring division, conducting monitoring trials and research, writing species management plans as well as handling the GIS database, quality control, verification and integrity for the ISU.
January 2012 – March 2014	University of Stellenbosch	Departmental Assistant Tasks included: Technical editing of academic reports. Formatting of PhD and MSc reports on a weekly basis, with short turnaround time and good quality feedback.
January 2011 – January 2012	University of the Witwatersrand	Departmental Assistant Tasks included: Responsible for practical tutorials and marking of 1st year medical students. Included zoology and botany.
January 2006 – November 2010 (part time)	Codeon Networking CC	Co-founder and web developer Tasks included: Small business owner, responsible for all facets of the business. Self-taught HTML, CSS, PHP and MySQL. Won and produced two medium enterprise websites serving the gaming community. Websites required user profiles & permissions, CMS system and automated payment options as functionality. Development

Date	Company	Roles and Responsibilities
		and maintenance of a user database and account management system.

PROJECT EXPERIENCE

Project experience includes project management, EIA, BA and EMPr documentation development, integrated water use license applications, general authorisations, specialist botanical and ecological impact assessments, specialist wetland delineation and impact assessments, GIS applications and mapping, compliance auditing and monitoring, vegetation rehabilitation and monitoring plans, integrated waste management plans and waste licencing, mining right & permits, as well as prospecting rights applications.

Industry experience includes the waste sector (IWMP's and waste licencing), road and rail infrastructure (BAR, S&EIR, WUL/GA, Waste Licence), ports and harbours (management plans), private sector clients across varying industries (various permits), mining sector (BAR, S&EIR, mining permits and rights, prospecting rights), conservation sector (biodiversity plans), renewable energy industry (BAR, S&EIR) as well as the gas and oil industry (biodiversity reports).

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Enel Paleisheuwel Solar compliance auditing, Paleisheuwel, Northern Cape	Enel Green Power RSA (EGP RSA)	Environmental consultant

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
G7 Brandvalley S&EIR, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Environmental consultant
G7 Rietkloof S&EIR, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Environmental consultant

Basic Assessments

Project Name & Location	Client Name	Role
G7 Renewable Energy 132kV BAR & EMPr, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Project Manager, Environmental consultant, Public Participation

Compliance Advice and ESAP reporting

Project Name & Location	Client Name	Role
Biotherm Energy Golden Valley Wind Energy Facility ESAP, Bedford, Eastern Cape	Biotherm Energy Pty Ltd	Environmental consultant

Amendments

Project Name & Location	Client Name	Role

Mosselbay Energy EA Amendment, Mosselbay, Western Cape	Mosselbay Energy IPP (Pty) Ltd	Environmental consultant

GAS PROJECTS

Screening Studies

Project Name & Location	Client Name	Role
iGas integrated biodiversity screening, Saldanha, Western Cape	Central Energy Fund - iGas (subsidiary)	Environmental consultant, Faunal specialist (assistant)

MINING SECTOR PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Triton Minerals Limited Ancuabe and Nicanda Hills EPDA, Ancuabe, Cabo Del Gado Province, Mozambique	Triton Minerals Ltd	Environmental consultant
Ancuabe graphite mine Environmental and Social Impact Assessment (ESIA), Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Environmental consultant

Basic Assessments

Project Name & Location	Client Name	Role
SANRAL material sourcing BAR (DMR), Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, Environmental consultant, Public Participation
SANRAL Bierspruit R510 Borrow Pit authorisation, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation
Almenar tin prospecting BAR, Carnarvon, Northern Cape	Almenar Property Investments (Pty) Ltd	Environmental consultant

Rehabilitation Studies

Project Name & Location	Client Name	Role
Ancuabe baseline vegetation monitoring assessment and programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist
Prospecting pit rehabilitation programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist, Environmental consultant
Mayfield Quarry rehabilitation plan, Grahamstown, Eastern Cape	Mayfield Quarry	Environmental consultant

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Construction monitoring and DMR environmental authorisation, Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, ECO,
SANRAL Caledon N2 Section 3 road upgrade ECO Audits and Reporting, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, ECO

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
VMC Mining permit renewal application, Rust De Winter, Gauteng	Vergenoeg Mining Company (Pty) Ltd	Environmental consultant
Zirco Resources Kamiesberg heavy mineral sand mine water use licence, Kamiesberg, Northern Cape	Zirco Roode Heuwel (Pty) Ltd	Environmental consultant

INFRASTRUCTURE DEVELOPMENT PROJECTS (BRIDGES, PIPELINES, ROADS, WATER RESOURCES, STORAGE, ETC)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
S&EIR authorisation for the SANRAL Zandkraal-Windburg N1 road upgrade, Windburg, Free State Province	SANRAL SOC Ltd & SMEC Consulting Engineers	Project Manager, Environmental consultant, Public Participation
Thabazimbi Local Municipality Integrated Waste Management Plan, Thabazimbi, Limpopo Province	Thabazimbi Local Municipality & Anglo American Plc	Environmental consultant, Public Participation

Basic Assessments

Project Name & Location	Client Name	Role
SANRAL Masekwaspoort N1 Road Upgrade BA, Louis Trichardt, Limpopo Province	SANRAL SOC Ltd & Knight Piésold Consulting	Project Manager, Environmental consultant, Public Participation
SANRAL Polokwane N1 Ring Road Upgrade Basic Assessment, Polokwane, Limpopo Province	SANRAL SOC Ltd & KBK Engineers	Environmental consultant
Boshoek Loop Rail Upgrade BAR, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Wetland specialist, Public Participation
Heysterkrand Loop Rail Upgrade BAR, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Public Participation
SANRAL Bierspruit R510 road upgrade Basic Assessment, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation
Barberton IAPS Waste Water Treatment Works development BAR, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Project Manager, Environmental consultant, Public Participation
SANRAL Caledon N2 Section 3 road upgrade project Basic Assessment, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, Environmental consultant, Ecological specialist, ECO

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Construction Monitoring and DMR environmental authorisation, Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, Environmental consultant, ECO

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Water use licence for the SANRAL Zandkraal-Windburg N1 road upgrade and quarrying, Windburg, Free State Province	SANRAL SOC Ltd & SMEC Consulting Engineers	Project Manager, Environmental consultant, Public Participation
SANRAL Masekwaspoort N1 road upgrade water use licence application, Louis Trichardt, Limpopo Province	SANRAL SOC Ltd & Knight Piésold Consulting	Project Manager, Environmental consultant, Public Participation
Boshoek Loop Rail Upgrade water use licence application, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Wetland specialist, Public Participation
SANRAL Bierspruit R510 road water use licence, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation
Barberton IAPS Waste Water Treatment Works water use licence and SASS 5 assessment, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Project Manager, Environmental consultant, Aquatic specialist, Public Participation
SANRAL Caledon N2 Section 3 road upgrade water use licence and specialist reports, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, Environmental consultant, Ecological specialist, Public Participation

HOUSING AND URBAN PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Scoping and EIR authorisation, Water Use Licence, for the Ganspan tourism facility development, Jan Kempdorp, Northern Cape	Frances Baard Local Municipality	Project Manager, Environmental consultant, Public Participation

Basic Assessments

Project Name & Location	Client Name	Role
Basic Assessment for the office complex development within the Pretoria National Botanical Gardens, Pretoria, Gauteng	South African National Biodiversity Institute (SANBI)	Project Manager, Environmental consultant, Public Participation, ECO
Corner Berg and Drooge Street township development BAR, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant, Public Participation
Corner Kort and Bree Street township development BAR, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant, Public Participation
Hope Village township development BAR, Johannesburg, Gauteng	Door of Hope Charity Organisation	Project Manager, Environmental consultant, Public Participation
ACSA Jones Road Filling Station Basic Assessment, Johannesburg, Gauteng	Airports Company South Africa SOC Ltd	Project Manager, Environmental consultant, Public Participation

Screening Studies

Project Name & Location	Client Name	Role
Kibler Park Church Development ecological assessment, Johannesburg, Gauteng	Riverside Community Church	Project Manager, Ecological specialist
DEA Quoin Point dune specialist assessments, Gansbaai, Western Cape	Department of Environmental Affairs (national)	Project Manager, Environmental consultant

Environmental Compliance, Auditing and ECO

Project Name & Location	Client Name	Role
Transnet Depot and Siding compliance auditing programme, Johannesburg, Gauteng & Rustenburg, North-West Province	Transnet SOC Ltd	ECO
Environmental compliance monitoring for the office complex development within the Pretoria National Botanical Gardens, Pretoria, Gauteng	South African National Biodiversity Institute (SANBI)	Project Manager, Environmental consultant, Public Participation, ECO

Environmental Permitting, S53, Water Use Licence (WUL), Waste Management Licence (WML) & Other Applications

Project Name & Location	Client Name	Role
Atmospheric Emissions Licence, Section 24G for the ER Galvanizing plant and operations, Johannesburg, Gauteng	ER Galvanizers Pty Ltd	Project Manager, Environmental consultant, Public Participation
City of Johannesburg nature reserve proclamation (Phase II), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Project Manager, Environmental consultant, Public Participation, Botanical specialist
Hope Village township development water use licence, Johannesburg, Gauteng	Door of Hope Charity Organisation	Project Manager, Environmental consultant, Public Participation
Diamond Park Township Development Section 24G, Kimberley, Northern Cape	Sol Plaatje Local Municipality	Project Manager, Environmental consultant, Public Participation
Boschendal Wine Estate hydro-electric power station Water Use Licence and S24G application, Stellenbosch, Western Cape	Boschendal Wine Estate	Environmental consultant
City of Johannesburg nature reserve proclamation boundary verification (Phase I), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Environmental consultant
PRDW Cape Town harbour breakwater rehabilitation EMPr, Cape Town, Western Cape	PRDW Engineering	Project Manager, Environmental consultant
PRDW Bushman's Estuary dune encroachment project management, Kenton-on-sea, Eastern Cape	PRDW Engineering	Environmental consultant
Corner Berg and Drooge Street township development water use licence application, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant
Corner Kort and Bree Street township development water use licence, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant
Bloekombos (Kraaifontein) hospital water use licence application, Cape Town, Western Cape	Western Cape Provincial Government (PGWC)	Project Manager, Environmental consultant, Botanical specialist, Wetland specialist

SPECIALIST STUDIES

Project Name & Location	Client Name	Role
Boshoek Loop Rail Upgrade BAR and Water Use Licence, Rustenburg, North-West Province	Transnet SOC Ltd	Wetland specialist
City of Johannesburg nature reserve proclamation (Phase II), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Botanical specialist
SANRAL Bierspruit R510 road upgrade Water Use Licence, Basic Assessment, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Ecological specialist
Kibler Park Church Development Ecological Assessment, Johannesburg, Gauteng	Riverside Community Church	Ecological specialist
Barberton IAPS Waste Water Treatment Works development BAR, water use licence and SASS 5 assessment, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Aquatic specialist
Wijnberg Trust Dam 2 expansion Aquatic Impact Assessment	Wijnberg Trust	Aquatic specialist
SANRAL Caledon N2 Section 3 road upgrade project Basic Assessment, Water Use Licence and Specialist reports, Caledon, Western Cape Province	JG Afrika Engineering	Ecological specialist
City of Johannesburg nature reserve proclamation boundary verification (Phase I), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	GIS specialist
iGas integrated biodiversity screening, Saldanha, Western Cape	Central Energy Fund - iGas (subsidiary)	Faunal specialist (assistant)
Bloekombos (Kraaifontein) botanical baseline and impact assessment, Cape Town, Western Cape	Western Cape Provincial Government (PGWC)	Wetland specialist Botanical specialist

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CURRICULUM VITAE OF GIDEON RAATH

Profession: Environmental and Permitting Consultant

Age: 33 years

Nationality: South African

	Read	Write	Speak
Language:	Afrikaans – Excellent	Excellent	Excellent
	English – Excellent	Excellent	Excellent

Position: Senior Environmental Assessment Practitioner (Permitting)

Parent Firm: Savannah Environmental

Specialisation: Environmental Impact Assessments, Water Use Licencing, Waste Licencing, Environmental Compliance Officer, Ecological Specialist, Wetland Specialist, GIS, MPRDA permitting

Work Experience: 6.5 years' experience in environmental management, National Water Act, Mineral and Petroleum Resources Development Act, ECO and compliance auditing, wetland and ecological specialist reporting

VOCATIONAL EXPERIENCE

Gideon holds an MSc (Geography and Environmental Management; SU), a BSc Honours (Ecology and Environmental Studies - Cum laude; Wits) and a BSc (Geography and Environmental Management; UJ). His MSc thesis focused on the hydrological impact on the spatial distribution of invasive Eucalyptus trees along the Breede River; while his honours thesis evaluated ethnobotanical relationships around the Rio Tinto copper mine in Phalaborwa. Most recently he has worked as a Senior Environmental Consultant at Coastal and Environmental Services (CES), conducting environmental authorisations applications (NWA, NEMA, MPRDA), Public Participation Processes, GIS specialisation — as well as Ecological and Wetland specialist studies. Previously, Gideon previously worked as the Monitoring & Evaluation Project Manager for the City of Cape Town's invasive species unit (Environmental Resources Management Department).

Gideon's experience includes EIA permitting for ~94 different projects, ranging from infrastructure, mining, energy, housing, renewable energy and the conservation industries. These include Environmental Authorisations (BAR, S&EIR), Water Use Licencing, Waste Licencing, Environmental Compliance Officer auditing, GIS studies and MPRDA permitting. He therefore has wide ranging experience with various legislation including NEMA, NHRA, NEM:WA, NEM:BA, MPRDA and NWA regulations, having applied them for numerous private and public sector clients across various industries for small, medium and large projects. Gideon is also an experienced Ecological & Wetland Specialist having conducted ~23 specialist studies, and has been accredited with SACNASP as a professional natural scientist (*Pr.Sci.Nat*) since 2017. Gideon also has experience beyond the permitting sphere through numerous screening assessments for potential developers, including fatal flaw screenings, regulatory and permitting approval screening as well as ecological and hydrological sensitivity screening. Gideon has also served in an advisory role for various infrastructure and mining projects, assisting with environmental due diligence, bankable feasibility study input and assistance towards financial close, most recently in the Renewable Energy sphere under the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP) and towards the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) round 5 bid compliance.

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SKILLS BASE AND CORE COMPETENCIES

- Environmental Management
- GIS data manipulation, storage, management and mapping
- EIA Impact Assessments and Basic Assessment
- Environmental Management Programmes
- Environmental Compliance Monitoring
- Mining Rights, Mining Permits, Prospecting Rights (and renewal) applications (MPRDA & NEMA)
- Public and Stakeholder Engagement (NEMA)
- Ecological/Botanical Specialist Studies
- Wetland Delineation, Functional and Impact Assessment studies
- Water Use Licence Applications (NWA)
- General Authorisations (NWA)
- Due diligence and financial close advisory services

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- M.Sc. Geography and Environmental Science (2014), Stellenbosch University (2014)
- B.Sc. (Hons) Ecology, Environment and Conservation (Cum Laude), University of the Witwatersrand (2011)
- B.Sc. Life and Environmental Sciences, University of Johannesburg (2010)

Short Courses:

- GroundTruth SASS5 competency course, GroundTruth Aquatic Consulting (2017)
- DWS 21C&I GA training workshop, Department of Water and Sanitation (2016)
- IAIAsa Public Participation Process Workshop, IAIA South Africa (2016)
- EIA Theory and application, EOH Coastal and Environmental Services (2015)
- Water Safety Training, City of Cape Town Environmental Resources Department (2014)
- Herbicide safety and application for weed control, City of Cape Town Environmental Resources Department (2014)
- Snake awareness training, City of Cape Town Environmental Resources Department (2014)
- Habitable Planet Workshop, Applied Centre for Climate & Earth Systems Science, Cape Town (2011)

Professional Society Affiliations:

- Golden Key International Honour Society – University of the Witwatersrand Chapter
- South African Council for Scientific Natural Professionals (SACNASP): Certified Natural Scientist – Pr.Sci.Nat. (Membership No.: 117178)
- IAIAsa (Membership No.: 3619)

Other Relevant Skills:

- GPS use, spatial data capturing and ground truthing

EMPLOYMENT		
Date	**Company**	**Roles and Responsibilities**
October 2018 - Current:	Savannah Environmental (Pty) Ltd	Senior Environmental and Permitting Consultant

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		Tasks include: Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, wetland assessments, botanical/ecological assessments, mining rights and permit applications, prospecting rights applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, client liaison and relationship management.
February 2015 – September 2018	EOH Coastal and Environmental Services (Pty) Ltd	Senior Environmental Consultant Tasks included: Undertaking environmental impact assessments, basic assessments, environmental management programmes (EMPrs), environmental amendments, water use license applications, general authorisations, wetland assessments, botanical/ecological assessments, mining rights and permit applications, prospecting rights applications, environmental compliance officer audits and reporting, Ensuring environmental compliance on permitting processes, client liaison and relationship management, public participation processes for environmental authorisations.
March 2014 – February 2015	Invasive Species Unit (ISU), Environmental Resources Management Department (ERMD), City of Cape Town	Professional Officer Tasks included: Managed the Monitoring & Evaluation project portfolio, entailing the establishment of an invasive species monitoring & evaluation system for the ISU, as well as GIS database management, quality assurance and reporting thereof. Position required managing a small staff compliment (dealing directly with GIS database management), managing time and budgets for the monitoring division, conducting monitoring trials and research, writing species management plans as well as handling the GIS database, quality control, verification and integrity for the ISU.
January 2012 – March 2014	University of Stellenbosch	Departmental Assistant Tasks included: Technical editing of academic reports.

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		Formatting of PhD and MSc reports on a weekly basis, with short turnaround time and good quality feedback.
January 2011 – January 2012	University of the Witwatersrand	Departmental Assistant Tasks included: Responsible for practical tutorials and marking of 1st year medical students. Included zoology and botany.
January 2006 – November 2010 (part time)	Codeon Networking CC	Co-founder and web developer Tasks included: Small business owner, responsible for all facets of the business. Self-taught HTML, CSS, PHP and MySQL. Won and produced two medium enterprise websites serving the gaming community. Websites required user profiles & permissions, CMS system and automated payment options as functionality. Development and maintenance of a user database and account management system.

PROJECT EXPERIENCE IN GENERAL ENVIRONMENTAL ASSESSMENT PRACTITIONER WORK

Please note: the following duties and responsibilities are in each instance relevant to the roles assigned below.

A. Environmental Consultant:
- Review of the project scope and advisory input into project approach;
- Report writing;
- Report reviewing;
- Site assessments;
- Competent authority liaison, client liaison;
- Specialist reports review;
- Quality control of specific and overall project deliverables; and
- Compliance auditing, report writing and audit report reviews;

B. Specialist (ecological and wetland):
- Project scope determination and development of terms of reference;
- Specialist field assessment;
- Sampling collection and interpretation of results (soil and water samples) where necessary;
- Specialist report writing; and
- Specialist input regarding public input or appeals;

C. Project manager:
- Project team liaison (engineers, subconsultants, financiers where applicable);
- Contracting and appointment of specialists or subcontractors;
- Client liaison, public liaison, project team and specialist liaison;
- Financial management (contracts, invoicing, cashflow). This includes but is not limited to:
  - Bid document preparation (where applicable) and development of terms of reference;

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- Determining applicable rates and budget for the environmental team;
- Management of appointments, development of contracts;
- Development of invoicing schedule and invoicing agreement;
- Responsible for assigning invoice values and dates to coincide with relevant partial or whole deliverables;
- Management or variations (internal and external);
- Evaluation of claims from subcontractors;
- Quality control of subcontractor deliverables;
- Ensuring timeous payment on invoices and appropriate payments are made to qualifying subcontractors;

- Schedule management (approach, deliverables, timeframes and resourcing). This includes but is not limited to:
  - Determining project approach and parties required;
  - Assessment of regulatory timeframes applicable for all aspects of the environmental work;
  - Development of an overall programme for all environmental work, including subcontractors;
  - Progress meetings with the project team, including regular schedule updates;
  - Variation management and crisis meetings, where applicable;
  - Deliverable management and close-out reporting;
- Due diligence inputs towards financial close; and
- Project assessment of environmental risk;

D. Public Participation:
- Identification of key stakeholders, landowners & neighbours, organs of state and other applicable interested and affected parties;
- Compilation and review of all public material (information documents, notices, advertisements) according to regulatory requirements;
- Public liaison, and client consultation;
- Compilation of public comments and response reports and reporting on public participation;
- Management of appeals;

E. Environmental Control Officer:
- Compliance audits;
- Development of checklists and document control sheets;
- Compliance audit reporting and report reviews;
- Authority liaison (DEA EMI's); and
- Liaison with project steering committee and Environmental Officer;

No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
94	Highveld Steel ZeroWaste Solution EIA, eMalahleni, Mpumalanga	Anglo African Metals (Pty) Limited	Project Manager, Environmental Consultant	August 2020 – current	Waste
93	Heuningspruit Financial Close, Arbeid, Free State	Cronimet Mining Power Solutions SA (Pty) Ltd	Project Manager, Environmental Consultant	February 2020 – current	Renewable Energy

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No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
92	Steynsrus Solar PV Financial Close, Arbeid, Free State	Cronimet Mining Power Solutions SA (Pty) Ltd	Project Manager, Environmental Consultant	February 2020 – current	Renewable Energy
91	Gunstfontein Wind Farm OHL BAR Sutherland, Northern Cape	African Clean Energy Developments (Pty) Ltd	Project Manager, Environmental Consultant	April 2020 – current	Renewable Energy
90	Tronox Namakwa Prospecting Right closure certificate, Garies, Northern Cape	Tronox Mineral Sands Northern Operations	Project Manager, Environmental Consultant	May 2020 – current	Mining
89	100 MW Vrede Solar Energy Facility EIA, Kroonstad, Free State	Mainstream Renewable Power SA, (Pty) Ltd	Project Manager, Environmental Consultant	June 2020 – current	Renewable Energy
88	100 MW Rondavel Solar Energy Facility EIA, Kroonstad, Free State	Mainstream Renewable Power SA, (Pty) Ltd	Project Manager, Environmental Consultant	June 2020 – current	Renewable Energy
87	Grid infrastructure BAR for Vrede SEF, Kroonstad, Free State	Mainstream Renewable Power SA, (Pty) Ltd	Project Manager, Environmental Consultant	June 2020 – current	Renewable Energy
86	Grid infrastructure BAR for Rondavel SEF, Kroonstad, Free State	Mainstream Renewable Power SA, (Pty) Ltd	Project Manager, Environmental Consultant	June 2020 – current	Renewable Energy
85	Energy Group Wadeville ECO, Wadeville, Gauteng	Energy Group (Pty) Ltd	Project Manager, Environmental Consultant	August 2020 – current	Infrastructure
84	Energy Group Nigel ECO, Nigel, Gauteng	Energy Group (Pty) Ltd	Project Manager, Environmental Consultant	September 2020 – current	Infrastructure
83	Great Karoo Battery Energy Storage System BAR, Sutherland, Northern Cape	African Clean Energy Developments (Pty) Ltd	Project Manager, Environmental Consultant	June 2020 – current	Renewable Energy
82	Gunstfontein Battery Energy Storage System BAR, Sutherland, Northern Cape	African Clean Energy Developments (Pty) Ltd	Project Manager, Environmental Consultant	June 2020 – current	Renewable Energy
81	Richards Bay 1250MW Combined Cycle Gas to Power Station EIA,	Richards Bay Gas Power 2 (Pty) Ltd /	Project Manager, Environmental Consultant	August 2020 – current	Energy

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No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
	Richards Bay, kwaZulu-Natal	Phakwe Group (Pty) Ltd			
80	Richards Bay 400MW Simple Cycle Gas to Power Station Part II amendment, Richards Bay, kwaZulu-Natal	Richards Bay Gas Power 2 (Pty) Ltd / Phakwe Group (Pty) Ltd	Project Manager, Environmental Consultant	April 2020 – current	Energy
79	Great Karoo Wind Farm OHL BAR, Sutherland, Northern Cape	African Clean Energy Developments (Pty) Ltd	Environmental Consultant	September 2020 – current	Renewable Energy
78	Dorper Wind Energy Facility Section 54 compliance audit, Molteno, Eastern Cape	Dorper Wind Farm RF (Pty) Ltd	Project Manager, Environmental Consultant, ECO	2019: 2 months	Renewable Energy
77	Rainmaker Malabar, Spreeukloof, Spinning Head and Loperberg Section 54 compliance audits (x4), Molteno, Eastern Cape	Rainmaker Energy (Pty) Ltd	Project Manager, Environmental Consultant, ECO	2019: 2 months	Renewable Energy
76	Togo Blita 40MW Solar Energy Facility ESMP Peer Review	OCA Global (Testing, Inspection and Certification) South Africa (Pty) Ltd	Environmental Consultant	2020: 3 months	Renewable Energy
75	Marubeni AMDA Straussheim 3 x Solar Energy Facility Peer Review, Kenhardt, Northern Cape	Marubeni Middle-East & Africa Power (Pty) Ltd	Environmental Consultant	2020: 4 months	Renewable Energy
74	Perdekraal PI Amendment	Perdekraal West Wind Farm (Pty) Ltd	Project Manager, Environmental Consultant	2020: 2 months	Renewable Energy
73	TAP desktop Palaeontological study, Vuwani, Limpopo	Trans African Projects (Pty) Ltd	Project Manager	2020: 3 months	Infrastructure
72	Kenhardt Solar PV Part I amendments, Kenhardt, Northern Cape	Biotherm Energy (Pty) Ltd	Project Manager, Environmental Consultant	2020: 2 months	Renewable Energy
71	Harmony Rietpan LILO & Switching substation BAR, Welkom, Free State	BBEntropie (Pty) Ltd	Ecological specialist	February 2020 – June 2020	Renewable Energy

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70	Harmony Nyala Solar PV grid connection BAR, Welkom, Free State	BBEntropie (Pty) Ltd	Ecological specialist	February 2020 – June 2020	Renewable Energy
69	Harmony Eland Solar PV grid connection BAR, Welkom, Free State	BBEntropie (Pty) Ltd	Ecological specialist	February 2020 – June 2020	Renewable Energy
68	Engie Rheboksfontein Part II amendment, Darling, Western Cape	Engie South Africa (Moyeng Energy)	Project Manager	July 2019 – January 2020: 8 months	Renewable Energy
67	APSA Liquid Natural Gas Vanderbijlpark, Vanderbijlpark, Gauteng	Air Products South Africa (Pty) Ltd	Project Manager	2019 – current: 8 months	Infrastructure
66	APSA Coega hazardous storage BAR, Coega IDZ, Eastern Cape	Air Products South Africa (Pty) Ltd	Project Manager	2019 – current: 8 months	Infrastructure
65	Korana WEF Part II amendment, Pofadder, Northern Cape	South African Mainstream Renewable Power Developments (Pty) Ltd	Project Manager	2019: 8 months	Renewable Energy
64	Khai-Ma WEF Part II amendment, Pofadder, Northern Cape	South African Mainstream Renewable Power Developments (Pty) Ltd	Environmental Consultant	2019: 8 months	Renewable Energy
63	Eskom Matla power station Reverse Osmosis Unit BAR, Emalahleni, Mpumalanga	Eskom SOC ltd	Project Manager, Environmental Consultant	2019 – current: 8 months	Infrastructure
62	Prana Sekaname (Kalahari Energy) 100MW coalbed-methane wellfield and gas power station ESIA, Mmashoro, Bostwana	Prana energy (Pty) Ltd	Project Manager, Environmental Consultant	2019 – current: 36 months	Mining & Energy
61	Solink Heineken Sedibeng PV plant GPEMF registration and ecological screening assessment, Sedibeng, Gauteng	Solink Power Procurement (Pty) Ltd	Project Manager, Environmental Consultant	2019 – current: 6 months	Renewable Energy
60	ENGP Neopak environmental	Energy Group (Pty) Ltd	Project Manager,	2019: 3 months	Infrastructure

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	screening, Rosslyn, Gauteng		Environmental Consultant		
59	ENGP Nigel compressed gas pipeline General Authorisation, BAR, Ecological Specialist Study, Due Diligence advisory, Nigel, Gauteng	Energy Group (Pty) Ltd	Project Manager, Environmental Consultant, Ecological Specialist	2019: 10 months	Infrastructure
58	Rainmaker Malabar, Spreeukloof and Spinning Head Wind Farm Part II amendments, Molteno, Eastern Cape	Rainmaker Energy (Pty) Ltd	Project Manager, Environmental Consultant	2019 – current: 12 months	Renewable Energy
57	Eskom Kriel asbestos decommissioning BAR, Emalahleni, Mpumalanga	Eskom SOC ltd	Project Manager, Environmental Consultant	2019: 6 months	Infrastructure
56	Wilmar Richards Bay vegetable oil pipeline BAR, General Authorisation and freshwater specialist study, Richards Bay, KwaZulu Natal	Wilmar SA (Pty) Limited	Project Manager, Environmental Consultant, Freshwater Specialist	2019: 10 months	Infrastructure
55	Great Karoo WEF Part II amendment	African Clean Energy Developments (Pty) Ltd	Project Manager,	2019: 8 months	Renewable Energy
54	Gunstfontein WEF Part II amendment	African Clean Energy Developments (Pty) Ltd	Environmental Consultant	2019: 8 months	Renewable Energy
53	Aggeneys Solar PV & gridline freshwater specialist reports (x2), Aggeneys, Northern Cape	Biotherm Energy (Pty) Ltd	Freshwater specialist	2019: 4 months	Renewable Energy
52	SANRAL Polokwane N1 Ring Road Upgrade Basic Assessment, Polokwane, Limpopo Province	SANRAL SOC Ltd & KBK Engineers	Environmental consultant	2018: 8 months	Infrastructure
51	Boshoek Loop Rail Upgrade BAR and water use licence application,	Transnet SOC Ltd	Project Manager, Environmental consultant, Wetland	2018: 8 months	Infrastructure

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No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
	Rustenburg, North-West Province		specialist, Public Participation, Wetland specialist		
50	Heysterkrand Loop Rail Upgrade BAR, Rustenburg, North-West Province	Transnet SOC Ltd	Project Manager, Environmental consultant, Public Participation	2018: 8 months	Infrastructure
49	VMC Mining permit renewal application, Rust De Winter, Gauteng	Vergenoeg Mining Company (Pty) Ltd	Environmental consultant	2018: 4 months	Mining
48	Wijnberg Trust Dam 2 expansion Aquatic Impact Assessment, Greyton, Western Cape	Wijnberg Trust	Aquatic specialist	2018: 4 months	Infrastructure
47	Zesfontein PV pre-feasibility screening and fatal flaw screening, Ekurhuleni, Gauteng	Genesis Eco-Energy Developments (Pty) Ltd	Environmental consultant	2018: 3 months	Renewable Energy
46	Ancuabe baseline vegetation monitoring assessment and programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist	2018: 3 months	Mining
45	Prospecting pit rehabilitation programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist, Environmental consultant	2018: 3 months	Mining
44	ENGP Wadeville environmental Screening report and heritage exemption application, Due Diligence Advisory, Wadeville, Gauteng	Energy Group (Pty) Ltd	Project Manager, Environmental Consultant	2018: 2 months	Energy
43	Eskom Kriel lime treatment plant BAR, Emalahleni, Mpumalanga	Eskom SOC ltd	Project Manager, Environmental Consultant	2018: 6 months	Infrastructure
42	Atmospheric Emissions Licence, Section 24G for the ER Galvanizing plant and operations, Johannesburg, Gauteng	ER Galvanizers Pty Ltd	Project Manager, Environmental consultant, Public Participation	2018/2019: 8 months	Manufacturing

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No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
41	Corner Berg and Drooge Street township development BAR, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant, Public Participation	2018/2019: 8 months	Housing
40	Corner Kort and Bree Street township development BAR, Zeerust, North-West Province	Ramotshere Moiloa Local Municipality	Project Manager, Environmental consultant, Public Participation	2018/2019: 8 months	Housing
39	Basic Assessment and environmental compliance monitoring for the office complex development within the Pretoria National Botanical Gardens, Pretoria, Gauteng	South African National Biodiversity Institute (SANBI)	Project Manager, Environmental consultant, Public Participation, ECO	2018/2019: 8 months	Housing
38	Thabazimbi Local Municipality Integrated Waste Management Plan, Thabazimbi, Limpopo Province	Thabazimbi Local Municipality & Anglo American Plc	Environmental consultant	2018/2019: 8 months	Waste
37	Aggeneys ADSS General Authorisation, Aggeneys, Northern Cape	Biotherm Energy Pty Ltd	Environmental consultant	2018/2019: 8 months	Infrastructure
36	Kruisvallei Hydro Environmental and Social Management System (ESMS), Bethlehem, Free State	Building Energy South Africa (Pty) Ltd	Environmental Consultant	2018/2019: 6 months	Renewable Energy
35	Transnet Depot and Siding compliance auditing programme, Johannesburg, Gauteng & Rustenburg, North-West Province	Transnet SOC Ltd	ECO	2018/2019: 4 months	Infrastructure
34	ENGP Clayville environmental Screening and due diligence advisory, Clayville, Gauteng	Energy Group (Pty) Ltd	Project Manager Environmental Consultant	2018/2019: 4 months	Energy
33	Transalloys coal-fired power station PII amendment, Water Use	Transalloys (Pty) Ltd	Project Manager, Environmental Consultant	2018/2019: 16 months	Energy

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No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
	Licence and Atmospheric Emissions Licence, Emalahleni, Mpumalanga				
32	SANRAL Masekwaspoort N1 Road Upgrade BAR, water use licence application, Louis Trichardt, Limpopo Province	SANRAL SOC Ltd & Knight Piésold Consulting	Project Manager, Environmental consultant, Public Participation	2018/2019: 12 months	Infrastructure
31	S&EIR authorisation and Water use licence for the SANRAL Zandkraal-Windburg N1 road upgrade, Windburg, Free State Province	SANRAL SOC Ltd & SMEC Consulting Engineers	Project Manager, Environmental consultant, Public Participation	2018/2019: 12 months	Infrastructure
30	Masetjaba water reservoir Ecological Impact Assessment and General Authorisation, Nigel, Gauteng	Naidu Consulting Engineers (Pty) Ltd & City of Ekurhuleni	Environmental Consultant, Ecological Specialist, Wetland Specialist	2018/2019: 12 months	Infrastructure
29	Dwarsrug access road BAR, Loeriesfontein, Northern Cape	South African Mainstream Renewable Power Developments (Pty) Ltd	Project Manager, Environmental Consultant	2018/2019: 8 months	Renewable Energy
28	Hope Village township development BAR, Johannesburg, Gauteng	Door of Hope Charity Organisation	Project Manager, Environmental consultant, Public Participation	2018/2019	Housing
27	Kibler Park Church Development ecological assessment, Johannesburg, Gauteng	Riverside Community Church	Project Manager, Ecological specialist	2017: 2 months	Housing
26	SANRAL Bierspruit R510 Borrow Pit authorisation, road upgrade Basic Assessment and water use licence, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Project Manager, Environmental consultant, Ecological specialist, Public Participation	2017: 12 months	Infrastructure
25	Diamond Park Township Development Section 24G, Kimberley, Northern Cape	Sol Plaatje Local Municipality	Project Manager, Environmental consultant, Public Participation	2017/2018: 6 months	Housing

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No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
24	Construction monitoring and DMR environmental authorisation, Hendrina, Mpumalanga Province	SANRAL SOC Ltd & Leo consulting engineers	Project Manager, ECO,	2017/2018: 24 months	Infrastructure
23	Triton Minerals Limited Ancuabe and Nicanda Hills EPDA, Ancuabe, Cabo Del Gado Province, Mozambique	Triton Minerals Ltd	Environmental consultant	2017/2018: 12 months	Mining
22	City of Johannesburg nature reserve proclamation (Phase II), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Project Manager, Environmental consultant, Public Participation, Botanical specialist	2017/2018: 12 months	Conservation
21	Scoping and EIR authorisation, Water Use Licence, for the Ganspan tourism facility development, Jan Kempdorp, Northern Cape	Frances Baard Local Municipality	Project Manager, Environmental consultant, Public Participation	2017/2018: 12 months	Conservation
20	G7 Renewable Energy 132kV BAR & EMPr, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Project Manager, Environmental consultant, Public Participation	2016: 8 months	Renewable Energy
19	DEA Quoin Point dune specialist assessments, Gansbaai, Western Cape	Department of Environmental Affairs (national)	Project Manager, Environmental consultant	2016: 6 months	Conservation
18	ACSA Jones Road Filling Station Basic Assessment, Johannesburg, Gauteng	Airports Company South Africa SOC Ltd	Project Manager, Environmental consultant, Public Participation	2016/2017: 8 months	Infrastructure
17	SANRAL Caledon N2 Section 3 road upgrade project Basic Assessment, General Authorisation and ecological specialist report, Caledon, Western Cape Province	JG Afrika Engineering	Project Manager, Environmental consultant, Ecological specialist, ECO	2016/2017: 8 months	Infrastructure
16	Barberton IAPS Waste Water Treatment Works development BAR and SASS 5 assessment,	Umjindi Local Municipality and Rhodes University	Project Manager, Environmental consultant, Public Participation, Aquatic specialist	2016/2017: 10 months	Infrastructure

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No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
	Barberton, Mpumalanga Province				
15	City of Johannesburg nature reserve proclamation boundary verification (Phase I), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Environmental consultant, GIS specialist	2016/2017: 12 months	Conservation
14	Almenar tin prospecting BAR, Carnarvon, Northern Cape	Almenar Property Investments (Pty) Ltd	Environmental consultant	2015: 8 months	Mining
13	iGas integrated biodiversity screening, Saldanha, Western Cape	Central Energy Fund - iGas (subsidiary)	Environmental consultant, Faunal specialist (assistant)	2015: 6 months	Energy
12	Biotherm Energy Golden Valley Wind Energy Facility ESAP, Bedford, Eastern Cape	Biotherm Energy Pty Ltd	Environmental consultant	2015: 2 months	Renewable Energy
11	Ancuabe graphite mine Environmental and Social Impact Assessment (ESIA), Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Environmental consultant	2015: 12 months	Mining
10	Mayfield Quarry rehabilitation plan, Grahamstown, Eastern Cape	Mayfield Quarry	Environmental consultant	2015: 1 month	Mining
9	Enel Paleisheuwel Solar compliance auditing, Paleisheuwel, Northern Cape	Enel Green Power RSA (EGP RSA)	Environmental consultant	2015: 6 months	Renewable Energy
8	Boschendal Wine Estate hydro-electric power station Water Use Licence and S24G application, Stellenbosch, Western Cape	Boschendal Wine Estate	Environmental consultant	2015/2016: 8 months	Renewable Energy
7	G7 Brandvalley S&EIR, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Environmental consultant	2015/2016: 12 months	Renewable Energy
6	G7 Rietkloof S&EIR, Matjiesfontein, Northern Cape	G7 Renewable Energy (Pty) Ltd	Environmental consultant	2015/2016: 12 months	Renewable Energy

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No.	Project Name & Location	Client Name	Role	Dates & Duration	Sector
5	Zirco Resources Kamiesberg heavy mineral sand mine water use licence, Kamiesberg, Northern Cape	Zirco Roode Heuwel (Pty) Ltd	Environmental consultant	2015/2016: 12 months	Mining
4	PRDW Cape Town harbour breakwater rehabilitation EMPr, Cape Town, Western Cape	PRDW Consulting port and Coastal Engineers	Project Manager, Environmental consultant	2014: 8 months	Infrastructure
3	Mosselbay Energy EA Amendment (Part II), Mosselbay, Western Cape	Mosselbay Energy IPP (Pty) Ltd	Environmental consultant	2014: 6 months	Renewable Energy
2	PRDW Bushman's Estuary dune encroachment project management, Kenton-on-sea, Eastern Cape	PRDW Consulting port and Coastal Engineers	Environmental consultant	2014: 6 months	Infrastructure
1	Bloekombos (Kraaifontein) hospital water use licence application and botanical baseline and impact assessment, Cape Town, Western Cape	Western Cape Provincial Government (PGWC)	Project Manager, Environmental consultant, Botanical specialist, Wetland specialist	2014/2015: 10 months	Housing

	SPECIALIST STUDIES			
No.	**Project Name & Location**	**Client Name**	**Role**	**Sector**
23	Aggeneys PV1 &2 PII specialist impact statement, Aggeneys, Northern Cape	ABO Wind Aggeneys 1 & 2 PV (Pty) Ltd	Freshwater Specialist	Renewable Energy
22	Rietvallei Ecological Status Quo Report, Randfontein, Gauteng	Africa Vision Holdings (Pty) Ltd	Ecological specialist	Infrastructure
21	Harmony Rietpan LILO & Switching substation BAR, Welkom, Free State	BBEntropie (Pty) Ltd	Ecological specialist	Renewable Energy
20	Harmony Nyala Solar PV grid connection BAR, Welkom, Free State	BBEntropie (Pty) Ltd	Ecological specialist	Renewable Energy
19	Harmony Eland Solar PV grid connection BAR, Welkom, Free State	BBEntropie (Pty) Ltd	Ecological specialist	Renewable Energy
18	RBGP2 AEL, MHI & Botanical Walkthrough, Richards Bay, KwaZulu Natal	Richards Bay Gas Power 2 (Pty) Ltd	Ecological specialist	Renewable Energy

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17	Solink Heineken Sedibeng PV plant GPEMF registration and ecological screening assessment, Sedibeng, Gauteng	Solink Power Procurement (Pty) Ltd	Ecological specialist	Renewable Energy
16	ENGP Nigel compressed gas pipeline General Authorisation, BAR, Ecological Specialist Study, Due Diligence advisory, Nigel, Gauteng	Energy Group (Pty) Ltd	Ecological specialist	Infrastructure
15	Wilmar Richards Bay vegetable oil pipeline BAR, General Authorisation and freshwater specialist study, Richards Bay, KwaZulu Natal	Wilmar SA (Pty) Limited	Freshwater Specialist	Infrastructure
14	Aggeneys Solar PV & gridline freshwater specialist reports (x2), Aggeneys, Northern Cape	Biotherm Energy Pty Ltd	Freshwater specialist	Renewable Energy
13	Ancuabe baseline vegetation monitoring assessment and programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist	Mining
12	Prospecting pit rehabilitation programme, Ancuabe, Cabo Del Gado Province, Mozambique	Grafex Limitada Mozambique	Botanical specialist	Mining
11	Masetjaba water reservoir Ecological Impact Assessment and General Authorisation, Nigel, Gauteng	Naidu Consulting Engineers (Pty) Ltd & City of Ekurhuleni	Ecological Specialist, Freshwater Specialist	Infrastructure
10	Boshoek Loop Rail Upgrade BAR and Water Use Licence, Rustenburg, North-West Province	Transnet SOC Ltd	Freshwater Specialist	Infrastructure
9	City of Johannesburg nature reserve proclamation (Phase II), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	Botanical specialist	Conservation
8	SANRAL Bierspruit R510 road upgrade Water Use Licence, Basic Assessment, Thabazimbi, Limpopo Province	SANRAL SOC Ltd & Royal HaskoningDHV South Africa	Ecological specialist	Infrastructure
7	Kibler Park Church Development Ecological Assessment, Johannesburg, Gauteng	Riverside Community Church	Ecological specialist	Infrastructure
6	Barberton IAPS Wastewater Treatment Works development BAR, water use licence and SASS 5 assessment, Barberton, Mpumalanga Province	Umjindi Local Municipality and Rhodes University	Aquatic specialist	Infrastructure
5	Wijnberg Trust Dam 2 expansion Aquatic Impact Assessment, Greyton, Western Cape	Wijnberg Trust	Aquatic specialist	Infrastructure
4	SANRAL Caledon N2 Section 3 road upgrade project Basic Assessment, Water Use Licence and Specialist	JG Afrika Engineering	Ecological specialist	Infrastructure

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	reports, Caledon, Western Cape Province			
3	City of Johannesburg nature reserve proclamation boundary verification (Phase I), Johannesburg, Gauteng	City of Johannesburg SOC Ltd	GIS specialist	Conservation
2	iGas integrated biodiversity screening, Saldanha, Western Cape	Central Energy Fund - iGas (subsidiary)	Faunal specialist (assistant)	Infrastructure
1	Bloekombos (Kraaifontein) botanical baseline and impact assessment, Cape Town, Western Cape	Western Cape Provincial Government (PGWC)	Wetland specialist	Infrastructure

APPENDIX 3: REHABILITATION MANAGEMENT PLAN

REVEGETATION AND REHABILITATION PLAN

1. PURPOSE

The purpose of the rehabilitation plan is to ensure that areas cleared or impacted during construction activities of the Grid Connection Infrastructure, including 132kV Overhead Power Line, Switching Station and Ancillaries for the Great Karoo Wind Farm are rehabilitated with a plant cover that reduces the risk or erosion from these areas as well as restores some ecosystem function. The purpose of the rehabilitation plan for the site can be summarised as follows:

» Achieve long-term stabilisation of all disturbed areas to minimise erosion potential.
» Re-vegetate all disturbed areas with suitable local plant species.
» Minimise visual impact of disturbed areas.
» Ensure that disturbed areas are safe for future uses.

This Revegetation and Rehabilitation Plan should be closely aligned with other site-specific plans, including the Alien Invasive Management Plan. Where a site-specific plan is developed, this site-specific plan may take precedence and must replace this plan.

2. RELEVANT ASPECTS OF THE SITE

The site occurs within a semi-arid environment and a fundamentally different approach to rehabilitation efforts in such areas is required as compared to traditional rehabilitation approaches within more mesic areas. In addition, rehabilitation techniques which rely on agricultural techniques such as the application of fertilizer and the planting of annual grasses or other alien species are not appropriate. The major implication of the semi-arid nature of the site is that the use of appropriate species and techniques is key in order to achieve long-term success.

3. IDENTIFICATION OF TARGET AREAS

The construction activities required for the development will result in significant disturbance at the site. Rehabilitation is costly and time-consuming and therefore priority areas where rehabilitation should be focused must be identified. Priority areas include areas vulnerable to erosion such as on steep slopes as well as areas near to important ecosystems such as areas near to drainage lines.

4. TOPSOIL MANAGEMENT

Effective topsoil management throughout the project life cycle is a critical element of rehabilitation, particularly in arid and semi-arid areas where soil properties are a fundamental determinant of vegetation composition and abundance. Although some parts of the site consist of exposed bedrock, most parts of the site have at least some topsoil. Where any excavation or topsoil clearing is required, the topsoil should stockpiled and later used to cover cleared and disturbed areas once construction activity has ceased.

» Topsoil is the top-most layer (0-25cm) of the soil in undisturbed areas. This soil layer is important as it contains nutrients, organic matter, seeds, micro-organisms fungi and soil fauna. All these elements are

necessary for soil processes such as nutrient cycling and the growth of new plants. The biologically active upper layer of the soil is fundamental in the maintenance of the entire ecosystem.

» Topsoil should be retained on site in order to be used for site rehabilitation. The correct handling of the topsoil is a key element to rehabilitation success. Firstly, it is important that the correct depth of topsoil is excavated. If the excavation is too deep, the topsoil will be mixed with sterile deeper soil, leading to reduction in nutrient levels and a decline in plant performance on the soil.
» Wherever possible, stripped topsoil should be placed directly onto an area being rehabilitated. This avoids stockpiling and double handling of the soil. Topsoil placed directly onto rehabilitation areas contains viable seed, nutrients and microbes that allow it to revegetate more rapidly than topsoil that has been in stockpile for long periods.
» If direct transfer is not possible, the topsoil should be stored separately from other soil heaps until construction in an area is complete. The soil should not be stored for a long time (longer than 12 months) and should be used as soon as possible. The longer the topsoil is stored, the more seeds, micro-organisms and soil biota become sterile.
» Ideally stored topsoil should be used within a month and should not be stored for longer than three months. In addition, topsoil stores should not be too deep, a maximum height of 2m is recommended to avoid compaction and the development of anaerobic conditions within the soil.
» If topsoil is stored on a slope then sediment fencing should be used downslope of the stockpile in order to intercept any sediment and runoff should be directed away from the stockpiles upslope.
» Reduced activity at the site after large rainfall events when the soils are wet is encouraged. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased.
» Any topsoil, waste rock or other material dumps should be protected from erosion with silt traps and other suitable prevention measures.
» Gabions and other stabilisation features may be utilised during construction activities on steep slopes in order to prevent erosion, where necessary.

5. GENERAL PRINCIPLES FOR REHABILITATION

5.1. Mulching

Mulching is the covering of the soil with a layer of organic matter of leaves, twigs bark or wood chips, usually chopped quite finely. The main purpose of mulching is to protect and cover the soil surface as well as serve as a source of seed for revegetation purposes.

» During site clearing the standing vegetation should not be cleared and mixed with the soil, but should be cleared separately, either mechanically or by hand using a brush-cutter. The cleared vegetation should be stockpiled and used whole or shredded by hand or machine to protect the soil in disturbed areas and promote the return of indigenous species.
» Mulch is to be harvested from areas that are to be denuded of vegetation during construction activities, provided that they are free of seed-bearing alien invasive plants.
» No harvesting of vegetation may be done outside the area to be disturbed by construction activities.
» Brush-cut mulch shall be stored for as short a period as possible.

5.2 Seeding

In some areas the natural regeneration of the vegetation may be poor and the application of seed to enhance vegetation recovery may be required. Seed should be collected from plants present at the site and should be used immediately or stored appropriately and used at the start of the following wet season. Seed can be broadcast onto the soil, but should preferably be applied in conjunction with measures to improve seedling survival such as scarification of the soil surface or simultaneous application of mulch.

- Indigenous seeds may be harvested for purposes of re-vegetation in areas that are free of alien / invasive vegetation, either at the site prior to clearance or from suitable neighbouring sites.
- Seed may be harvested by hand and if necessary dried or treated appropriately.
- Seed gathered by vacuum harvester, or other approved mass collection method, from suitable shrubs or from the plant litter surrounding the shrubs must be kept apart from individually harvested seed.
- No seed of alien or foreign species should be used or brought onto the site.

5.3 Transplants

Where succulent plants are available or other species which may survive translocation are present, individual plants can be dug out from areas about to be cleared and planted into areas which require revegetation. This can be an effective means of establishing indigenous species quickly.

- Plants for transplant should only be removed from areas that are going to be cleared.
- Perennial grasses, shrubs, succulents and geophytes are all potentially suitable candidates for transplant.
- Transplants should be nearby and should not be transported around the site to distant areas.
- Transplants must remain within the site and may not be transported off the site. Therefore, it is recommended that before construction commences individuals of listed species within the development footprint should be marked and translocated to similar habitat outside the development footprint under the supervision of an ecologist or someone with experience in plant translocation. Permits from the relevant provincial authorities must be obtained prior to relocation of listed plant species.

5.4 Use of soil savers

On steep slopes and areas where seed and organic matter retention is low, it is recommended that soil savers are used to stabilise the soil surface. Soil savers are man-made materials, usually constructed of organic material such as hemp or jute and are usually applied in areas where traditional rehabilitation techniques are not likely to succeed.

- In areas where soil saver is used, it should be pegged down to ensure that is captures soil and organic matter flowing over the surface; and
- Soil saver may be seeded directly once applied as the holes in the material catch seeds and provide suitable microsites for germination.

5.6. General

- Progressive rehabilitation is an important element of the rehabilitation strategy and should be implemented where feasible.
- Once revegetated, areas should be protected to prevent trampling and erosion.
- No construction equipment, vehicles or unauthorised personnel should be allowed onto areas that have been revegetated.
- Where rehabilitation sites are located within actively grazed areas, they should be fenced.
- Fencing should be removed once a sound vegetative cover has been achieved.
- Any runnels, erosion channels or wash aways developing after revegetation should be backfilled and consolidated and the areas restored to a proper stable condition.

6. OPEN SPACE MANAGEMENT PRINCIPLES

Access Control:

- Access to the facility should be strictly controlled.
- All visitors and contractors should be required to sign-in.
- Signage at the entrance should indicate that disturbance to fauna and flora is strictly prohibited.

Prohibited Activities:

The following activities should not be permitted by anyone except the landowner or his representatives:

- No fires within the site.
- No hunting, collecting or disturbance of fauna and flora, except where required for the safe operation of the facility and only by the Environmental Officer on duty and with the appropriate permits and landowner permission.
- No driving off of demarcated roads.
- No interfering with livestock.

Fire Risk Management:

Although fires are not a regular occurrence at the site, fires may occasionally occur under the right circumstances. Ignition risk sources in the area include the following:

- Lightning strikes
- Personnel within the facility
- Infrastructure such as transmission lines

The National Veld and Forest Fires Act places responsibility on the landowner to ensure that the appropriate equipment as well as trained personnel are available to combat fires. Therefore, the management of the facility should ensure that they have suitable equipment as well as trained personnel available to assist in the event of fire.

Firebreaks

Extensive firebreaks are not recommended as a fire-risk management strategy at the site. The risk of fires is not distributed equally across the site and within many of the lowlands of the site, there is not sufficient biomass to carry fires and the risk of fires within these areas is very low. Rather targeted risk management should be implemented around vulnerable or sensitive elements of the facility such as in the immediate vicinity of the switching station, or other high-risk components. Within such areas, the extent over which

management action needs to be applied is relatively limited and it is recommended that firebreaks are created by mowing and then burning to create firebreaks, provided this does not in itself pose a risk of runaway fires. Where such firebreaks need to be established around the switching station, a strip of vegetation 5-10 m wide can be cleared manually and maintained relatively free of vegetation through manual clearing on an annual basis. However if alien species colonise these areas, more regular clearing should be implemented.

7. MONITORING REQUIREMENTS

As rehabilitation success, particularly in arid areas is unpredictable, monitoring and follow-up actions are important to achieve the desired cover and soil protection. The following monitoring provision may be used as a guide in the absence of a site-specific plan having been developed:

- Re-vegetated areas should be monitored every 3 months for the first 12 months and every 6 months thereafter for the next year.
- Re-vegetated areas showing inadequate surface coverage (less than 30% within 12 months after re-vegetation) should be prepared and re-vegetated.
- Where transplants have been used the survival rate of the different species used should be monitored every 3 months for the first 12 months and every 6 months thereafter for the next year. The results should be used to inform the choice of species for transplant and other factors which may influence survival.

APPENDIX 4: ALIEN VEGETATION MANAGEMENT PLAN

ALIEN INVASIVE MANAGEMENT PLAN

1. PURPOSE

Invasive alien species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Invasive Management Plan is to provide a framework for the management of alien and invasive plant species and the integrated management of the natural and semi-natural areas within the development area during the construction and operation of the Great Karoo grid connection infrastructure (including switching station). The broad objectives of the plan includes the following:

- Ensure alien plants do not become dominant in parts or throughout the whole site through the control and management of alien and invasive species presence, dispersal and encroachment.
- Managing and maintaining the ecosystem in a near-natural state and restoring and/or rehabilitating the ecosystems to such a state.
- Develop and implement a monitoring and eradication programme for alien and invasive species.
- Promote the natural re-establishment and planting of indigenous species in order to retard erosion and alien plant invasion.

2. RELEVANT ASPECTS OF THE SITE

The disturbance associated with the construction of the grid connection infrastructure will encourage the invasion of alien species into areas with very low current levels of invasion. Some alien invasion is inevitable and regular alien clearing activities would be required to limit the extent of this problem. Once the natural vegetation has returned to the disturbed areas, the site will be less vulnerable to alien plant invasion, however, the roadsides areas are likely to remain foci of alien plant invasion. This impact is highly likely to occur during the operational phase of the development. The construction phase is considered too short for significant alien plant invasion to occur despite the fact that many alien species are likely to be imported at this point. Species observed to be problematic in the area include:

- *Bromus spp.*
- *Avena fatua*
- *Erodium cicutarium*
- *Salsola kali*
- *Malva parviflora*
- *Prosopis glandulosa*
- *Atriplex inflata*

Although the presence of these species within the development area are not directly of concern to the development of the grid connection infrastructure, these are the species that are likely to become a problem within the disturbed areas of the site on account of seed input from these adjacent areas.

3. LEGISLATIVE CONTEXT

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

The National Environmental Management: Biodiversity Act (NEM:BA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations have been published in Government Notices GNR1020 of September 2020 under NEMBA. According to this Act and the regulations, any species designated under Section 70 cannot be propagated, grown, bought or sold without a permit. Below is an explanation of the three categories:

- Category 1a: Invasive species requiring compulsory control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Cat 2 plants to exist in riparian zones.
- Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Cat 3 plants to exist in riparian zones.

Plants listed under the categories above are detailed within Notice 1 of the Alien and Invasive Species published in GNR599 of 01 August 2014. The following guide is a useful starting point for the identification of alien species: Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.

It is important to note that alien species that are regulated in terms of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) as weeds and invader plants are exempted from NEM:BA. This implies that the provisions of the CARA in respect of listed weed and invader plants supersede those of NEM:BA.

4. ALIEN PLANT MANAGEMENT PRINCIPLES

4.1. Prevention and early eradication

A prevention strategy should be considered and established, including regular surveys and monitoring for the presence of invasive alien plants, effective rehabilitation of disturbed areas and prevention of unnecessary disturbance of natural areas.

Monitoring plans should be developed which are designed to identify Invasive Alien Plant Species shortly after they establish in the project area. Keeping up to date on which weeds are an immediate threat to the site is important, but efforts should be planned to update this information on a regular basis. When new Invasive Alien Plant Species are recorded on site, an immediate response of identifying the area for future monitoring and either hand-pulling the weeds or an application of a suitable herbicide should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.

4.2. Containment and control

If any alien invasive plants are found to become established on site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Separate plans and control actions may be necessary for each location and/or each species. Appropriate registered chemicals and other possible control agents should be considered in the action plans for each site/species. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least energy and resources are required to maintain this status over the long-term. This will also be an indicator that natural systems are impacted to the smallest degree possible.

4.3. General Clearing and Guiding Principles

Alien control programs are long-term management projects and should include a clearing plan which includes follow up actions for rehabilitation of the cleared area. The less infested areas should be cleared first to prevent the build-up of seed banks. Pre-existing dense mature stands ideally should be left for last, as they probably will not increase in density or pose a greater threat than they are currently. Collective management and planning with neighbours may be required in the case of large woody invaders as seeds of aliens are easily dispersed across boundaries by wind or watercourses. All clearing actions should be monitored and documented to keep records of which areas are due for follow-up clearing.

i. <u>Clearing Methods</u>

Different species require different clearing methods such as manual, chemical or biological methods or a combination of both. Care should however be taken that the clearing methods used do not encourage further invasion. As such, regardless of the methods used, disturbance to the soil should be kept to a minimum.

Fire shall not be used for alien control or vegetation management at the site. The best-practice clearing method for each species identified should be used. The preferred clearing methods for most alien species can be obtained from the DWAF Working for Water

» **Mechanical control**

This entails damaging or removing the plant by physical action. Different techniques could be used, e.g. uprooting, felling, slashing, mowing, ringbarking or bark stripping. This control option is only really feasible in sparse infestations or on small scale, and for controlling species that do not coppice after cutting. Species that tend to coppice, need to have the cut stumps or coppice growth treated with herbicides following the mechanical treatment. Mechanical control is labour intensive and therefore expensive, and could cause severe soil disturbance and erosion.

» **Chemical Control**

Although it is usually preferable to use manual clearing methods where possible, such methods may create additional disturbance which stimulates alien invasion and may also be ineffective for many woody species which re-sprout. Where herbicides are to be used, the impact of the operation on the natural environment should be minimised by observing the following:

- Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
- All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
- Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of at a suitable site.
- To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
- Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.
- The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.

For all herbicide applications, the following Regulations and guidelines should be followed:

- Working for Water: Policy on the Use of Herbicides for the Control of Alien Vegetation.
- Pesticide Management Policy for South Africa published in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947) – GNR 1120 of 2010.
- South African Bureau of Standards, Standard SANS 10206 (2010)

According to Government Notice No. 13424 dated 26 July 1992, it is an offence to "*acquire, dispose, sell or use an agricultural or stock remedy for a purpose or in a manner other than that specified on the label on a container thereof or on such a container*".

Contractors using herbicides need to have a valid Pest Control Operators License (limited weeds controller) according to the Fertilizer, Farm Feeds, Agricultural Remedies and Stock Remedies Act (Act No. 36 of 1947). This is regulated by the Department of Agriculture, Forestry and Fisheries (DAFF).

» **Biological control**

Biological weed control consists in the use of natural enemies to reduce the vigour or reproductive potential of an invasive alien plant. Biological control agents include insects, mites, and micro-organisms such as fungi or bacteria. They usually attack specific parts of the plant, either the reproductive organs

directly (flower buds, flowers or fruit) or the seeds after they have dropped. The stress caused by the biological control agent may kill a plant outright or it might impact on the plants reproductive capacity. In certain instances, the reproductive capacity is reduced to zero and the population is effectively sterilised. All of these outcomes will help to reduce the spread of the species.

To obtain biocontrol agents, provincial representatives of the Working for Water Programme or the Directorate: Land Use and Soil Management (LUSM), Department of Agriculture, Forestry and Fisheries (DAFF) can be contacted. Should biocontrol agents be employed, relevant permits must first be obtained based on the regulation pertaining to the use of biocontrol agents.

4.4. General management practices

The following general management practices should be encouraged or strived for:

- Establish an ongoing monitoring programme for the construction phase to detect and quantify any alien species that may become established and identify the problem species.
- Alien vegetation regrowth on areas disturbed by construction must be immediately controlled once recorded - throughout the entire site during construction and operation.
- Care must be taken to avoid the introduction of alien invasive plant species to the site. Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment. Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.
- Cleared areas that have become invaded by alien species can be sprayed with appropriate herbicides provided that these are such that they break down on contact with the soil. Residual herbicides should not be used. Mechanical/ manual method should however also be considered as an option.
- The effectiveness of vegetation control varies seasonally and this is also likely to impact alien species. Control early in the wet season will allow species to re-grow and follow-up control is likely to be required. It is tempting to leave control until late in the wet season to avoid follow-up control. However, this may allow alien species to set seed before control and hence will not contribute towards reducing alien species abundance. Therefore, vegetation control should be aimed at the middle of the wet season, with a follow-up event towards the end of the wet season. There are no exact dates that can be specified here as each season is unique and management must therefore respond according to the state and progression of the vegetation.
- Alien management is an iterative process and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed banks. However, repeated control usually results in rapid decline once seed banks become depleted.
- Some alien species are best individually pulled by hand and removed from the site.
- Regular vegetation control to reduce plant biomass within the site should be conducted. This should be timed so as to coincide with the critical growth phases of the most important alien species on site. This will significantly reduce the cost of alien management as this should contribute towards the control of the dominant alien species and additional targeted control will be required only for a limited number of species.
- No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used.

» During operation, surveys for alien species should be conducted regularly, (as determined by the site specific alien vegetation management plan, where applicable). All aliens identified should be cleared using appropriate means.

4.5. Monitoring

In order to monitor the impact of clearing activities, follow-ups and rehabilitation efforts, monitoring must be undertaken. This section provides a description of a possible monitoring programme that will provide an assessment of the magnitude of alien invasion on site as well as an assessment of the success of the management programme.

In general, the following principles apply for monitoring:

» Photographic records must be kept of areas to be cleared prior to work starting and at regular intervals during initial clearing activities. Similarly, photographic records should be kept of the area from immediately before and after follow-up clearing activities. Rehabilitation processes must also be recorded.
» Simple records must be kept of daily operations, e.g. area/location cleared, labour units and, if ever used, the amount of herbicide used.
» It is important that, if monitoring results in detection of invasive alien plants, that this leads to immediate action.

The following monitoring suggestions may be used as a guideline and may be updated by a site specific invasive alien plan, towards management of alien invasive plant species:

Construction Phase

Monitoring Action	Indicator	Timeframe
Document alien species present at the site	List of alien species	Preconstruction & monthly thereafter
Document alien plant distribution	Alien plant distribution map within priority areas	Once off 6 month following commencement of construction, and thereafter weekly cEO reports to document and record alien control measures throughout construction phase
Document & record alien control measures implemented	Record of clearing activities	Weekly cEO reports to document and record alien control measures throughout construction phase
Review & evaluation of control success rate	Decline in documented alien abundance over time	Biannually

Operation Phase

Monitoring Action	Indicator	Timeframe
Document alien species distribution and abundance over time at the site	Alien plant distribution map	Biannually (first 2 years) / Annually
Document alien plant control measures implemented & success rate achieved	Records of control measures and their success rate. A decline in alien distribution and cover over time at the site	Biannually (first 2 years) / Annually
Document rehabilitation measures implemented and success achieved in problem areas	Decline in vulnerable bare areas over time	Biannually(first 2 years) / Annually