

UMMBILA EMOYENI EGI – PHASE ONE, MPUMALANGA PROVINCE

Final Environmental Management Programme for 1 x 33kV/132kV onsite substation (Eskom Portion) associated and 1 x Collector Substation (400kV MTS) associated with the Umbila Emoyeni Phase One EGI

May 2023

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	<p>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.</p> <p>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.</p> <p>Where an impact management outcome is not relevant, the words “not applicable” can be inserted in the template under the “responsible persons” column.</p> <p>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.</p> <p>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.</p>
	2	Site specific information	Contains preliminary infrastructure layout and a declaration that the applicant/holder of the EA

Part	Section	Heading	Content
			<p>will comply with the pre-approved generic EMPr template contained in <u>Part B: Section 1</u>, and understands that the impact management outcomes and impact management actions are legally binding. The preliminary infrastructure layout must be finalized to inform the final EMPr that is to be submitted with the basic assessment report (BAR) or environmental impact assessment report (EIAR), ensuring that all impact management outcomes and impact management actions have been either pre-approved or approved in terms of <u>Part C</u>.</p> <p>This section must be submitted to the CA together with the final BAR or EIAR. The information submitted to the CA will be considered to be incomplete should a signed copy of <u>Part B: section 2</u> not be submitted. Once approved, this Section forms part of the EMPr for the development and is legally binding.</p>
C		Site specific sensitivities/ attributes	<p>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 (<u>Part B: section 1</u>)</p> <p>This section will not be required should the site contain no specific environmental sensitivities or attributes. However, if <u>Part C</u> 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</p>

Part	Section	Heading	Content
			<p>approved, Part C forms part of the EMPr for the site and is legally binding.</p> <p>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 <u>Part B: section 1</u>.</p>
		Appendix 1	<p>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.</p>

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)	<p><u>Role</u></p> <p>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.</p> <p><u>Responsibilities</u></p> <ul style="list-style-type: none"> - 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)	<p><u>Role</u> The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr.</p> <p><u>Responsibilities</u></p> <ul style="list-style-type: none"> - 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)	<p><u>Role</u> The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non-compliance with the Performance Specifications as set out in the EA and EMPr.</p> <p>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</p>

Responsible Person(s)	Role and Responsibilities
	<p>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.</p> <p><u>Responsibilities</u></p> <p>The responsibilities of the ECO will include the following:</p> <ul style="list-style-type: none"> - 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
	<ul style="list-style-type: none"> - 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.
<p>developer Environmental Officer (dEO)</p>	<p><u>Role</u></p> <p>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.</p> <p><u>Responsibilities</u></p> <ul style="list-style-type: none"> - 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
	<ul style="list-style-type: none"> - 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	<p><u>Role</u></p> <p>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.</p> <p><u>Responsibilities</u></p> <ul style="list-style-type: none"> - 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)	<p><u>Role</u></p> <p>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:</p> <p><u>Responsibilities</u></p> <ul style="list-style-type: none"> - 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 contractor and the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

5.1 Environmental awareness training

Impact management outcome: All onsite staff are aware and understands the individual responsibilities in terms of this EMPr.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All staff must receive environmental awareness training prior to commencement of the activities;	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

<ul style="list-style-type: none"> - The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: <ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> - Environmental awareness training must include as a minimum the following: <ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> - 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 register and training minutes / notes for the record)	During the construction phase	ECO dEO	Monthly	Completed and up to date filing system with proof of training
<ul style="list-style-type: none"> - Educate workers on the dangers of open and/or unattended fires; 	cEO / dEO in consultation with the ECO	Develop environmental awareness training	Pre-construction Construction	ECO dEO	Prior to the commencement of the	Environmental awareness training

		material which covers the dangers of open and/or unattended fire			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 be 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
<ul style="list-style-type: none"> - 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
<ul style="list-style-type: none"> - 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
<ul style="list-style-type: none"> - Sites must be located where possible on previously disturbed areas; 	DPM	Place site outside of sensitive areas and within previously disturbed areas	Pre-construction	ECO dEO	Once, prior to construction	Availability of a layout and sensitivity map indicating

		identified in the BA Report				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 temporary staff accommodation is proposed as part of the <u>grid connection infrastructure</u> .					

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	Pre-construction Construction	ECO	Once, prior to construction	Access routes map readily available

		provide the map to all contractors				
- 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 rehabilitated 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 construction of access roads	Implementation of the approved layout

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 construction of all new gates have been completed	Photographic record of the existing and new gates as per the requirements of section 4.9
– 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 maintenance team and cEO	Bi-weekly (every second week)	All gates are locked and no complaints from 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 construction phase	Gates installed in electrified fencing is electrified
- 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	During the construction phase	ECO	To be monitored as temporary	Written approval to be provided by the dEO

		temporary fencing is required to restrict livestock movement			fencing is required	
- 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 construction phase	Fences erected do not make use of razor wire
- 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 construction 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 construction 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;	DPM and Contractor	Obtaining relevant registrations from DWS and installation of water meters	Pre-construction	cEO	To be monitored with the installation of water meters and daily during	Use of high quality water meters

					construction and operation	
<ul style="list-style-type: none"> - The Contractor must ensure the following: <ul style="list-style-type: none"> 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 - water will not be abstracted from a river					
<ul style="list-style-type: none"> - Ensure water conservation is being practiced by: <ul style="list-style-type: none"> a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged. 	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

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

<p>– 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;</p>	<p>Contractor</p>	<p>Implement measures for the control and management of runoff</p>	<p>During the construction phase</p>	<p>cEO</p>	<p>Weekly</p>	<p>No mismanagement of runoff or contaminated water due to the temporary concrete batching plant</p>
<p>– 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;</p>	<p>Contractor and cEO</p>	<p>Obtain approved absorbent material and make use of licensed waste disposal facilities for disposal of oil</p>	<p>During the Construction Phase</p>	<p>ECO</p>	<p>Monthly</p>	<p>Availability of approved absorbent material at the construction site and proof of disposal of oil at licensed disposal facilities</p>
<p>– 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;</p>	<p>DPM in consultation with the ECO</p>	<p>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</p>	<p>During the construction phase</p>	<p>ECO</p>	<p>As and when the need arises to discharge natural stormwater runoff and clean water</p>	<p>Proof of consultation between the DPM and ECO and the outcomes thereof to be provided. Proof of water quality testing and the results thereof.</p>

<p>– 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.</p>	<p>DPM in consultation with the ECO</p>	<p>Consultation between the DPM and the ECO to determine if water can be released following settling.</p>	<p>During the construction phase</p>	<p>ECO</p>	<p>As and when the need arises to discharge settled water</p>	<p>Proof of consultation between the DPM and ECO and the outcomes thereof to be provided.</p>
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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
<p>– All measures regarding waste management must be undertaken using an integrated waste management approach;</p>	<p>Contractor</p>	<p>Develop and implement a waste management plan</p>	<p>During the construction phase</p>	<p>ECO</p>	<p>Monthly</p>	<p>Implementation of the waste management plan and proof of waste management through proof of responsible disposal</p>

– 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 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
- 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
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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;	Not applicable – no estuaries present					
- Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available;	cEO, Contractor	Ensure that permanent crossings (access roads) are provided for access to the substations if no alternative	During the construction phase	cEO	Weekly	Ensure that permanent crossings are developed if there is no alternative.

		crossing is available.				
- 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 continuous monitoring	During the construction and operation phase	ECO, dEO	For all phases of the project life cycle (i.e. construction, operation, decommissioning)	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 ensure continuous monitoring	During the pre-construction and construction phase	ECO, dEO	During the construction phase of the project.	Existing crossing points utilised as opposed to new ones created and no incidents 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.	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

<p>including ensuring that construction equipment is well maintained;</p> <p>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</p> <p>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.</p>						
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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	During the Construction Phase	ECO monthly and Operation and	Weekly, and as and when required	No clearance of protected or endangered

		species to be avoided by construction activities		maintenance team weekly		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 permits for the removal of protected species. Permits must be kept on file	Pre-construction	ECO	Once, prior to the commencement of the construction phase and removal of the protected species	CA permits on file
– 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	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.

		permits for replanting				
- 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 waste disposal facility	During the Construction Phase	ECO	Monthly	No felled trees, vegetation cuttings and debris are dumped in 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 and 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 and 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	Not Applicable – 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	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

		guideline and ensure the vegetation is disposed of at a licensed waste disposal facility				accordance to the relevant guideline and that the vegetation was disposed of at a licensed waste disposal facility
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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

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– 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 during operation	Photographic record of intact breeding sites
– 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

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
- 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 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 deliberate or intentional killing is reported
- In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing	dEO / cEO in consultation	Implement and maintain snake deterrents on	During the Construction Phase	ECO Operation and	Once, during the construction	Photographic record of the implementati

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
up, being electrocuted and causing power outages; and	with the Contractor	pylons in areas where snakes are abundant	Operation Phase	maintenance team	of the pylons and as and when required. Monthly during operation	on 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	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

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
<ul style="list-style-type: none"> All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences. 	dEO / cEO in consultation with the Contractor and ECO	Develop and implement procedures for situations where human remains, archaeological, palaeontological or historical material are uncovered	During the Construction Phase	ECO	As and when required	Proof of work ceased and the required procedures followed in 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
<ul style="list-style-type: none"> 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	Compliance with the Emergency Preparedness, Response and Fire Management Plan

					construction phase	
– All unattended open excavations must be adequately fenced or demarcated;	Contractor	Ensure that all excavations undertaken is fenced and demarcated within a reasonable timeframe and in instances where excavations will be open for long-periods of time	During the Construction Phase	cEO	Weekly	Excavations are fenced where required and photographic proof can be provided
– 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
– 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	During the construction phase	ECO	Monthly, and as and when required	The incidents and complaints register is complete and provides all the required details

		resolve the complaint				
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5.14 Sanitation

Impact management outcome: Clean and well maintained toilet facilities are available to all staff in an effort to minimise the risk of disease and impact to the environment.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Mobile chemical toilets are installed onsite if no other ablution facilities are available;	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

<p>– Where mobile chemical toilets are required, the following must be ensured:</p> <p>a) Toilets are located no closer than 100 m to any watercourse or water body;</p> <p>b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause;</p> <p>c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr;</p> <p>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;</p> <p>e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours;</p> <p>f) Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards;</p>	<p>Contractor in consultation with the cEO</p>	<p>The installation of the toilets by the Contractor must be as per the listed requirements</p>	<p>During the Construction Phase</p>	<p>cEO</p>	<p>Weekly</p>	<p>No evidence of non-compliance identified</p>
<p>– A copy of the waste disposal certificates must be maintained.</p>	<p>Contractor</p>	<p>Certificates obtained from the licensed waste disposal facility with the emptying of the toilets must be kept on file</p>	<p>During the Construction Phase</p>	<p>ECO</p>	<p>Monthly, and as and when required</p>	<p>Certificates for waste disposal from the licensed waste disposal facility available on site</p>

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	Pre-construction & Construction	ECO	Monthly	Environmental awareness training material

		diseases must be covered in the Environmental Awareness Training.				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	Pre-construction	ECO	Prior to the commencement of the environmental	Environmental awareness training material requirements checklist

		emergency procedures			awareness training	
- 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, Response and Fire Management Plan for the event of a fire and the procedure to be followed for informing the local authority	Construction	ECO	As and when a fire occurs	The local authority was informed as per the relevant 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 during the construction phase	Contractor to provide evidence of substances used for proof of compliance
- 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 commencement of construction and monthly during the construction 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 Construction 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 Construction 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

<p>– All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS);</p>	<p>cEO / Contractor</p>	<p>Keep a record of all hazardous chemicals and the respective MSDS</p>	<p>During the Construction Phase</p>	<p>ECO</p>	<p>Monthly, and as and when required</p>	<p>Record of hazardous chemicals and the respective MSDS</p>
<p>– All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet;</p>	<p>cEO / Contractor</p>	<p>Provide training for personnel working with HCS</p>	<p>Pre-construction</p>	<p>ECO</p>	<p>Once, prior to the commencement of construction and as and when required</p>	<p>Record of training provided to personnel working with HCS</p>
<p>– 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;</p>	<p>cEO / Contractor</p>	<p>Develop environmental awareness training material which covers the relevant impacts and safety measures.</p> <p>Provide appropriate training and personal protective equipment for the relevant personnel handling hazardous substances and materials</p>	<p>Pre-construction & Construction</p>	<p>ECO</p>	<p>Prior to the commencement of the environmental awareness training and monthly during the construction phase for personal protective equipment</p>	<p>Environmental awareness training material requirements checklist and all relevant personnel have undergone appropriate training and have access to personal protective equipment</p>

<p>– The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowzers;</p>	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
<p>– The tanks/ bowzers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 130% of the total capacity of all the storage tanks/ bowzers (110% statutory requirement plus an allowance for rainfall);</p>	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/ bowzers for the project are appropriate and no incidents are reported in this regard
<p>– The floor of the bund must be sloped, draining to an oil separator;</p>	Contractor	Appropriate storage facilities must be constructed as per the requirements listed	During the Construction Phase	ECO	Once, during construction	Bunded storage areas are constructed according to the requirements
<p>– 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;</p>	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 implementation 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
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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 any 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 Construction 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 equipment. Enforce limitations on water use for washing of equipment	During the Construction Phase	cEO	Weekly	No cement laden water is released into the 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 area 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 construction	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	ECO	ECO to provide adequate recommendations	During the Construction Phase	Not Applicable		

working will cease altogether until the wind speed drops to an acceptable level;						
– Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind;	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 and agreed with the ECO	During the Construction Phase	cEO	Weekly, until erosion is no longer a problem	Recommendations made by the ECO have been implemented 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 m ² 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 and landowners 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 and landowners 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 of amplification communication	During the Construction Phase	ECO	Monthly, and as and when required	No complaints registered in this regard. No 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	Develop environmental awareness training	Pre-construction & Construction	ECO	Prior to the commencement of the	Environmental awareness training

	consultation with the ECO	material which covers the contact numbers for the FPA and emergency services. Place the contact numbers for the FPA and emergency services at a visible and central location			environmental awareness training and once during the construction phase	material requirements checklist and photographic record of contact 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	Contractor	Identify and demarcate an appropriate location for the	Pre-construction & Construction	ECO	Monthly	Excavated material is not stored within sensitive

to minimise impacts to watercourses, watercourses and water bodies;		storage of excavated materials				environmental 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
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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	Duration of the construction phase	ECO	Monthly	Visual inspection of stabilised soil regions and descriptions of staff of

		rehabilitation and erosion control				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 conformance 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 environmental 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	Duration of the construction phase	ECO	Monthly	Spoil material used in landscaping is suitably

		implement a 150mm topsoil layer on top following shaping and compaction to promote rehabilitation				covered with a later of topsoil at least 150mm deep
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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

<p>– Batching of cement to be undertaken in accordance with Section 5.19: Batching plants; and</p>	Contractor	Ensure correct of batching 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
<p>– Residual solid waste must be disposed of in accordance with Section 5.8: Solid waste and hazardous management.</p>	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

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

						requirement of Section 5.17 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 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
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	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 Sections 5.18 and 5.16 of this report	Duration of the construction phase	ECO	Monthly	Evidence of emergency repairs carried out having been conducted in accordance with Sections 5.18 and 5.16 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 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
– 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 hazardous substances 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

<p>- Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process;</p>	<p>Contractor</p>	<p>Development and implement a Grievance Mechanism which considers the community needs and provides procedures for conflict resolution</p>	<p>Pre-construction & Construction</p>	<p>ECO</p>	<p>Once, prior to the commencement of construction and monthly during the construction phase</p>	<p>Conflict resolution is undertaken in line with the requirements of the Grievance Mechanism. No complaints on conflict resolution is submitted by the community</p>
<p>- Sustain continuous communication and liaison with neighboring owners and residents</p>	<p>Contractor</p>	<p>Development and implement and Grievance Mechanism provides procedures for communication / liaison with neighbouring landowners and residents</p>	<p>Pre-construction & Construction</p>	<p>ECO</p>	<p>Once, prior to the commencement of construction and monthly during the construction phase</p>	<p>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</p>

						and residents are 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-night on the site. This would reduce the risk to local farmers.	Not applicable – the development of temporary staff accommodation is proposed as part of the grid connection infrastructure					

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	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

		listed in 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 location. Ensure service records and kept up to date and filed	During the Construction Phase	ECO	Prior to site closure for more than 05 days	Signage placed indicating location of fire extinguishers 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	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.

		emergency personnel				
- 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 is 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 is 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 utilised 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	Pre-construction & Rehabilitation	cEO	Weekly	Rehabilitation of the disturbed areas is undertaken as per the rehabilitation plan. All certificates of

		licensed waste disposal facility				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 and grasses that approximates the original condition;	Contractor	Ensure all berms have a slope of 1:4 and is replanted with indigenous species and grasses	Rehabilitation	cEO	Weekly	All berms have a slope of 1:4 and is 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	Rehabilitation	cEO	Weekly	Stockpiled topsoil is used as per the

		requirements listed under section 5.24				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 spreading of topsoil	Rehabilitation	cEO	Weekly	Subsoil is ripped before topsoil is placed
- 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

<p>– Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil.</p>	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
<p>– 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:</p> <ul style="list-style-type: none"> 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 	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

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: Umbila Emoyeni (Pty) Ltd

Tel No: +27 83 689 3063

Fax No: Not supplied

Physical Address:

15 Chaplin

Cnr Chaplin and Oxford Streets

Illovo

Johannesburg, 2196

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: Umbila Emoyeni EGI – Phase One, Mpumalanga Province

7.1.4 Description of the project:

Umbila Emoyeni (Pty) Ltd is proposing the development of grid connection infrastructure on a site located ~6km south-east of Bethal and 1km east of Morgenzon, within the Mpumalanga Province. The project site is located in the Lekwa Local Municipalities within the Gert Sibande District on the following properties:

Parent Farm Number	Farm Portions
Farm 422 – Klipfontein	12, 16
Farm 458 – Goedgedacht	18, , 25, , 27, 33, 43

A project site considered to be suitable for the development of grid connection infrastructure, with an extent of ~696ha, was identified by the project developer. It is within the identified project site that a footprint has been identified by the developer through consideration of the sensitive environmental features and buffers identified during the Scoping Phase.

The grid connection infrastructure will include:

- » A new 400/132 kV Main Transmission Substation (MTS), to be located adjacent to the Camden SOL Overhead Lines (OHLs).
- » New collector stations: with:

- 132 kV feeder bays
 - 132 kV busbar
 - 132 kV switchgear
 - 90 MVA 132/33 kV transformers
 - 33 kV switchgear
 - Capacitor Bank
- » 33 kV network connecting wind turbines to IPP substation
 - » 400kV loop-in loop-out OHLs to the existing Camden-Sol 400kV transmission line from the MTS.
 - » On-site switching stations (132kV in capacity), adjacent to the IPP substation.
 - » 132kV power line from the collector substation to the new MTS.
 - » On-site IPP substation where the generated power will be transformed from 33 kV to 132 kV so it can be evacuated to the switching station and from there to the Collector station and MTS.
 - » Access roads up to 12m wide.

The 400/132kV MTS will serve as the main point of connection to which the internal 132kV power lines of the proposed Ummbila Emoyeni Phase One Wind Energy Facility will connect. The connection of the proposed 400/132kV MTS to the national grid will be via a new loop-in loop-out 400kV power line that will connect into the existing Camden-Sol 400kV transmission line.

An Environmental Authorisation (EA) for the project was issued on 27 January 2023 (DFFE Ref: 14/12/16/3/3/2/2162). It is the intention of the applicant to develop the EGI in commercially viable phases. This Final EMPr has been compiled in terms of the requirements of Condition 13 of the EA amendment (DFFE Ref: 14/12/16/3/3/2/2162/AM2) and is applicable to the first phase of development.

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.

The maps provided below have been compiled based on verified site sensitivities through specialist studies, and relate to the EGI – Phase One which the substations are associated with. The DFFE screening tool report for the project site is included in Appendix 3 of this EMPr.

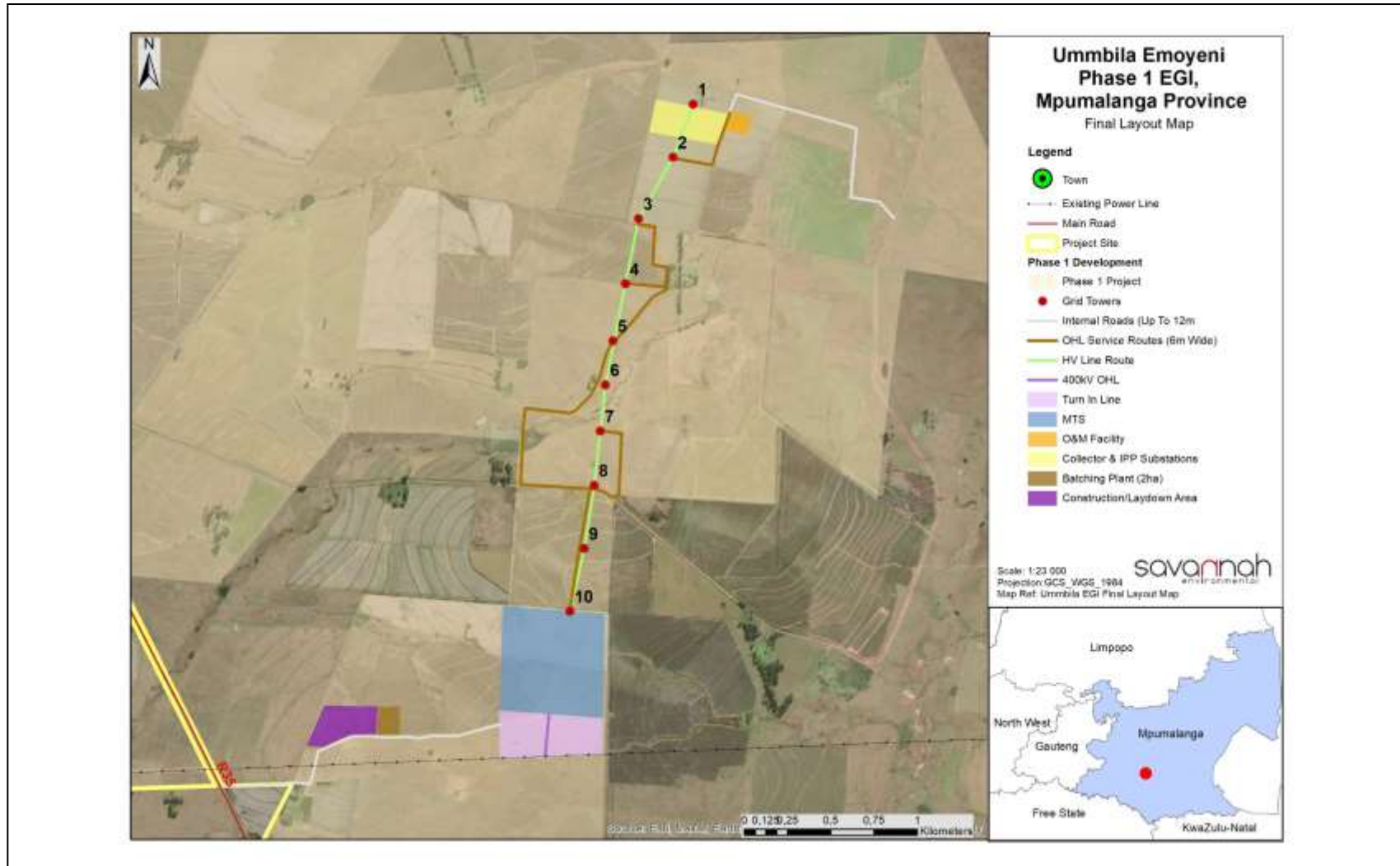


Figure 1: Final layout map of the Umbila Emoyeni EGI – Phase One, including all infrastructure

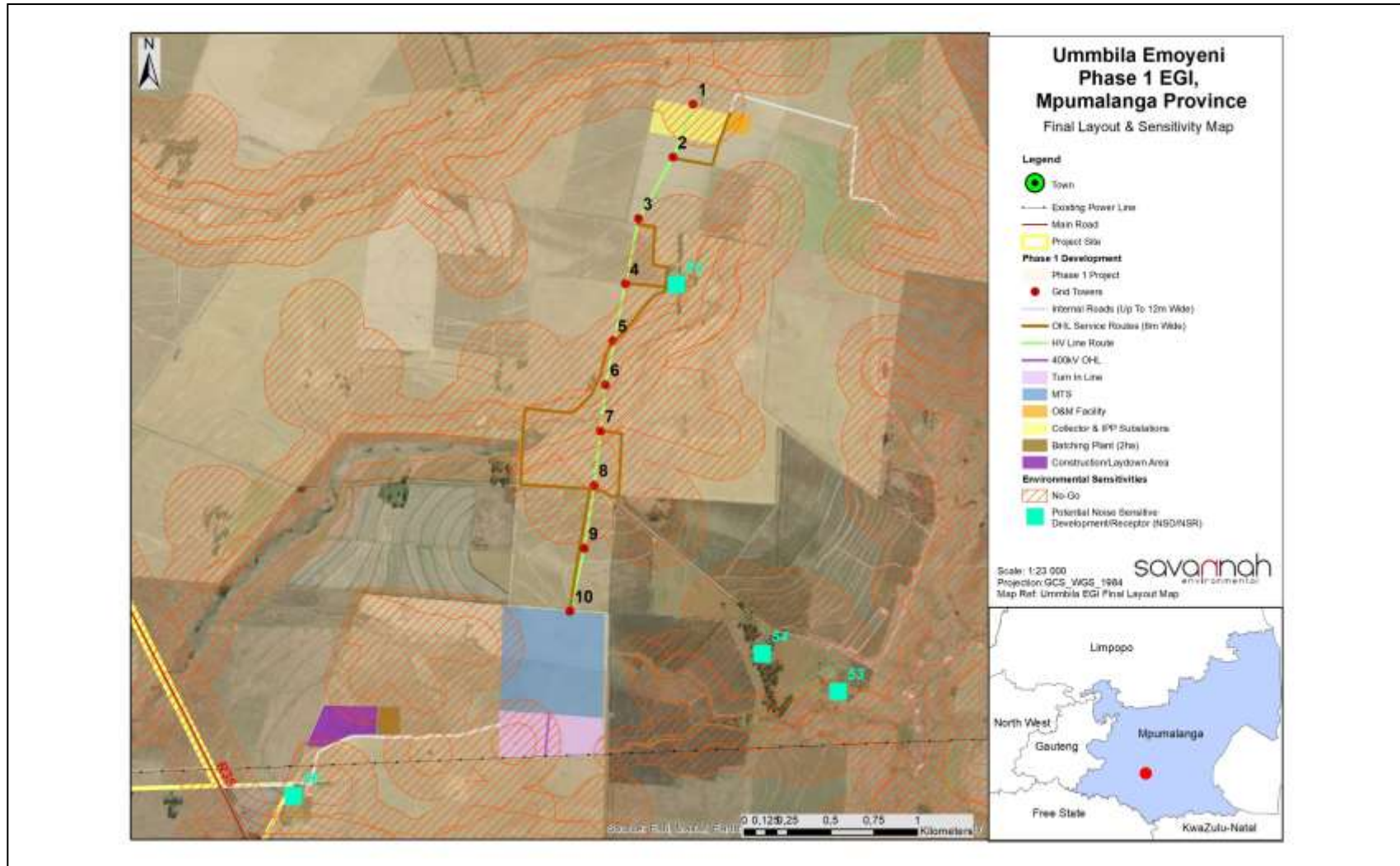


Figure 2: Environmental sensitivity & final layout map of the Umbila Emoyeni EGI – Phase One, including all infrastructure

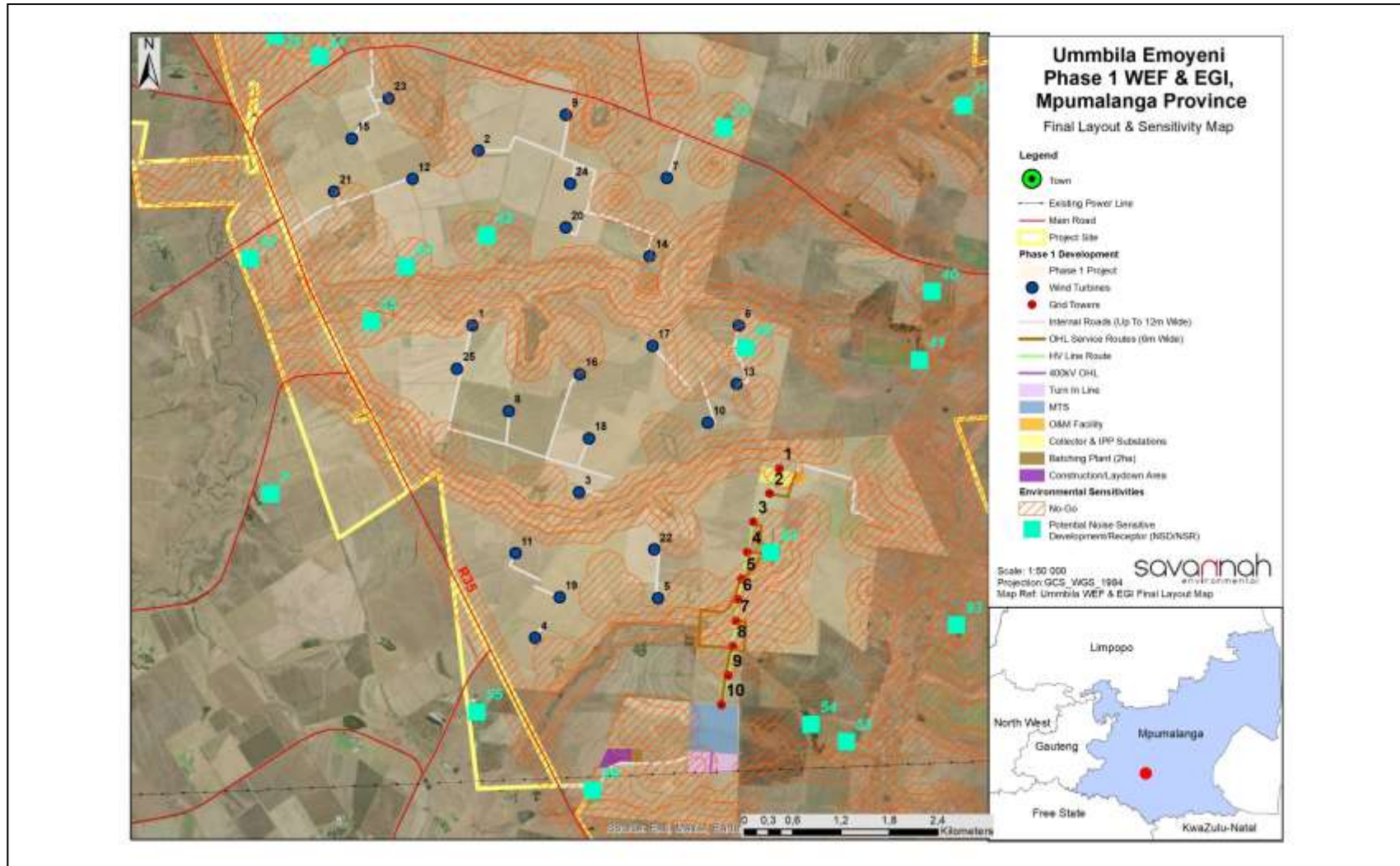


Figure 3: Environmental sensitivity & final layout map of the Umbila Emoyeni Phase One WEF & EGI, including all infrastructure

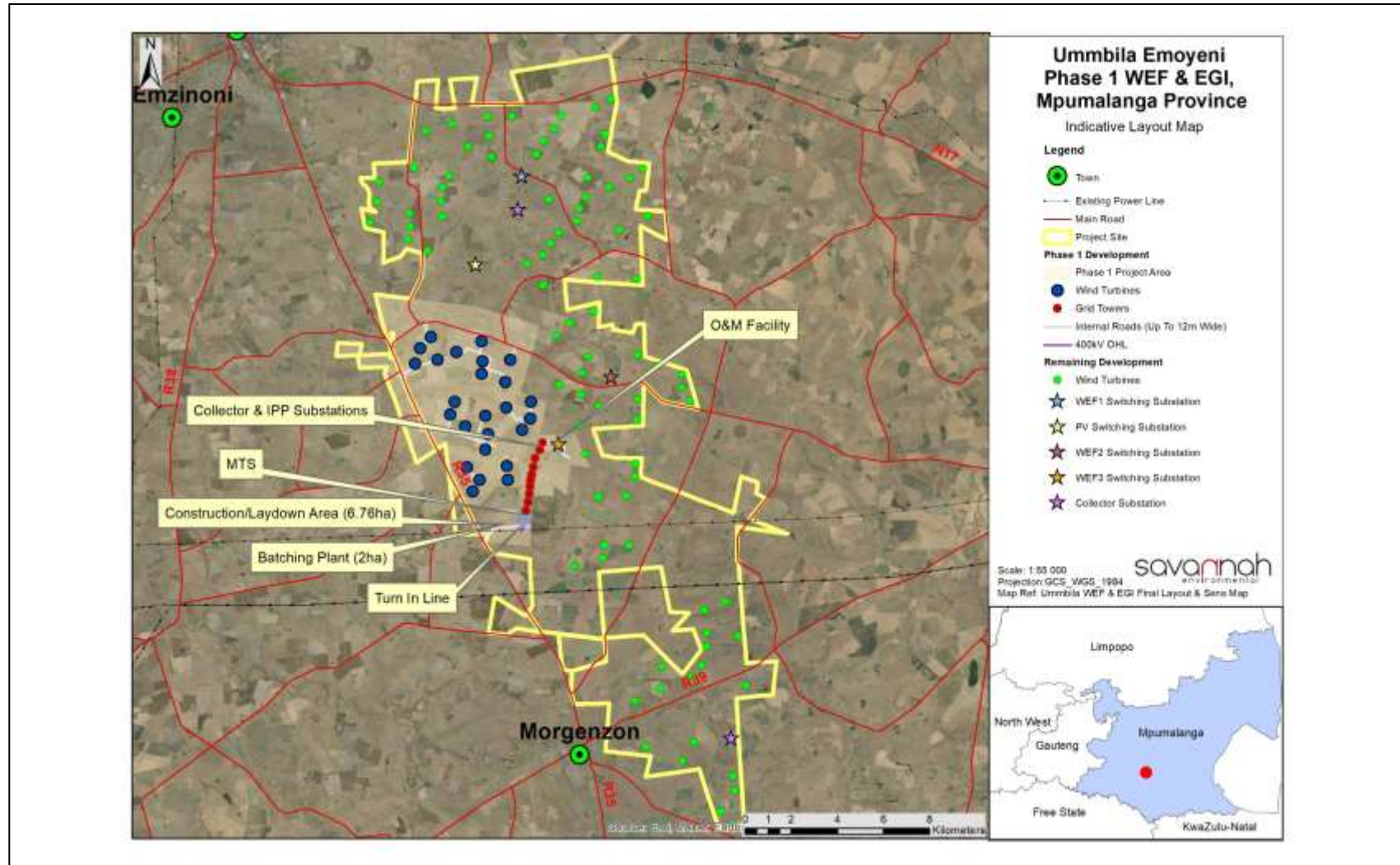


Figure 4: Indicative layout map of the Umbila Emoyeni Phase One WEF & EGI Final layout in relation to the remainder of the project site.

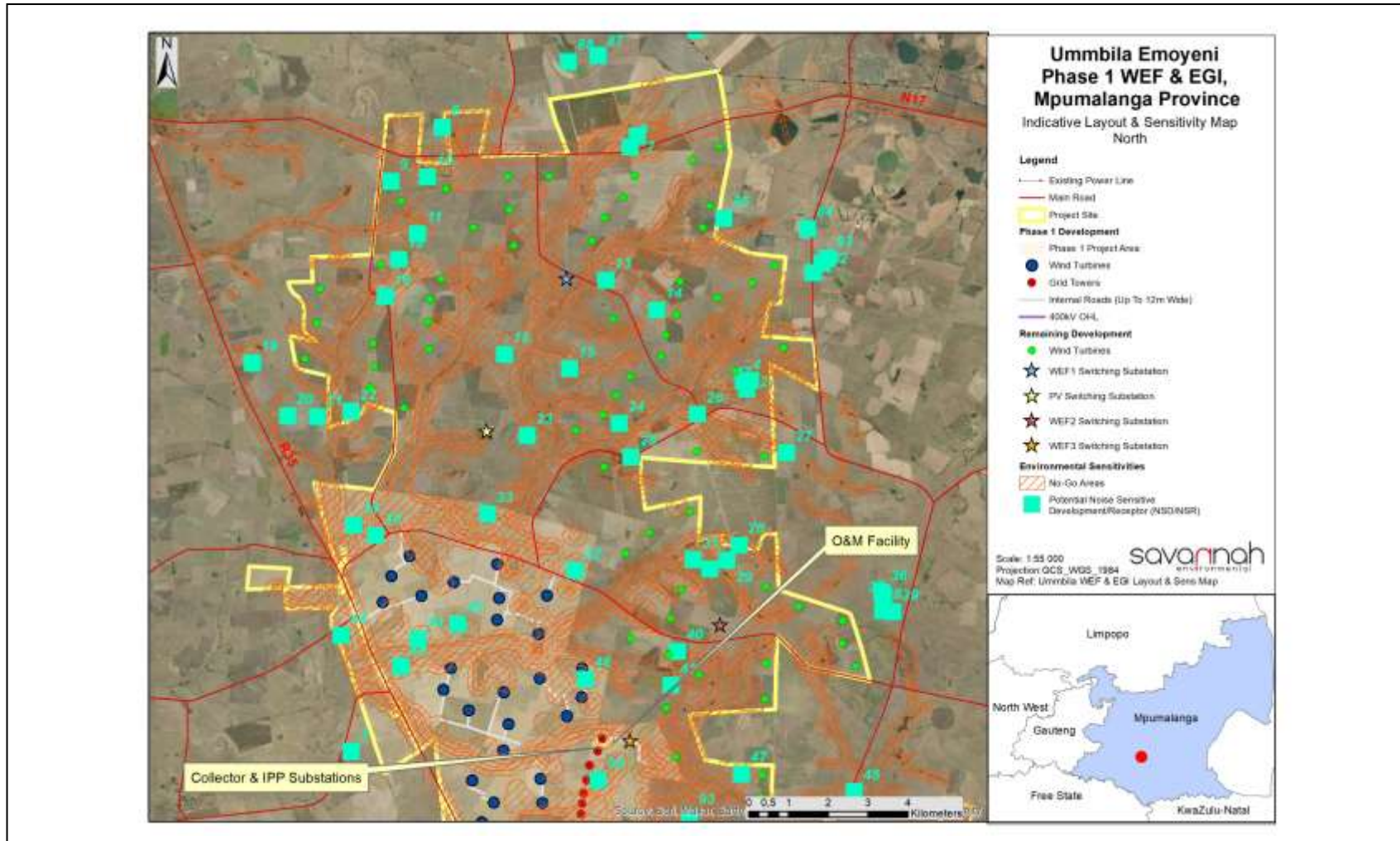


Figure 5: Northern indicative layout map of the Umbila Emoyeni Phase One WEF & EGI Final layout in relation to the remainder of the project site, overlain with sensitivities identified in the EIA Phase 1.

¹ The status of the NSRs is to be confirmed.

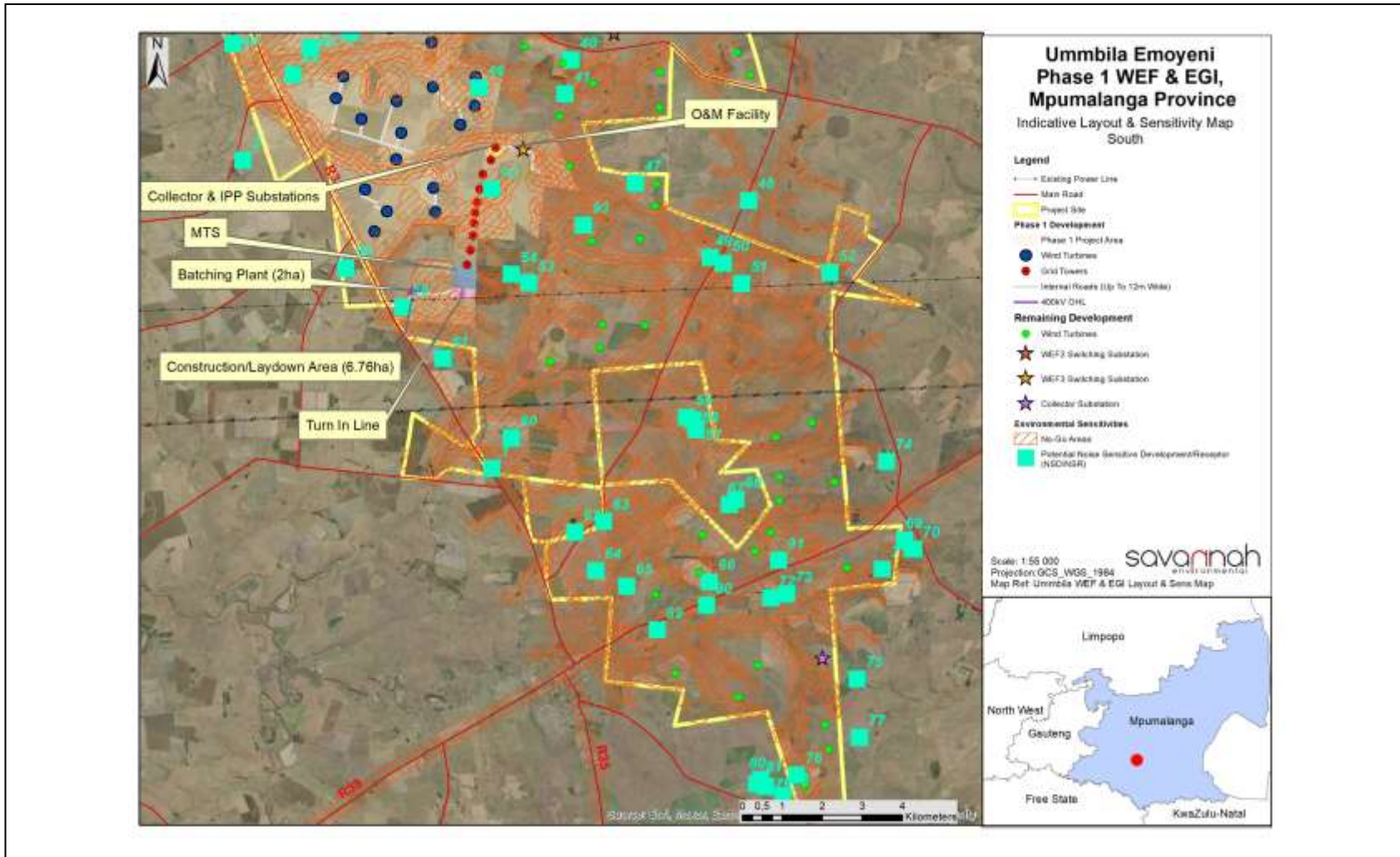


Figure 6: Southern indicative layout map of the Umbila Emoyeni Phase One WEF & EGI Final layout in relation to the remainder of the project site, overlain with sensitivities identified in the EIA Phase 2.

² The status of the NSRs is to be confirmed.

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: 19 May 2023

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.

OBJECTIVE 1: To ensure that the design of the facility responds to the identified environmental constraints and opportunities

Project component/s	<ul style="list-style-type: none"> » Substations; » Access roads; and » Associated infrastructure.
Potential Impact	» Design fails to respond optimally to the identified environmental considerations.
Activities/risk sources	<ul style="list-style-type: none"> » Positioning of onsite substations. » Positioning of laydown areas
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To ensure that the design responds to the identified environmental constraints and opportunities, including the constraints identified through the EIA process. » To ensure that pre-construction activities are undertaken in an environmentally friendly manner by e.g. avoiding identified sensitive areas.

Mitigation: Action/control	Responsibility	Timeframe
Plan and conduct pre-construction activities in an environmentally responsible manner and in a manner that does not lead to unnecessary impacts and disturbance.	Developer EPC Contractor	Pre-construction
Consider design level mitigation measures recommended by the specialists, as detailed within the EIA report and relevant appendices.	Developer EPC Contractor	Design phase
Ensure that laydown areas, construction camps and other temporary use areas are located in areas of low and medium sensitivity and are properly fenced or demarcated as appropriate and practically possible.	Developer EPC Contractor	Design phase
<u>Existing access routes, especially roads must be made use of. The development areas and access roads should be specifically demarcated so that during the construction phase, only the demarcated areas may be impacted upon</u>	<u>Design Engineer</u> <u>EO</u>	<u>Design Phase</u> <u>Construction</u>
<p>The following buffer areas are recommended, and should be implemented for maintaining the freshwater resource features REC (Recommended Ecological Category) allowing the persistence of the current present ecological status as well as their functions and services.</p> <ul style="list-style-type: none"> » All small, endorheic seepages and depressions with a High Ecological Importance: 50m buffers from the outer edge of the freshwater resource features. » All larger interconnected wetland features with Very Ecological Importance: 100m buffers from the outer edge of the freshwater resource features. » All freshwater features with their buffer areas have been classified as either Very High- or High sensitive and should be regarded as “No-Go” areas apart 	Developer EPC Contractor	Design phase

Mitigation: Action/control	Responsibility	Timeframe
<p>from the following activities and infrastructure which may be allowed (although restricted to an absolute minimum footprint):</p> <ul style="list-style-type: none"> * only activities relating to the route access and cabling; * the use/upgrade of existing roads and watercourse crossings are the preferred options; * Where no suitable existing roads and watercourse crossings exist, the construction of new access roads and watercourse crossings can be allowed, however this should be deemed as a last resort. * All underground cabling should be laid either within access roads or next to access roads (as close as possible). 		
<u>Drainage lines must be avoided for the placement of power line towers and a no-go buffer of 20 m must be applied around them.</u>	<u>Project manager, Environmental Officer</u>	<u>Life of operation</u>
Infrastructure to avoid avifauna Very High Sensitivity areas, linear infrastructure (including roads) permitted.	Developer EPC Contractor	Design phase
The footprint within avifauna Medium Sensitivity areas should be minimised and avoided wherever possible.	Developer EPC Contractor	Design phase
The minimum footprint areas of infrastructure should be used wherever possible.	Developer EPC Contractor	Design phase
No placement of infrastructure (except roads) within 200m of key habitat features specifically including tree clumps, buildings, dams/wetlands, and rivers/streams.	Developer EPC Contractor	Design phase
Avoid all high agricultural production land and other actively cultivated areas. Where avoidance is not feasible, stakeholder engagement should occur to compensate affected landowners	Developer EPC Contractor	Design phase
<ul style="list-style-type: none"> » A 500m no development buffer should be implemented on either side of the N17, R35 and R39. » A 200m no development buffer should be implemented on either side of the secondary routes that run through the development area. » A 500m no development buffer must be implemented around the identified farm werfs. 	Developer EPC Contractor	Design phase
A 50m no-go development buffer is implemented around all burial ground sites including Observations 001, 005, 006, 008, 012 and 013. A Management Plan for the ongoing conservation of these burials is developed prior to construction, along with a Guide on how to identify marked and unmarked burials and how to proceed should previously unidentified burials be uncovered during the construction process.	Developer EPC Contractor	Design phase

Mitigation: Action/control	Responsibility	Timeframe
The historic farm werf cluster as defined in the Heritage Impact Assessment must not be impacted by the development.	Developer EPC Contractor	Design phase
A 500m no development buffer must be implemented around the identified farm werfs.	Developer EPC Contractor	Design phase
Undertake careful design of security and operational lighting to minimise impacts on surrounding areas. No high mast lighting should be used.	Developer EPC Contractor	Design phase

Performance Indicator	<ul style="list-style-type: none"> » Design meets the objectives and does not degrade the environment. » Design and layouts respond to the mitigation measures and recommendations in the EIA report.
Monitoring	<ul style="list-style-type: none"> » Ensure that the design implemented meets the objectives and mitigation measures in the EIA report through review of the facility design by the Project Manager and ECO prior to the commencement of construction.

OBJECTIVE 2: Protection of avifauna

Project component/s	<ul style="list-style-type: none"> » Onsite substations
Potential Impact	<ul style="list-style-type: none"> » Disturbance of birds (e.g. destruction of habitat). » Displacement of birds. » Collision with project components. » Traffic to and from site.
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on site. » Substation construction facilities.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise footprints of habitat destruction. » To minimise disturbance to resident and visitor avifaunal species.

Mitigation: Action/control	Responsibility	Timeframe
The extent of clearing and disturbance to the vegetation must be kept to a minimum so that impact on avifauna and their habitats is restricted.	Contractor	Construction
Construction camps should be lit with as little light as practically possible, with the lights directed downwards where appropriate	Contractor	Construction
The movement of construction personnel should be restricted to the construction areas on the project site.	Contractor	Construction
No dogs or cats other than those of the landowners should be allowed on site.	Contractor	Construction
The appointed Environmental Officer must be trained to identify the potential Red Data species as well as the signs that indicate possible breeding by these species.	Contractor EO	Construction
The Environmental Officer must, during audits/site visits, make a concerted effort to look out for such breeding activities of SCCs	Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
(e.g. cranes, Secretarybird), and such efforts may include the training of construction staff (e.g. in Toolbox talks) to identify Red Data species, followed by regular questioning of staff as to the regular whereabouts on site of these species.		
If any avifaunal SCCs are confirmed to be breeding (e.g. if a nest site is found), construction activities within 500 m of the breeding site must cease, and an avifaunal specialist is to be contacted immediately for further assessment of the situation and instruction on how to proceed.	Contractor	Construction
Any holes dug should not be left open for extended periods of time to prevent entrapment by ground dwelling avifauna or their young and only be dug when required and filled in soon thereafter.	Contractor	Construction
Temporary fencing must be suitably constructed, e.g. if double layers of fencing are required for security purposes they should be positioned at least 2 m apart to reduce the probability of entrapment by larger bodied species that may find themselves between the two fences.	Contractor	Construction

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation and habitats for avifauna. » Limited impacts on avifaunal species (i.e. noted/recorded fatalities), especially those of conservation concern.
Monitoring and Reporting	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by the EO throughout construction phase. » Supervision of all clearing and earthworks by the EO.

OBJECTIVE 3: Appropriate management of the construction site and construction workers

Project Component/s	<ul style="list-style-type: none"> » Grid infrastructure; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Damage to indigenous natural vegetation and sensitive areas. » Damage to and/or loss of topsoil (i.e. pollution, compaction etc.). » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities. » Pollution/contamination of the environment.
Activities/Risk Sources	<ul style="list-style-type: none"> » Vegetation clearing and levelling of equipment storage area/s. » Access to and from the equipment storage area/s. » Ablution facilities. » Contractors not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » Limit equipment storage within demarcated designated areas. » Ensure adequate sanitation facilities and waste management practices.

- » Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/Control	Responsibility	Timeframe
<u>To minimise impacts on the surrounding environment, contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation, the EIA Report, and this EMPr, as well as the requirements of all relevant environmental legislation.</u>	<u>Contractors</u>	<u>Construction</u>
<u>Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site.</u>	<u>Contractor</u>	<u>Construction</u>
<u>A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment. 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.</u>	<u>Contractor</u>	<u>Construction</u>
Contractors must ensure that all workers are informed at the outset of the construction phase of the conditions contained in the Code of Conduct.	Contractor and sub-contractor/s	Pre-construction
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	Contractor	Construction
All construction vehicles must adhere to clearly defined and demarcated roads. No driving outside of the development boundary must be permitted.	Contractor	Construction
Ensure all construction equipment and vehicles are properly maintained at all times.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction	Specialist	Pre-construction
Ensure that construction workers are clearly identifiable. All workers must carry identification cards and wear identifiable clothing.	Contractor	Construction
Undertake pre-construction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimising wildlife interactions, remaining within demarcated construction areas, etc.	Contractor	Construction
All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as tortoises and snakes, which are often persecuted out of fear or superstition, waste management and the importance of not undertaking activities that could result in pollution of those watercourses.	Contractor	Construction
Regular toolbox talks should be undertaken to ensure appropriate levels of environmental awareness.	Contractor	Construction
Contact details of emergency services must be prominently displayed on site.	Contractor	Construction
Contractor must provide adequate firefighting equipment on site and provide firefighting training to selected construction staff.	Contractor	Construction
Personnel trained in first aid must be on site to deal with smaller incidents that require medical attention.	Contractor	Construction
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. An emergency fire plan must be developed with emergency procedures in the event of a fire.	Contractor	Duration of construction
Strict control of the behaviour of construction workers must be implemented in terms of works near watercourses.	Contractor	Construction
Ensure waste storage facilities are maintained and emptied on a regular basis.	Contractor	Duration of construction
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Contractor	Duration of Contract
No liquid waste, including grey water, may be discharged into any water body or drainage line. All sewage disposal to take place at a registered and operational wastewater treatment works. Proof of disposal to be retained as proof of responsible disposal.	Contractor	Duration of construction
All contaminated water must be contained by means of careful run-off management on site.	Contractor	Construction

Mitigation: Action/Control	Responsibility	Timeframe
Ensure compliance with all national, regional and local legislation with regard to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other harmful and hazardous substances and materials.	Contractor	During construction.
Ensure ablution facilities are appropriately maintained. Ablutions must be cleaned regularly and associated waste disposed of at a registered/permitted waste disposal site. Ablutions must be removed from site when construction is completed.	Contractor and sub-contractor/s	Duration of contract
Cooking and eating of meals must take place in a designated area. No fires are allowed on site. No firewood or kindling may be gathered from the site or surrounds.	Contractor and sub-contractor/s	Duration of contract
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area. Particular attention needs to be paid to food waste.	Contractor and sub-contractor/s	Duration of contract
Keep a record of all hazardous substances stored on site. Clearly label all the containers storing hazardous waste.	Contractor	Duration of contract
Existing access routes, especially roads must be made use of. The development areas and access roads should be specifically demarcated so that during the construction phase, only the demarcated areas may be impacted upon.	Environmental Officer & Design Engineer	Construction/Operational Phase
A Method Statement must be compiled for the management of pests and vermin within the site, specifically relating to the canteen area if applicable.	Contractor	Construction
Ensure proper health and safety plans in place during the construction period to ensure safety on and around site during construction, including fencing of the property and site access restriction.	Contractor and sub-contractor/s	Pre-construction
All disturbed areas that are not used such as excess road widths, should be rehabilitated with locally occurring shrubs and grasses after construction to reduce the overall footprint of the development.	Contractor and sub-contractor/s	Construction
On completion of the construction phase, all construction workers must leave the site within one week of their contract ending.	Contractor and sub-contractor/s	Construction

Performance Indicator	<ul style="list-style-type: none"> » Code of Conduct drafted <u>by the Developer</u> before commencement of the construction phase. » Appropriate training of all staff is undertaken prior to them commencing work on the construction site. » Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement. » All areas are rehabilitated promptly after construction in an area is complete. » Excess vegetation clearing and levelling is not undertaken.
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	» No complaints regarding contractor behaviour or habits.
Monitoring	<ul style="list-style-type: none"> » Regular audits of the construction camps and areas of construction on site by the EO. » Proof of disposal of sewage at an appropriate licensed wastewater treatment works. » Proof of disposal of waste at an appropriate licensed waste disposal facility. » An incident reporting system must be used to record non-conformances to the EMPr. » Observation and supervision of Contractor practices throughout the construction phase by the EO. » Complaints will be investigated and, if appropriate, acted upon.

OBJECTIVE 4: Protection of terrestrial fauna

A total of 32 mammal species, 6 amphibians and 10 reptile species were recorded within the overall project site. No amphibian or reptile SCC were recorded within the project site; however, 5 mammal SCC were recorded within the project site namely; Serval (Near Threatened), Brown hyena (Near Threatened); Vlei rat (Near Threatened), Cape clawless otter (Near Threatened) and South African hedgehog (Near Threatened). It was determined that the development will not detrimentally impact these populations/individual SCC.

Project component/s	<ul style="list-style-type: none"> » Grid connection infrastructure; » Access roads; and » Associated infrastructure.
Potential Impact	<ul style="list-style-type: none"> » Vegetation clearance and associated impacts on faunal habitats. » Traffic to and from site.
Activity/risk source	<ul style="list-style-type: none"> » Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on site. » Access road construction activities. » Substation construction facilities.
Mitigation: Target/Objective	<ul style="list-style-type: none"> » To minimise footprints of habitat destruction. » To minimise disturbance to resident and visitor faunal species.

Mitigation: Action/control	Responsibility	Timeframe
The extent of clearing and disturbance to the vegetation must be kept to a minimum so that impact on fauna and their habitats is restricted.	Contractor	Construction
During construction any fauna directly threatened by the construction activities should be removed to a safe location by a suitably qualified person.	Contractor	Construction
The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off of the construction site.	Contractor	Construction
Employees should be trained (e.g. during toolbox talks) that poisonous animals should not be killed	Developer EPC Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
and if encountered the ECO/ EO should be informed.		
If any parts of the site such as construction camps must be lit at night, this should be done with low-UV type lights (such as most LEDs) as far as practically possible, which do not attract insects and which should be directed downwards.	Contractor	Construction
All construction vehicles on site should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises.	Contractor	Construction
Construction vehicles limited to a minimal footprint on site (no movement outside of the demarcated footprint).	Contractor	Construction
If any parts of the facility are to be fenced, then no electrified strands should be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks.	Contractor	Duration of contract
<u>The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments.</u> • <u>Signs must be put up to enforce this</u>	<u>Project manager, Environmental Officer</u>	<u>Construction</u>
<u>The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna.</u>	<u>Project manager, Environmental Officer & Design Engineer</u>	<u>Construction Phase</u>
<u>Any holes/deep excavations must be dug and planted in a progressive manner and should not be left open overnight. Should the holes remain overnight they must be covered temporarily to ensure no small fauna species fall in.</u>	<u>Environmental Officer & Contractor, Engineer</u>	<u>Planning and Construction</u>
<u>The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprint of the roads must be kept to prescribed widths.</u>	<u>Project manager, Environmental Officer & Contractor</u>	<u>Construction</u>

Performance Indicator	<ul style="list-style-type: none"> » No disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation and habitats for fauna. » Limited impacts on faunal species (i.e. noted/recorded fatalities), especially those of conservation concern.
Monitoring and Reporting	<ul style="list-style-type: none"> » Observation of vegetation clearing activities by the EO throughout construction phase. » Supervision of all clearing and earthworks by the EO.

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

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 four (24) 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 EAP with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (2019/726)
- Registered with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Scientist (400024/00)
- Registered with the International Association 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

Project Name & Location	Client Name	Role
Karoshhoek CPV facility on site 2 as part of the larger Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
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, Northern Cape	Building Energy	Project Manager & EAP
Vrede & Rondavel PV, Free State	Mainstream Renewable Energy Developments	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

Project Name & Location	Client Name	Role
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
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
Northam PV, Limpopo Province	Northam Platinum	Project Manager & EAP
Kolkies PV Suite (x 6 projects) and Sadawa PV Suite (x 4 projects), Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP

Screening Studies

Project Name & Location	Client Name	Role
Allemans Fontein SEF near Noupoot, Northern Cape	Fusion Energy	Project Manager & EAP
Amandel SEF near Thabazimbi, Limpopo	iNca Energy	Project Manager & EAP
Arola/Doomplaat SEF near Ventersdorp, North West	FRV & iNca Energy	Project Manager & EAP
Bloemfontein Airport PV Installation, Free State	The Power Company	Project Manager & EAP
Brakspuit SEF near Klerksorp, North West	FRV & iNca Energy	Project Manager & EAP
Carolus Poort SEF near Noupoot, Northern Cape	Fusion Energy	Project Manager & EAP
Damfontein SEF near Noupoot, Northern Cape	Fusion Energy	Project Manager & EAP
Everest SEF near Welkom, Free State	FRV & iNca Energy	Project Manager & EAP
Gillmer SEF near Noupoot, 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
Upington Airport 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,	Enel Green Power	Project Manager

Project Name & Location	Client Name	Role
Northern Cape		
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 Cape	Windfall 59 Properties	Project Manager
ECO for the construction of the Upington Airport PV Facility, Northern Cape	Sublary 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	Engle	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
Konkoonsies 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	Sublary Trading	Environmental Advisor
Upington SEF, Northern Cape	Abengoa Solar	Environmental Advisor
Ofir-ZX PV SEF near Keimoes, Northern Cape	Network S28 Energy	Environmental Advisor
Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape	Cronimet Power Solutions	Environmental Advisor
Environmental Permitting for the 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 Lephallale SEF, Limpopo	Exxaro Resources	Project Manager & EAP
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 Lephallale 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

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

Project Name & Location	Client Name	Role
Ilanga Tower 1 Facility near Upington, Northern Cape	Emvelo Holdings	Project Manager & EAP
Karoshhoek CPVPD 1-4 facilities on site 2 as part of the larger Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshhoek CSP facilities on sites 1.4; 4 & 5 as part of the larger Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP
Karoshhoek Linear Fresnel 1 Facility on site 1.1 as part of the larger Karoshhoek 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	Karoshhoek 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 Karoshhoek Solar One CSP Facility, Northern Cape	Karoshhoek 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
Ilangaletu 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
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
Wind Garden & Fronteer WEFs, Eastern Cape	Wind Relc	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

Project Name & Location	Client Name	Role
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
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 Tsitsikamma 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

Project Name & Location	Client Name	Role
Waterberg IPP Coal-Fired Power Station near Lephallale, 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
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 Lephallale, 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 Lephallale, 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 Lephallale, Limpopo	Axia	Project Manager & EAP
S53 & WULA for the Waterberg IPP Coal-Fired Power Station near Lephallale, Limpopo	Exxaro Resources	Project Manager & EAP
S53 Application for the Tshivasho Coal-fired Power Station near Lephallale, 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 & 400kV 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 Power 2	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	Eskom Holdings	Project Manager & EAP

Project Name & Location	Client Name	Role
Ankerlig Power Station in Atlantis Industria, Western Cape		
320MW gas-to-power station in Richards Bay, KwaZulu-Natal	Phinda Power Projects	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
Karoshhoek Grid Integration project as part of the Karoshhoek 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
Main Transmission Substation (MTS) associated with the Choje Wind Farm cluster, Eastern Cape	Wind Relic	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
Karoshhoek Grid Integration project as part of the Karoshhoek Solar Valley Development East of Upington, Northern Cape	FG Emvelo	Project Manager & EAP

Project Name & Location	Client Name	Role
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, Western 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	Karoshhoek Solar One	Project Manager & EAP
Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape	Eskom Holdings	Project Manager & EAP
Two 132kV Chickadee Lines to the new Zonnebloem Switching Station, Mpumalanga	Eskom Holdings	Project Manager & EAP
Electrical Grid Infrastructure for the Kolkies and Sadawa PV clusters, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Sadawa Collector substation, Western Cape	Mainstream Renewable Energy Developments	Project Manager & EAP
Electrical Grid Infrastructure for the Vrede and Rondavel PV facilities, Free State	Mainstream Renewable Energy Developments	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	Karoshhoek 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	Iiso	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	Sesoko 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 Westonia, Gauteng	Goldfields	Project Manager & EAP
Expansion of the existing Welgedacht Water Care Works, Gauteng	ERWAT	Project Manager & EAP
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	Karoshhoek Solar one	Project Manager & EAP
Modification of the existing Hartebeestfontein Water Care Works, Gauteng	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	Emalaheni 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	Emalaheni 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

Project Name & Location	Client Name	Role
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

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	Karoshhoek Solar One	Project Manager & EAP
WULA for the Kruisvallei Hydroelectric Power Generation Scheme, Free State	Building Energy	Project Manager & EAP

Project Name & Location	Client Name	Role
S24G and WULA for the illegal construction of structures within a watercourse on EFF 24 Ruimsig Agricultural Holdings, Gauteng	Sorrer 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
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 EMP for the Sirius Solar PV	Aurora Power Solutions	Project Manager & EAP

Project Name & Location	Client Name	Role
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

CURRICULUM VITAE OF CHANTELE GEYER

Comprehensive CV

Profession :	Junior Environmental Consultant
Specialisation:	Environmental Management; Project-related GIS mapping; Public Participation Administration; General Geology and Geochemistry.
Work Experience:	Six (6) months in the environmental field.

VOCATIONAL EXPERIENCE

Chantelle is a conscientious and ambitious junior Environmental Consultant who holds a BSc(Hons) degree in Environmental Geology. She recently graduated from the North-West University where she consistently stayed in the top 3 of her class. She joined a group of passionate academic peers in her third year to create the first North-West University Geoscience Society to teach young earth scientists about the environment and introduce them to professional mentors, thus bridging the gap between university and a professional career. She was appointed as project manager for this society for two consecutive terms and organized career talks, academic game shows, alumni talks, clean-up initiatives, and numerous team-building events.

She has special interests in geological formations, geochemistry, minerals, contamination studies, rehabilitation and restoration of disturbed areas, as well as hydrology. However, she found her passion for Environmental Management during an environmental internship where she gained experience in:

- Environmental Impact Assessments
- Project-related GIS mapping
- Water use licences
- Public participation processes

Chantelle is a loyal and enthusiastic individual who is dedicated to further her studies in Environmental Management, Environmental Legislation, GIS-mapping, and studies on the renewable energy sector of South Africa. Her goal is to gain knowledge in the processes of Basic Assessments, EIAs, Environmental Compliance, public participation, screening assessments, and environmental authorisation applications. She aims to use this knowledge to strategically consult clients and undertaking projects efficiently and to the highest standard.

SKILLS BASE AND CORE COMPETENCIES

- Great organisational skills
- Good at time management
- Passionate about the environment
- Compilation of Basic Assessment Reports in compliance with environmental legislation.
- Project management for environmental-related events and projects.
- Water Use Licences
- Aiding with public participation processes.
- Experience with South African environmental legislation.

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- BSc Environmental Sciences, North-West University, Potchefstroom (2021)
- BSc Honours Environmental Geology, North-West University, Potchefstroom (2022)

Short Courses:

- Advanced Microsoft Excel Qualification, Lead Academy (2020)

Professional Society Affiliations:

- Registered with the International Association for Impact Assessment South Africa (IAIASa)

EMPLOYMENT

Date	Company	Roles and Responsibilities
July 2022 - Current:	Savannah Environmental (Pty) Ltd	<i>Junior Environmental Consultant</i> <u>Tasks include:</u> <i>Environmental Assessment Practitioner (EAP); Specialising in project-related GIS mapping, Performing Basic Assessment Reports and Environmental Impact Assessments, Assisting on administrative public participation documents.</i>
September 2021 – November 2021	Prescali Environmental (Pty)	<i>Environmental Intern</i> <u>Tasks included:</u> <i>Liaising with senior management on environmental concerns, Preparing Water Use Licence (WUL) audits, Taking minutes during meetings, Public Participation tasks.</i>

PROJECT EXPERIENCE

Project experience includes renewable energy projects, grid connection infrastructure, and access roads.

RENEWABLE POWER GENERATION PROJECTS: SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Mutsho Solar PV (4x100MW projects, Limpopo)	Cri-Eagle	Junior EAP & GIS Specialist
Harmony One Plant Solar PV Facility (30MW), Free State	ENGP	Junior EAP & GIS Specialist
Harmony Target Solar PV Facility (30MW), Free State	ENGP	Junior EAP & GIS Specialist
Harmony Joel Solar PV Facility (18MW), Free State	ENGP	Junior EAP & GIS Specialist
Umbhila Emoyeni SEF (150MW), Mpumalanga	Windlab Developments South Africa (Pty) Ltd	Junior EAP & GIS Specialist

Basic Assessments

Project Name & Location	Client Name	Role
Harmony Central Plant Solar PV Facility (14MW), Free State	ENGP	Junior EAP & GIS Specialist
Harmony Moab Khotsong Solar PV Facility (100MW), Free State	ENGP	Junior EAP & GIS Specialist
Highveld Solar PV Facility (240MW), North West	WKN Windcurrent	Junior EAP & GIS Specialist
Komsberg Solar PV Facility (200MW), Western and Northern Cape	Salika SA	Junior EAP & GIS Specialist
Klipfontein Solar PV Facility (500MW), Western and Northern Cape	Salika SA	Junior EAP & GIS Specialist

RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Umbhila Emoyeni WEF (666MW), Mpumalanga	Windlab Developments South Africa (Pty) Ltd	Junior EAP & GIS Specialist

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Umbhila Emoyeni EGI, Mpumalanga	Windlab Developments South Africa (Pty) Ltd	Junior EAP & GIS Specialist

Basic Assessments

Project Name & Location	Client Name	Role
Mutsho Solar Grid Connection, Limpopo	Cri-Eagle	Junior EAP & GIS Specialist
Highveld Grid Connection, North West	WKN Windcurrent	Junior EAP & GIS Specialist
Komsberg Grid Connection, Western and Northern Cape	Salika SA	Junior EAP & GIS Specialist
Klipfontein Grid Connection, Western and Northern Cape	Salika SA	Junior EAP & GIS Specialist

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

Basic Assessments

Project Name & Location	Client Name	Role
<i>Witberg WEF Access Road, Western Cape</i>	<i>Red Rocket South Africa (Pty) Ltd</i>	<i>Junior EAP and GIS Specialist</i>



CURRICULUM VITAE OF NICOLENE VENTER

Profession :	Public Participation and Social Consultant
Specialisation:	Public participation process; stakeholder engagement; facilitation (workshops, focus group and public meetings; public open days; steering committees); monitoring and evaluation of public participation and stakeholder engagement processes
Work Experience:	23 years' experience as a Public Participation Practitioner and Stakeholder Consultant

VOCATIONAL EXPERIENCE

Over the past 23 years Nicolene established herself as an experienced and well recognised public participation practitioner, facilitator and strategic reviewer of public participation processes. She has experience in managing public participation and stakeholder engagement projects and awareness creation programmes. Her experience includes designing and managing countrywide public participation and stakeholder engagement projects and awareness creation projects, managing multi-project schedules, budgets and achieving project goals. She has successfully undertaken several public participation processes for EIA, BA and WULA projects. The EIA and BA process include linear projects such as the NMPP, Eskom Transmission and Distribution power lines as well as site specific developments such as renewable energy projects i.e. solar, photo voltaic and wind farms. She also successfully managed stakeholder engagement projects which were required to be in line with the Equator Principles, locally and in neighbouring countries.

SKILLS BASE AND CORE COMPETENCIES

- Project Management
- Public Participation, Stakeholder Engagement and Awareness Creation
- Public Speaking and Presentation Skills
- Facilitation (workshops, focus group meetings, public meetings, public open days, working groups and committees)
- Social Assessments (Stakeholder Analysis / Stakeholder Mapping)
- Monitoring and Evaluation of Public Participation and Stakeholder Engagement Processes
- Community Liaison
- IFC Performance Standards
- Equator Principles
- Minute taking, issues mapping, report writing and quality control

EDUCATION AND PROFESSIONAL STATUS

Degrees / Diplomas / Certificates:

- Higher Secretarial Certificate, Pretoria Technicon (1970)

Short Courses:

- Techniques for Effective Public Participation, International Association for Public Participation, IAP2 (2008)
- Foundations of Public Participation (Planning and Communication for Effective Public Participation), IAP2 (2009)
- Certificate in Public Participation – IAP2SA Modules 1, 2 and 3 (2013)

Certificate in Public Relations, Public Relation Institute of South Africa, Damelin Management School (1989)

Professional Society Affiliations:

- Member of International Association for Public Participation (IAP2): Southern Africa

EMPLOYMENT

Date	Company	Roles and Responsibilities
November 2018 – current	Savannah Environmental (Pty) Ltd	<p>Public Participation and Social Consultant</p> <p><i>Tasks include:</i></p> <p><i>Tasks include: Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.</i></p> <p><i>Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved.</i></p>

Date	Company	Roles and Responsibilities
2016 – October 2018	Imaginative Africa (Pty) Ltd <i>(Director of Imaginative Africa)</i>	Independent Consultant Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements: <u>Tasks include:</u> Tasks include: Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc. Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved <u>Clients:</u> SiVEST Environmental Savannah Environmental Baagi Environmental Royal Haskoning DHV (previously SSI)
2013 - 2016	Zitholele Consulting Contact person: Dr Mathys Vosloo Contact number: 011 207 2060	Senior Public Participation Practitioner and Project Manager <u>Tasks included:</u> Project managed public participation process for EIA/BA/WULA/EAL projects. Manages two Public Participation Administrators. Public Participation tasks as outlined as above and including financial management of public participation processes.
2011 - 2013	Imaginative Africa (Pty) Ltd <i>(company owned by Nicolene Venter)</i>	Independent Consultant Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements <u>Tasks included:</u> Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document,

		<p>Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc.</p> <p>Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved</p> <p><u>Clients:</u> Bohlweki Environmental Bembani Sustainability (Pty) Ltd Naledzi Environmental</p>
2007 – 2011	SiVEST SA (Pty) Ltd Contact person: Andrea Gibb Contact number: 011 798 0600	Unit Manager: Public Participation Practitioner <u>Tasks included:</u> Project managed public participation process for EIA/BA projects. Manages two Junior Public Participation Practitioners. Public Participation tasks as outlined as above and including financial management of public participation processes.
2005 – 2006	Imaginative Africa (Pty) Ltd (company owned by Nicolene Venter)	Independent Consultant Public Participation and Stakeholder Engagement Practitioner <u>Tasks included:</u> Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, Tribal Chiefs, affected landowners, etc. Managing interaction between Stakeholders and Team Members, liaising with National, Provincial and Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical

		<p>information communicated to and consultation with all level of stakeholders involved.</p> <p><u>Clients:</u></p> <p>Manyaka-Greyling-Meiring (previously Greyling Liaison and currently Golder Associates)</p>
1997 - 2004	<p>Imaginative Africa (Pty) Ltd</p> <p>(company owned by Nicolene Venter)</p>	<p>Independent Consultant: Public Participation Practitioner.</p> <p><u>Tasks included:</u></p> <p>Drafting of a Public Participation Plan with key deliverable dates and methodology to be followed, Background Information Document, Letters to Stakeholders and Interested and/or Affected Parties (I&APs) inclusive of key project deliverables and responses to questions / concerns raised; Stakeholder identification; facilitating stakeholder workshops, focus group and public meetings; conduct one-on-one consultation with Community Leaders, affected landowners, etc.</p> <p>Managing interaction between Stakeholders and Team Members, liaising with National, Provincial Local Authorities, managing community consultation and communications in project affected areas, attend to the level of technical information communicated to and consultation with all level of stakeholders involved.</p> <p><u>Clients:</u></p> <p>Greyling Liaison (currently Golder Associates); Bemani Sustainability (Pty) Ltd; Lidwala Environmental; Naledzi Environmental</p>

PROJECT EXPERIENCE

RENEWABLE POWER GENERATION PROJECTS

PHOTOVOLTAIC SOLAR ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role	
Lichtenburg PVs (3 PVs) & Power Lines (grid connection), Lichtenburg, North West Province	Atlantic Energy Partners EAP: Savannah Environmental	Project Manage the Public Participation Process Facilitate all meetings Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders	
Allepad PVs 4 PVs) & Power Lines (grid connection), Upington, Northern Cape Province	IL Energy EAP: Savannah Environmental		
Hyperion Solar PV Developments (4 PVs) and Associated Infrastructures, Kathu, Northern Cape Province	Building Energy EAP: Savannah Environmental		
Aggeneys Solar PV Developments (2 PVs) and Associated Infrastructures, Aggeneys, Northern Cape Province	Atlantic Energy Partners and ABO Wind EAP: Savannah Environmental		
Upilanga Solar Park, Northern Cape (350MW CSP Tower)	Emvelo Capital Projects (Pty) Ltd		
Khunab Solar Development, consisting of Klip Punt PV1, McTaggarts PV1, McTaggarts PV2, McTaggarts PV3 and the Khunab solar Grid Connection near Upington, Northern Cape Province	Atlantic Energy Partners and Abengoa		
Sirius Solar PV3 and PV4, near Upington, Northern Cape Province	Solal		
Geelster PV 1 and PV2 solar energy facilities, near Aggeneys, Northern Cape	ABO Wind		
Naledi PV and Ngwedi PV solar energy facilities, near Upington, Northern Cape	Atlantic Energy Partners and Abengoa		
Kotulo Tsatsi PV1, Kotulo Tsatsi PV3 and Kotulo Tsatsi PV4 solar energy facilities, near Kenhardt, Northern Cape	Kotulo Tsatsi Energy		
Tlisitseng PV, including Substations & Power Lines, Lichtenburg, North West Province Sendawo PVs, including Substations & Power Lines, Vryburg, North West Province Helena Solar 1, 2 and 3 PVs, Copperton, Northern Cape Province	BioTherm Energy EAP: SiVEST		Public Participation, Landowner and Community Consultation
Farm Spes Bona 23552 Solar PV Plants, Bloemfontein, Free State Province	Surya Power EAP: SiVEST		Public Participation, Landowner and Community Consultation
De Aar Solar Energy Facility, De Aar, Northern Cape Province	South Africa Mainstream Renewable Power	Public Participation, Landowner and Community Consultation	
Droogfontein Solar Energy Facility, Kimberley, Northern Cape Province	Developments EAP: SiVEST		
Kaalspruit Solar Energy Facility, Loeriesfontein, Northern Cape Province			

Platsjambok East PV, Prieska, Northern Cape Province		
Renosterburg PV, De Aar, Northern Cape Province	Renosterberg Wind Energy Company EAP: SIVEST	Public Participation, Landowner and Community Consultation
19MW Solar Power Plant on Farm 198 (Slypklip), Danielskuil, Northern Cape Province	Solar Reserve South Africa EAP: SIVEST	Public Participation, Landowner and Community Consultation

Basic Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Upilanga Solar Park, Northern Cape (x6 100MW PV's and x3 350MW PV Basic Assessments)	Emvelo Capital Projects (Pty) Ltd	Project Manage the Public Participation Process Facilitate all meetings Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders
Sirius Solar PV Solar Energy Facility, Upington, Northern Cape Province	SOLA Future Energy	
Khunab Solar Development, consisting of Klip Punt PV1, McTaggart PV1, McTaggart PV2, McTaggart PV3 and the Khunab solar Grid Connection near Upington, Northern Cape Province	Atlantic Energy Partners and Abengoa	

WIND ENERGY FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Aletta Wind Farm, Copperton, Northern Cape Province	BioTherm Energy EAP: SIVEST	Public Participation
Eureka Wind Farm, Copperton, Northern Cape Province		
Loeriesfontein Wind Farm, Loeriesfontein, Northern Cape Province	South Africa Mainstream Renewable Power Developments EAP: SIVEST	Public Participation
Droogfontein Wind Farm, Loeriesfontein, Northern Cape Province		
Four Leeuwberg Wind Farms, Loeriesfontein, Northern Cape Province		
Noupoort Wind Farm, Noupoort, Northern Cape Province		
Mierdam PV & Wind Farm, Prieska, Northern Cape Province		
Platsjambok West Wind Farm & PV, Prieska, Northern Cape Province		

Basic Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Cluster of Renewable Energy Developments, Eastern Cape Province	Wind Relic	

Nama Wind Energy Facility, Northern Cape Province	Genesis ECO EAP: Savannah Environmental	Project Manage the Public Participation Process Facilitate all meetings Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders
Zonnequa Wind Energy Facility, Northern Cape Province		

CONCENTRATED SOLAR FACILITIES (CSP)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Upington Concentrating Solar Plant and associated Infrastructures, Northern Cape Province	Eskom Holdings EAP: Bohlweki Environmental	Project Manage the Public Participation Process Facilitate all meetings Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders

CONVENTIONAL POWER GENERATION PROJECTS (GAS)

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
450MW gas to power project and associated 132kV power line, Richards bay, KwaZulu-Natal	Phinda Power Producers	Project Manage the Public Participation Process Facilitate all meetings Consultation with Government Officials, Key Stakeholders & Landowners
4000MW gas to power project and associated 400kV power lines, Richards bay, KwaZulu-Natal	Phinda Power Producers	
Richards Bay Gas to Power Combined Cycle Power Station, KwaZulu-Natal	Eskom Holdings SoC Limited	

GRID INFRASTRUCTURE PROJECTS

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
132/11kV Olifantshoek Substation and Power Line, Northern Cape	Eskom	Project Manage the Public Participation Process Facilitate all meetings Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders
Grid connection infrastructure for the Namas Wind Farm, Northern Cape Province	Genesis Namas Wind (Pty) Ltd	
Grid connection infrastructure for the Zonnequa Wind Farm, Northern Cape Province	Genesis Zonnequa Wind (Pty) Ltd	
Khunab Solar Grid Connection, near Upington, Northern Cape Province	Atlantic Energy Partners and Abengoa	
Pluto-Mahikeng Main Transmission Substation and 400kV Power Line (Carletonville to Mahikeng), Gauteng and North West Provinces	Eskom Holdings EAP: Baagi Environmental	
Thyspunt Transmission Lines Integration Project, Eastern Cape Province	Eskom Holdings EAP: SIVEST	
Westrand Strengthening Project, Gauteng Province		Public Participation,

Mookodi Integration Project, North-West Province		
Transnet Coallink, Mpumalanga and KwaZulu-Natal Provinces		
Delarey-Kopela-Phahameng Distribution power line and newly proposed Substations, North-West Province		Public Participation, Landowner and Community Consultation
Invubu-Theta 400kV Eskom Transmission Power Line, KwaZulu-Natal Province	Eskom Holding EAP: Bemani Environmental	
Melkhout-Kudu-Grassridge 132kV Power Line Project (project not submitted to DEA), Eastern Cape Province	Eskom Holdings EAP: SIVEST	Public Participation, Landowner and Community Consultation
Tweespruit-Welroux-Driedorp-Wepener 132Kv Power Line, Free State Province		
Kuruman 132Kv Power Line Upgrade, Northern Cape Province	Eskom Holdings EAP: Zitholele	
Vaalbank 132Kv Power Line, Free State Province		
Pongola-Candover-Golela 132kV Power Line (Impact Phase), KwaZulu-Natal Province		

PART 2 AMENDMENTS

Project Name & Location	Client Name	Role
Transalloys Coal-Fired Power Station near Emalahleni, Mpumalanga Province	Transalloys (Pty) Ltd	Project Manage the Public Participation Process
Zen Wind Energy Facility, Western Cape	Energy Team (Pty) Ltd	
Hartebeest Wind Energy Facility, Western Cape	juwi Renewable Energies (Pty) Ltd	
Khai-Ma and Korana Wind Energy Facilities	Mainstream Renewable Power (Pty) Ltd	

FACILITATION

Project Name & Location	Client Name	Meeting Type
Bloemfontein Strengthening Project, Free State Province	Eskom Holdings EAP: Baagi Environmental	Public Meetings
Moodraai-Smitkloof 132kV Power Line and Substation, Northern Cape Province	Eskom Holdings EAP: SSI	Focus Group Meetings
Aggeneis-Oranjemond 400kV Eskom Transmission Power Line, Northern Cape Province	Eskom Holdings EAP: Savannah Environmental	Focus Group Meetings & Public Meetings
Ariadne-Eros 400kV/132kV Multi-Circuit Transmission Power Line (Public Meetings)	Eskom Holdings EAP: ACER Africa	Public Meetings
Majuba-Venus 765kV Transmission Power Lines, Mpumalanga Province		
Thabametsi IPP Power Station, Limpopo Province	Thabametsi Power Company EAP: Savannah Environmental	Focus Group Meeting & Public Meeting
Aggeneis-Oranjemond Transmission Line & Substation Upgrade, Northern Cape	Eskom Transmission	Focus Group Meetings & Public Meetings

SCREENING STUDIES

Project Name & Location	Client Name	Role
Potential Power Line Alternatives from Humansdorp to Port Elizabeth, Eastern Cape Province	Nelson Mandela Bay Municipality EAP: SiVEST	Social Assessment

ASH DISPOSAL FACILITIES

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	Client Name	Role
Medupi Flue Gas Desulphurisation Project (up to completion of Scoping Phase), Limpopo Province	Eskom Holdings SOC Ltd EAP: Zitholele Consulting	Public Participation, Landowner and Community Consultation
Kendal 30-year Ash Disposal Facility, Mpumalanga Province		
Kusile 60-year Ash Disposal Facility, Mpumalanga Province		
Camden Power Station Ash Disposal Facility, Mpumalanga Province		
Tutuka Fabric Filter Retrofit and Dust Handling Plant Projects, Mpumalanga Province	Eskom Holdings SOC Ltd EAP: Lidwala Environmental	
Eskom's Majuba and Tutuka Ash Dump Expansion, Mpumalanga Province		
Hendrina Ash Dam Expansion, Mpumalanga Province		

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

Basic Assessments

Project Name & Location	Client Name	Role
Expansion of LOX and Diesel Storage at the Air Products Facility in Coega, Eastern Cape	Air Products South Africa (Pty) Ltd	Project Manage the Public Participation Process Facilitate all meetings Consultation with Government Officials, Key Stakeholders & Landowners
Transnet's New Multi-Products Pipeline traversing Kwa-Zulu Natal, Free State and Gauteng Provinces	Transnet EAP: Bohlweki Environmental	
Realignment of the Bulshoek Dam Weir near Klaver and the Doring River Weir near Clanwilliam, Western Cape Province	Dept of Water and Sanitation EAP: Zitholele	Public Participation

STAKEHOLDER ENGAGEMENT

Project Name & Location	Client Name	Role
Socio-Economic Impact Study for the shutdown and repurposing of Eskom Power Stations: Komati Power Station, Hendrina Power Station & Grootvlei Power Station	Urban-Econ	Project Management for the stakeholder engagement with Community

		Representatives in the primary data capture area
First State of Waste Report for South Africa	Golder Associates on behalf of the Department of Environmental Affairs	Secretarial Services
Determination, Review and Implementation of the Reserve in the Olifants/Letaba System	Golder Associates on behalf of the Department of Water and Sanitation	
Orange River Bulk Water Supply System		
Levuvu-Letaba Resources Quality Objectives		

FACILITATION

Project Name & Location	Client Name	Meeting Type
Determination, Review and Implementation of the Reserve in the Olifants/Letaba System	Department of Water and Sanitation	Secretarial Services
Orange River Bulk Water Supply System	Golder Associates	Secretarial Services
Levuvu-Letaba Resources Quality Objectives		Secretarial Services
SmancorCR Chemical Plant (Public Meeting), Gauteng Province	Samancor Chrome (Pty) Ltd EAP: Environmental Science Associates	Public Meeting
SANRAL N4 Toll Highway Project (2 nd Phase), Gauteng & North West Provinces	Department of Transport EAP: Bohlweki Environmental	Public Meetings

MINING SECTOR

Environmental Impact Assessment and Environmental Management Programme

Project Name & Location	Client Name	Role
Zero Waste Recovery Plant at highveld Steel, Mpumalanga Province	Anglo African Metals EAP: Savannah Environmental	Public Participation
Koffiefontein Slimes Dam, Free State Province	Petra Diamond Mines EAP: Zitholele	Public Participation
Baobab Project: Ethenol Plant, Chimbanje, Middle Sabie, Zimbabwe	Applicant: Green Fuel EAP: SIVEST	Public Participation & Community Consultation
BHP Billiton Energy Coal SA's Middelburg Water Treatment Plant, Mpumalanga	BHP Billiton Group EAP: Jones & Wagener	Public Participation

ENVIRONMENTAL AUTHORISATION AMENDMENTS

Project Name & Location	Client Name	Role
Transalloys Coal-Fired Power Station near Emalahleni, Mpumalanga Province	Transalloys (Pty) Ltd	Public Participation
Zen Wind Energy Facility, Western Cape	Energy Team (Pty) Ltd	
Hartebeest Wind Energy Facility, Western Cape	juwi Renewable Energies (Pty) Ltd	
Khai-Ma and Korana Wind Energy Facilities	Mainstream Renewable Power (Pty) Ltd	
Beaufort West 280MW Wind Farm into two 140MW Trakas and Beaufort West Wind Farms, Western Cape	South Africa Mainstream Renewable Power Developments EAP: SIVEST	

SECTION 54 AUDITS

Project Name & Location	Client Name	Role
Mulilo 20MW PV Facility, Prieska, Northern Cape	Mulilo (Pty) Ltd	Public Participation: I&AP Notification process
Mulilo 10MW PV Facility, De Aar, Northern Cape	Mulilo (Pty) Ltd	
Karoshhoek CSP 1 Facility/ Solar One, Upington, Northern Cape	Karoshhoek Solar One (Pty) Ltd	

APPENDIX 3: DFFE SCREENING TOOL REPORT

**SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS
REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE
ENVIRONMENTAL SENSITIVITY**

EIA Reference number: TBD

Project name: Umbila Emoyeni Electrical Grid Infrastructure

Project title: Umbila Emoyeni Electrical Grid Infrastructure

Date screening report generated: 12/05/2022 10:38:22

Applicant: Emoyeni Renewable Energy (Pty) Ltd

Compiler: Savannah Environmental (Pty) Ltd

Compiler signature:
.....

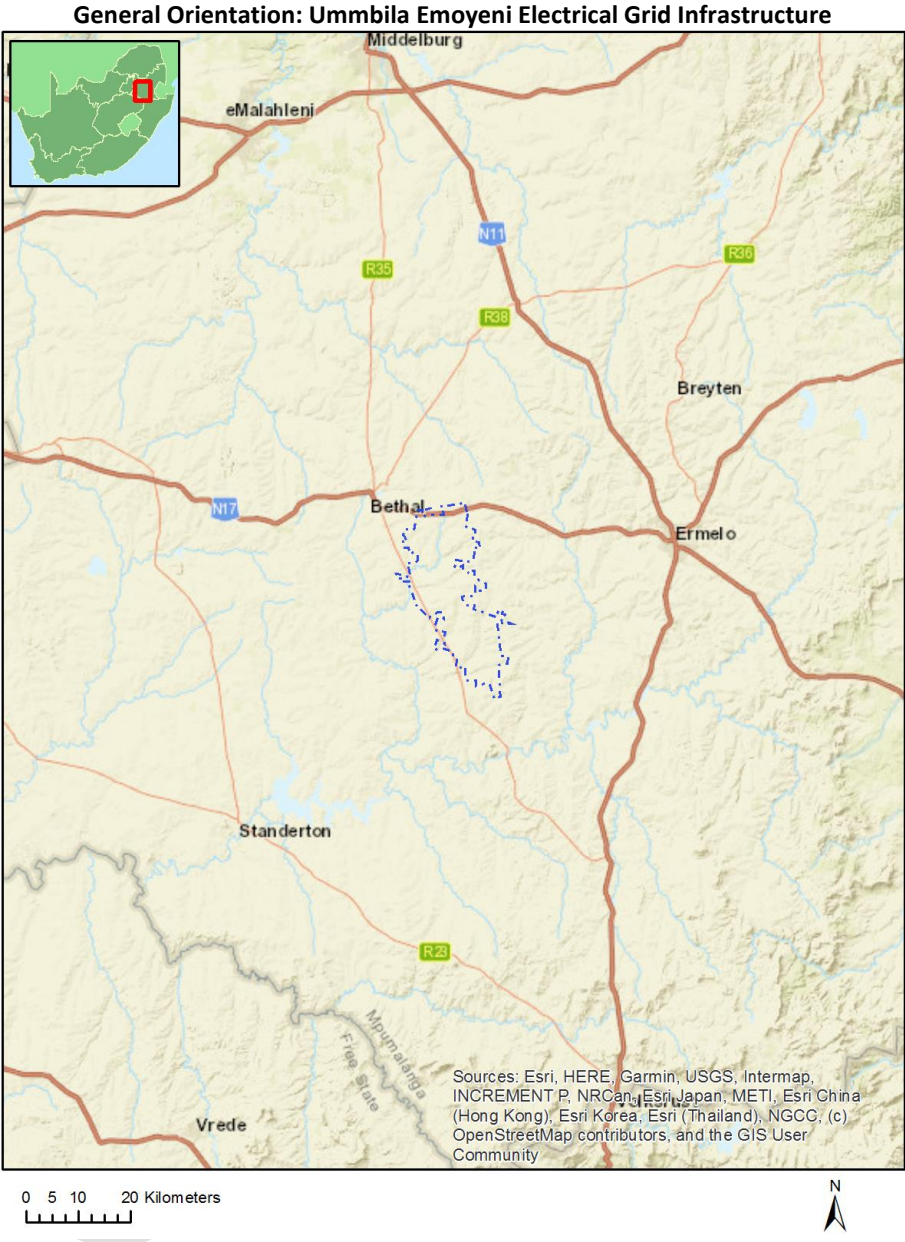
Application Category: Utilities Infrastructure | Electricity | Distribution and Transmission | Powerline

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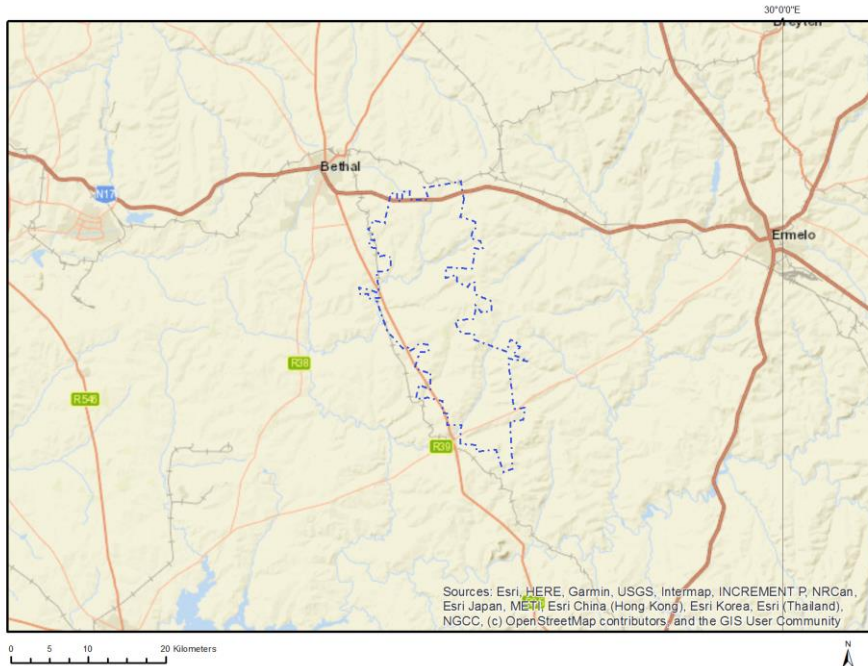
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Proposed Project Location

Orientation map 1: General location



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	SPRINGBOKFONTEIN	425	0	26°34'4.51S	29°40'25.01E	Farm
2	VAALBANK	456	0	26°41'19.21S	29°39'17.6E	Farm
3	NAUDEFONTEIN	261	0	26°28'28.25S	29°31'41.69E	Farm
4	RIETFONTEIN	420	0	26°31'55.89S	29°31'35.24E	Farm
5	MORGENZON	466	0	26°44'32.53S	29°35'44.46E	Farm
6	AMAJUBA	482	0	26°45'27.12S	29°43'35.38E	Farm
7	ROODEKRANS	457	0	26°41'27.59S	29°35'40.12E	Farm
8	DURABEL	548	0	26°34'17.12S	29°33'50.27E	Farm
9	BEKKERSPRUIT	423	0	26°32'58.95S	29°36'18.51E	Farm
10	ZEVENFONTEIN	468	0	26°43'25.32S	29°43'1.75E	Farm
11	BRAKFONTEIN SETTLEMENT	268	0	26°30'13.97S	29°39'1.92E	Farm
12	OSHOEK	454	0	26°36'52.84S	29°40'32.54E	Farm
13	GOEDEGEDACHT	458	0	26°38'30.67S	29°35'37.06E	Farm
14	KLIPKRAAL	469	0	26°42'18.67S	29°42'52.44E	Farm
15	HENDRIKSPAN	459	0	26°38'22.05S	29°32'52.43E	Farm
16	SUKKELAAR	421	0	26°34'47.76S	29°31'25.64E	Farm
17	RIETPAN	263	0	26°27'16.5S	29°35'25.66E	Farm
18	EBENHEAZER	455	0	26°38'56.57S	29°39'17.4E	Farm
19	KLIPFONTEIN	422	0	26°35'50.07S	29°36'4.08E	Farm
20	BRAKFONTEIN	452	0	26°40'23S	29°42'48.62E	Farm
21	VLAKFONTEIN -	484	0	26°46'56.99S	29°40'25.95E	Farm
22	TWEEFONTEIN	467	0	26°44'28.81S	29°39'15.89E	Farm
23	GELUKSPLAATS	264	0	26°29'51.68S	29°35'42.7E	Farm
24	NAUDEFONTEIN	261	21	26°29'7.08S	29°33'32.19E	Farm Portion
25	NAUDEFONTEIN	261	22	26°29'32.9S	29°31'13.57E	Farm Portion
26	GELUKSPLAATS	264	0	26°30'22.25S	29°34'23.29E	Farm Portion

27	GELUKSPLAATS	264	2	26°28'42.51S	29°34'35.29E	Farm Portion
28	GELUKSPLAATS	264	9	26°31'0.2S	29°36'40.36E	Farm Portion
29	GELUKSPLAATS	264	13	26°28'56.37S	29°34'23.3E	Farm Portion
30	BRAKFONTEIN SETTLEMENT	268	1	26°29'11.77S	29°38'0.82E	Farm Portion
31	BRAKFONTEIN SETTLEMENT	268	45	26°27'49.77S	29°37'38.93E	Farm Portion
32	NAUDESFONTEIN	261	1	26°28'44.5S	29°33'15.16E	Farm Portion
33	RIETPAN	263	10	26°27'44.85S	29°35'51.07E	Farm Portion
34	RIETPAN	263	5	26°27'47.26S	29°36'49.42E	Farm Portion
35	GELUKSPLAATS	264	8	26°30'34.81S	29°35'48.76E	Farm Portion
36	GELUKSPLAATS	264	14	26°28'56.09S	29°35'13.34E	Farm Portion
37	GELUKSPLAATS	264	16	26°28'54.67S	29°35'43.65E	Farm Portion
38	NAUDESFONTEIN	261	15	26°29'5.71S	29°32'44.01E	Farm Portion
39	GELUKSPLAATS	264	4	26°28'23.7S	29°37'4.57E	Farm Portion
40	BRAKFONTEIN SETTLEMENT	268	8	26°30'47.12S	29°38'52.85E	Farm Portion
41	BRAKFONTEIN SETTLEMENT	268	13	26°32'5.07S	29°39'31.77E	Farm Portion
42	BRAKFONTEIN SETTLEMENT	268	24	26°27'22.95S	29°38'18.31E	Farm Portion
43	NAUDESFONTEIN	261	25	26°29'57.67S	29°31'35E	Farm Portion
44	NAUDESFONTEIN	261	70	26°28'57.93S	29°33'14.4E	Farm Portion
45	RIETPAN	263	11	26°27'21.56S	29°35'20.66E	Farm Portion
46	GELUKSPLAATS	264	6	26°31'35.1S	29°36'36.13E	Farm Portion
47	GELUKSPLAATS	264	3	26°28'28.37S	29°35'49.83E	Farm Portion
48	GELUKSPLAATS	264	15	26°28'55.57S	29°35'34.86E	Farm Portion
49	BRAKFONTEIN SETTLEMENT	268	10	26°31'20.55S	29°38'0.6E	Farm Portion
50	BRAKFONTEIN SETTLEMENT	268	35	26°30'10.96S	29°38'34.49E	Farm Portion
51	NAUDESFONTEIN	261	24	26°29'52.28S	29°32'6.39E	Farm Portion
52	NAUDESFONTEIN	261	69	26°28'56.54S	29°32'41.71E	Farm Portion
53	RIETPAN	263	2	26°27'38.48S	29°36'47.62E	Farm Portion
54	GELUKSPLAATS	264	18	26°28'38.74S	29°37'3.19E	Farm Portion
55	BRAKFONTEIN SETTLEMENT	268	25	26°28'6.45S	29°37'57.87E	Farm Portion
56	BRAKFONTEIN SETTLEMENT	268	12	26°31'41.12S	29°38'40.65E	Farm Portion
57	RIETKUIL	57	11	26°42'48.14S	29°36'29.3E	Farm Portion
58	NAUDESFONTEIN	261	14	26°30'1.21S	29°33'1.95E	Farm Portion
59	NAUDESFONTEIN	261	71	26°28'57.38S	29°33'44.29E	Farm Portion
60	GELUKSPLAATS	264	5	26°29'32.36S	29°36'32.77E	Farm Portion
61	RIETFONTEIN	420	12	26°30'46.46S	29°32'3.3E	Farm Portion
62	GELUKSPLAATS	264	12	26°29'29.66S	29°34'46.92E	Farm Portion
63	GELUKSPLAATS	264	11	26°31'22.36S	29°34'28.68E	Farm Portion
64	BRAKFONTEIN SETTLEMENT	268	28	26°28'40.71S	29°38'9.41E	Farm Portion
65	BRAKFONTEIN SETTLEMENT	268	34	26°29'30.46S	29°37'59.97E	Farm Portion
66	BRAKFONTEIN SETTLEMENT	268	5	26°29'52.86S	29°37'53.54E	Farm Portion
67	BRAKFONTEIN SETTLEMENT	268	6	26°30'32.09S	29°37'40.2E	Farm Portion
68	GELUKSPLAATS	264	10	26°31'33.85S	29°35'40.69E	Farm Portion
69	GELUKSPLAATS	264	17	26°28'52.28S	29°36'19.91E	Farm Portion
70	BRAKFONTEIN SETTLEMENT	268	7	26°30'38.07S	29°38'14.25E	Farm Portion
71	BRAKFONTEIN SETTLEMENT	268	11	26°31'21.86S	29°37'29.81E	Farm Portion
72	RIETFONTEIN	420	11	26°30'39.26S	29°33'5.51E	Farm Portion

73	RIETFONTEIN	420	13	26°30'41.78S	29°30'32.56E	Farm Portion
74	SUKKELAAR	421	25	26°34'58.91S	29°31'29.77E	Farm Portion
75	SUKKELAAR	421	14	26°36'40.12S	29°32'0.3E	Farm Portion
76	SUKKELAAR	421	37	26°37'2.88S	29°33'4.16E	Farm Portion
77	SUKKELAAR	421	9	26°35'34.9S	29°32'1.45E	Farm Portion
78	SUKKELAAR	421	57	26°34'35.6S	29°31'49.97E	Farm Portion
79	KLIPFONTEIN	422	14	26°35'2.08S	29°35'49.9E	Farm Portion
80	SUKKELAAR	421	6	26°35'24.4S	29°31'5.57E	Farm Portion
81	SUKKELAAR	421	8	26°34'29.33S	29°31'54.11E	Farm Portion
82	SUKKELAAR	421	12	26°36'58.65S	29°32'43.4E	Farm Portion
83	SUKKELAAR	421	12	26°36'40.98S	29°32'58.69E	Farm Portion
84	SUKKELAAR	421	9	26°35'28.8S	29°32'26.43E	Farm Portion
85	SUKKELAAR	421	54	26°35'28.43S	29°32'14.04E	Farm Portion
86	SUKKELAAR	421	55	26°35'4.05S	29°32'3.58E	Farm Portion
87	KLIPFONTEIN	422	7	26°35'24.89S	29°38'9.22E	Farm Portion
88	KLIPFONTEIN	422	10	26°36'15.95S	29°37'39.49E	Farm Portion
89	KLIPFONTEIN	422	2	26°33'55.29S	29°34'25.37E	Farm Portion
90	KLIPFONTEIN	422	11	26°36'50.89S	29°37'53.13E	Farm Portion
91	BEKKERSPRUIT	423	20	26°33'47S	29°36'52.99E	Farm Portion
92	BRAK FONTEIN SETTLEMENT	268	9	26°31'10.44S	29°38'44.86E	Farm Portion
93	RIETFONTEIN	420	2	26°33'11.75S	29°31'21.92E	Farm Portion
94	RIETFONTEIN	420	8	26°33'17.93S	29°33'19.13E	Farm Portion
95	SUKKELAAR	421	22	26°34'42.86S	29°30'46.33E	Farm Portion
96	SUKKELAAR	421	37	26°36'43.21S	29°33'9.93E	Farm Portion
97	SUKKELAAR	421	49	26°37'1.72S	29°33'4.67E	Farm Portion
98	RIETFONTEIN	420	15	26°32'17.47S	29°31'57.86E	Farm Portion
99	SUKKELAAR	421	7	26°35'26.99S	29°33'4.21E	Farm Portion
100	SUKKELAAR	421	10	26°36'0.2S	29°32'44.12E	Farm Portion
101	SUKKELAAR	421	53	26°36'6.71S	29°32'33.2E	Farm Portion
102	SUKKELAAR	421	56	26°34'48.8S	29°31'56.81E	Farm Portion
103	SUKKELAAR	421	1	26°34'27.7S	29°31'21.4E	Farm Portion
104	KLIPFONTEIN	422	8	26°35'39.4S	29°36'34.75E	Farm Portion
105	KLIPFONTEIN	422	12	26°37'5.2S	29°36'32.14E	Farm Portion
106	BEKKERSPRUIT	423	10	26°34'24.98S	29°37'43.46E	Farm Portion
107	BEKKERSPRUIT	423	15	26°32'21.3S	29°37'18.48E	Farm Portion
108	BEKKERSPRUIT	423	16	26°33'18.26S	29°38'3.73E	Farm Portion
109	BEKKERSPRUIT	423	25	26°33'47.79S	29°35'16.1E	Farm Portion
110	RIETFONTEIN	420	23	26°31'13.99S	29°31'10.84E	Farm Portion
111	RIETFONTEIN	420	9	26°32'30.21S	29°33'11.21E	Farm Portion
112	RIETFONTEIN	420	19	26°31'7.09S	29°33'23.96E	Farm Portion
113	RIETFONTEIN	420	14	26°31'39.67S	29°30'32.08E	Farm Portion
114	RIETFONTEIN	420	24	26°31'20.58S	29°30'53.07E	Farm Portion
115	SUKKELAAR	421	21	26°34'21.78S	29°30'50.44E	Farm Portion
116	SUKKELAAR	421	36	26°35'24.37S	29°33'30.94E	Farm Portion
117	SUKKELAAR	421	35	26°35'6.95S	29°32'36.36E	Farm Portion
118	SUKKELAAR	421	51	26°36'24.68S	29°32'43.5E	Farm Portion
119	SUKKELAAR	421	11	26°36'22.26S	29°32'52.22E	Farm Portion
120	SUKKELAAR	421	1	26°34'21.63S	29°31'43.22E	Farm Portion
121	SUKKELAAR	421	58	26°34'26.6S	29°31'43.78E	Farm Portion
122	KLIPFONTEIN	422	18	26°35'22.84S	29°33'49.72E	Farm Portion
123	RIETFONTEIN	420	20	26°32'56.56S	29°32'11.66E	Farm Portion
124	RIETFONTEIN	420	32	26°31'59.22S	29°33'5.2E	Farm Portion
125	RIETFONTEIN	420	22	26°30'51.05S	29°31'18.5E	Farm Portion
126	RIETFONTEIN	420	0	26°32'20.55S	29°29'37.04E	Farm Portion
127	SUKKELAAR	421	5	26°34'39.81S	29°30'5.45E	Farm Portion
128	SUKKELAAR	421	23	26°34'43.01S	29°31'27.69E	Farm Portion
129	SUKKELAAR	421	34	26°34'49.67S	29°33'25.94E	Farm Portion
130	SUKKELAAR	421	39	26°33'46.73S	29°32'5.32E	Farm Portion
131	SUKKELAAR	421	40	26°33'54.76S	29°33'3.46E	Farm Portion

132	SUKKELAAR	421	11	26°36'26.75S	29°32'24.67E	Farm Portion
133	SUKKELAAR	421	52	26°36'31.52S	29°32'46.78E	Farm Portion
134	SUKKELAAR	421	2	26°34'54.36S	29°31'57.57E	Farm Portion
135	KLIPFONTEIN	422	20	26°35'16.03S	29°36'35.27E	Farm Portion
136	KLIPFONTEIN	422	4	26°36'23.05S	29°37'45.67E	Farm Portion
137	KLIPFONTEIN	422	0	26°37'11.82S	29°37'30.27E	Farm Portion
138	BEKKERSPRUIT	423	1	26°33'5.24S	29°34'36.67E	Farm Portion
139	SUKKELAAR	421	43	26°34'51.88S	29°31'53.66E	Farm Portion
140	SUKKELAAR	421	45	26°34'31.73S	29°31'56.39E	Farm Portion
141	SUKKELAAR	421	13	26°37'7.92S	29°32'7.18E	Farm Portion
142	SUKKELAAR	421	15	26°36'8.63S	29°31'33.32E	Farm Portion
143	SUKKELAAR	421	42	26°34'38.41S	29°32'35.57E	Farm Portion
144	SUKKELAAR	421	42	26°35'5.49S	29°32'2E	Farm Portion
145	KLIPFONTEIN	422	16	26°36'58.21S	29°35'55.58E	Farm Portion
146	KLIPFONTEIN	422	23	26°34'51.83S	29°34'35.14E	Farm Portion
147	BEKKERSPRUIT	423	19	26°34'2.6S	29°36'10.5E	Farm Portion
148	OSHOEK	454	3	26°38'23.29S	29°41'54.62E	Farm Portion
149	VAALBANK	456	2	26°40'40.32S	29°40'27.02E	Farm Portion
150	VAALBANK	456	4	26°41'42.4S	29°38'46.35E	Farm Portion
151	ROODEKRANS	457	8	26°41'2.98S	29°34'11.86E	Farm Portion
152	RIETFONTEIN	420	16	26°31'21.75S	29°31'47.56E	Farm Portion
153	RIETFONTEIN	420	27	26°32'21.95S	29°31'15.08E	Farm Portion
154	RIETFONTEIN	420	10	26°31'34.16S	29°32'58.91E	Farm Portion
155	RIETFONTEIN	420	18	26°31'46S	29°31'47.28E	Farm Portion
156	SUKKELAAR	421	38	26°36'4.66S	29°33'15.25E	Farm Portion
157	SUKKELAAR	421	50	26°36'45.86S	29°32'55.66E	Farm Portion
158	SUKKELAAR	421	10	26°36'7.66S	29°32'14.66E	Farm Portion
159	SUKKELAAR	421	2	26°34'13.99S	29°32'32.82E	Farm Portion
160	SUKKELAAR	421	4	26°35'38.65S	29°31'31.06E	Farm Portion
161	KLIPFONTEIN	422	9	26°36'16.04S	29°36'22.13E	Farm Portion
162	KLIPFONTEIN	422	19	26°35'1.93S	29°36'43.73E	Farm Portion
163	BEKKERSPRUIT	423	13	26°31'48.98S	29°35'30.69E	Farm Portion
164	BEKKERSPRUIT	423	22	26°32'32.52S	29°34'24.09E	Farm Portion
165	BEKKERSPRUIT	423	17	26°34'28.4S	29°38'20.01E	Farm Portion
166	KLIPFONTEIN	422	13	26°36'20.97S	29°34'43.89E	Farm Portion
167	BEKKERSPRUIT	423	9	26°34'0.55S	29°37'47.36E	Farm Portion
168	BEKKERSPRUIT	423	3	26°33'34.65S	29°36'52.26E	Farm Portion
169	OSHOEK	454	12	26°35'30.34S	29°40'5.42E	Farm Portion
170	EBENHEAZER	455	3	26°39'20.07S	29°40'19.11E	Farm Portion
171	EBENHEAZER	455	2	26°38'42.91S	29°40'29.85E	Farm Portion
172	VAALBANK	456	16	26°42'40.86S	29°38'7.48E	Farm Portion
173	VAALBANK	456	3	26°41'30.64S	29°40'33.04E	Farm Portion
174	VAALBANK	456	14	26°41'2.43S	29°38'48.28E	Farm Portion
175	ROODEKRANS	457	27	26°42'42.6S	29°36'35.69E	Farm Portion
176	ROODEKRANS	457	4	26°42'37.32S	29°36'59.48E	Farm Portion
177	ROODEKRANS	457	6	26°41'31.94S	29°36'10.15E	Farm Portion
178	ROODEKRANS	457	21	26°40'24.92S	29°34'55.77E	Farm Portion
179	GOEDEGEDACHT	458	21	26°37'25.75S	29°34'29.08E	Farm Portion
180	GOEDEGEDACHT	458	17	26°39'10.26S	29°37'30.05E	Farm Portion
181	GOEDEGEDACHT	458	39	26°39'27.8S	29°35'0.52E	Farm Portion
182	BEKKERSPRUIT	423	24	26°32'29.77S	29°35'33.17E	Farm Portion
183	OSHOEK	454	13	26°35'15.12S	29°39'2.33E	Farm Portion
184	VAALBANK	456	1	26°40'9.59S	29°39'45.98E	Farm Portion
185	ROODEKRANS	457	1	26°40'17.73S	29°36'28.15E	Farm Portion
186	ROODEKRANS	457	29	26°42'11.45S	29°36'24.74E	Farm Portion
187	ROODEKRANS	457	30	26°42'6.05S	29°36'21.97E	Farm Portion
188	GOEDEGEDACHT	458	32	26°38'43.43S	29°37'3.16E	Farm Portion
189	GOEDEGEDACHT	458	33	26°37'33.09S	29°35'32E	Farm Portion
190	GOEDEGEDACHT	458	18	26°38'9.56S	29°35'24.26E	Farm Portion
191	GOEDEGEDACHT	458	25	26°38'52.64S	29°35'2.52E	Farm Portion

192	KLIPFONTEIN	422	17	26°34'38.67S	29°35'13.88E	Farm Portion
193	KLIPFONTEIN	422	21	26°35'40.01S	29°34'9.35E	Farm Portion
194	OSHOEK	454	4	26°35'40.83S	29°39'15.32E	Farm Portion
195	ROODEKRANS	457	0	26°42'43.69S	29°34'37.4E	Farm Portion
196	ROODEKRANS	457	34	26°40'17.56S	29°35'6.32E	Farm Portion
197	ROODEKRANS	457	21	26°40'15.23S	29°35'18.67E	Farm Portion
198	GOEDEGEDACHT	458	22	26°37'50.27S	29°34'17.2E	Farm Portion
199	GOEDEGEDACHT	458	29	26°38'18.47S	29°35'50.94E	Farm Portion
200	GOEDEGEDACHT	458	9	26°38'43.44S	29°37'39.08E	Farm Portion
201	GOEDEGEDACHT	458	19	26°37'32.33S	29°34'50E	Farm Portion
202	GOEDEGEDACHT	458	40	26°39'48.06S	29°35'6.61E	Farm Portion
203	BEKKERSPRUIT	423	5	26°33'34.49S	29°34'23.36E	Farm Portion
204	BEKKERSPRUIT	423	12	26°31'39.11S	29°34'20.94E	Farm Portion
205	BRAKFONTein	452	4	26°39'22.43S	29°42'21.52E	Farm Portion
206	OSHOEK	454	7	26°37'37.77S	29°40'27.45E	Farm Portion
207	OSHOEK	454	17	26°36'13S	29°39'39.43E	Farm Portion
208	EBENHEAZER	455	0	26°38'25.6S	29°38'56.67E	Farm Portion
209	VAALBANK	456	12	26°40'59.44S	29°37'49.14E	Farm Portion
210	VAALBANK	456	17	26°42'35.27S	29°40'46.23E	Farm Portion
211	VAALBANK	456	19	26°42'6.86S	29°40'39.98E	Farm Portion
212	VAALBANK	456	5	26°41'39.63S	29°39'23.64E	Farm Portion
213	VAALBANK	456	7	26°42'25.88S	29°40'8.14E	Farm Portion
214	ROODEKRANS	457	28	26°42'25.42S	29°36'29.24E	Farm Portion
215	ROODEKRANS	457	18	26°42'18.95S	29°36'33.54E	Farm Portion
216	ROODEKRANS	457	6	26°41'44.43S	29°35'27.89E	Farm Portion
217	ROODEKRANS	457	32	26°41'8.74S	29°35'41.33E	Farm Portion
218	GOEDEGEDACHT	458	8	26°38'8.31S	29°37'8.93E	Farm Portion
219	GOEDEGEDACHT	458	2	26°39'46.55S	29°36'36.44E	Farm Portion
220	HENDRIKSPAN	459	17	26°37'19.08S	29°33'14.41E	Farm Portion
221	ROODEKRANS	457	24	26°41'34.46S	29°34'34.79E	Farm Portion
222	ROODEKRANS	457	25	26°42'13.81S	29°35'48.62E	Farm Portion
223	ROODEKRANS	457	25	26°42'2.94S	29°36'22.22E	Farm Portion
224	GOEDEGEDACHT	458	31	26°38'27.68S	29°36'23.19E	Farm Portion
225	GOEDEGEDACHT	458	36	26°38'11.23S	29°35'1.88E	Farm Portion
226	GOEDEGEDACHT	458	38	26°39'37.13S	29°35'3.13E	Farm Portion
227	GOEDEGEDACHT	458	3	26°38'11.89S	29°34'36.42E	Farm Portion
228	GOEDEGEDACHT	458	11	26°39'28.38S	29°36'58.83E	Farm Portion
229	GOEDEGEDACHT	458	41	26°38'29.2S	29°34'19.66E	Farm Portion
230	BEKKERSPRUIT	423	6	26°33'20.57S	29°35'51.56E	Farm Portion
231	BEKKERSPRUIT	423	8	26°33'30.96S	29°37'36.68E	Farm Portion
232	BEKKERSPRUIT	423	14	26°32'31.28S	29°36'42.36E	Farm Portion
233	BEKKERSPRUIT	423	4	26°32'24.66S	29°36'4.51E	Farm Portion
234	SPRINGBOKFONTEIN	425	4	26°34'26.93S	29°39'3.01E	Farm Portion
235	SPRINGBOKFONTEIN	425	9	26°32'55.45S	29°38'44.41E	Farm Portion
236	BRAKFONTein	452	2	26°40'41.88S	29°41'40.65E	Farm Portion
237	OSHOEK	454	21	26°37'27.1S	29°38'39.72E	Farm Portion
238	OSHOEK	454	1	26°36'31.5S	29°39'7.13E	Farm Portion
239	VAALBANK	456	18	26°42'41.33S	29°39'17.84E	Farm Portion
240	VAALBANK	456	15	26°42'3.71S	29°38'17.3E	Farm Portion
241	ROODEKRANS	457	26	26°42'54.33S	29°36'40.07E	Farm Portion
242	ROODEKRANS	457	22	26°41'7.04S	29°36'37.14E	Farm Portion
243	ROODEKRANS	457	23	26°40'48.38S	29°35'58.31E	Farm Portion
244	BEKKERSPRUIT	423	0	26°32'5.42S	29°34'29.56E	Farm Portion
245	OSHOEK	454	18	26°38'10.02S	29°41'12.92E	Farm Portion
246	OSHOEK	454	6	26°37'45.85S	29°39'41.05E	Farm Portion
247	EBENHEAZER	455	1	26°39'22.42S	29°38'31.26E	Farm Portion
248	VAALBANK	456	8	26°41'43.22S	29°38'29.59E	Farm Portion
249	VAALBANK	456	11	26°40'15.98S	29°38'19.02E	Farm Portion
250	ROODEKRANS	457	7	26°41'0.22S	29°34'52.35E	Farm Portion
251	ROODEKRANS	457	18	26°42'24.88S	29°36'14.94E	Farm Portion

252	ROODEKRANS	457	31	26°41'37.02S	29°36'2.24E	Farm Portion
253	GOEDEGEDACHT	458	27	26°37'30.54S	29°35'51.57E	Farm Portion
254	GOEDEGEDACHT	458	5	26°37'51.07S	29°37'36.47E	Farm Portion
255	GOEDEGEDACHT	458	26	26°38'40.56S	29°35'49.83E	Farm Portion
256	GOEDEGEDACHT	458	0	26°37'49.14S	29°38'13.84E	Farm Portion
257	GOEDEGEDACHT	458	48	26°38'13.88S	29°33'45.69E	Farm Portion
258	GOEDEGEDACHT	458	23	26°38'17.47S	29°33'39.8E	Farm Portion
259	GOEDEGEDACHT	458	49	26°37'48.89S	29°33'31.46E	Farm Portion
260	KLIPFONTEIN	422	22	26°36'2.02S	29°34'14.51E	Farm Portion
261	KLIPFONTEIN	422	5	26°34'39.45S	29°36'49.12E	Farm Portion
262	KLIPFONTEIN	422	6	26°35'18.42S	29°37'31.15E	Farm Portion
263	KLIPFONTEIN	422	3	26°36'51.16S	29°34'56.35E	Farm Portion
264	BEKKERSPRUIT	423	2	26°32'24.08S	29°38'2.2E	Farm Portion
265	BEKKERSPRUIT	423	7	26°33'16.7S	29°36'50.56E	Farm Portion
266	BEKKERSPRUIT	423	11	26°34'8.81S	29°36'58.28E	Farm Portion
267	BEKKERSPRUIT	423	23	26°32'1.83S	29°35'24.89E	Farm Portion
268	OSHOEK	454	20	26°37'31.44S	29°39'8.45E	Farm Portion
269	VAALBANK	456	13	26°42'22.12S	29°40'2.7E	Farm Portion
270	ROODEKRANS	457	4	26°42'37.32S	29°36'59.48E	Farm Portion
271	ROODEKRANS	457	33	26°40'55.93S	29°35'31.97E	Farm Portion
272	ROODEKRANS	457	23	26°40'57.15S	29°35'30.54E	Farm Portion
273	MORGENZON	466	3	26°43'48.25S	29°37'25.64E	Farm Portion
274	MORGENZON	466	7	26°43'13.34S	29°37'5.37E	Farm Portion
275	TWEEFONTEIN	467	7	26°44'17.94S	29°39'15.01E	Farm Portion
276	ZEVENFONTEIN	468	2	26°43'19.23S	29°41'15.41E	Farm Portion
277	GOEDEGEDACHT	458	12	26°39'0.54S	29°36'5.25E	Farm Portion
278	GOEDEGEDACHT	458	15	26°37'22.17S	29°34'4.65E	Farm Portion
279	GOEDEGEDACHT	458	37	26°39'19.68S	29°34'59.69E	Farm Portion
280	GOEDEGEDACHT	458	34	26°37'31.86S	29°35'22.04E	Farm Portion
281	GOEDEGEDACHT	458	10	26°39'6.53S	29°36'57.58E	Farm Portion
282	GOEDEGEDACHT	458	4	26°37'17.27S	29°33'36.2E	Farm Portion
283	TWEEFONTEIN	467	10	26°43'48.16S	29°39'23.92E	Farm Portion
284	HENDRIKSPAN	459	15	26°37'9.48S	29°33'15.71E	Farm Portion
285	TWEEFONTEIN	467	0	26°43'32.5S	29°38'15.31E	Farm Portion
286	TWEEFONTEIN	467	2	26°45'19.67S	29°39'47.8E	Farm Portion
287	GOEDEGEDACHT	458	14	26°39'32.96S	29°35'53.11E	Farm Portion
288	GOEDEGEDACHT	458	16	26°37'40.59S	29°36'19.96E	Farm Portion
289	GOEDEGEDACHT	458	28	26°37'56S	29°35'51.44E	Farm Portion
290	GOEDEGEDACHT	458	13	26°39'15.08S	29°36'2.42E	Farm Portion
291	GOEDEGEDACHT	458	44	26°39'26.22S	29°34'29.03E	Farm Portion
292	GOEDEGEDACHT	458	1	26°39'24.71S	29°34'0.8E	Farm Portion
293	GOEDEGEDACHT	458	4	26°37'59.67S	29°33'32.32E	Farm Portion
294	KLIPKRAAL	469	4	26°42'35.56S	29°42'18.91E	Farm Portion
295	TWEEFONTEIN	467	5	26°45'1.33S	29°40'52.08E	Farm Portion
296	TWEEFONTEIN	467	6	26°43'16.91S	29°39'25.86E	Farm Portion
297	AMAJUBA	482	1	26°44'44.12S	29°41'39.81E	Farm Portion
298	AMAJUBA	482	2	26°45'27.97S	29°41'52.52E	Farm Portion
299	KLIPKRAAL	469	3	26°42'5.44S	29°42'25.36E	Farm Portion
300	VLAKFONTEIN -	484	4	26°46'31.54S	29°40'33.92E	Farm Portion
301	TWEEFONTEIN	467	4	26°45'10.04S	29°40'27.7E	Farm Portion
302	KLIPKRAAL	469	7	26°42'27.05S	29°41'12.41E	Farm Portion
303	TWEEFONTEIN	467	1	26°43'55.72S	29°40'26.65E	Farm Portion
304	TWEEFONTEIN	467	8	26°43'8.01S	29°40'25.78E	Farm Portion
305	KLIPKRAAL	469	6	26°42'26.65S	29°41'29.98E	Farm Portion
306	KLIPKRAAL	469	8	26°42'32.85S	29°41'47.14E	Farm Portion
307	KLIPKRAAL	469	1	26°42'20.75S	29°42'24.72E	Farm Portion
308	KLIPKRAAL	469	5	26°42'9.75S	29°41'47.94E	Farm Portion
309		547	11	26°42'40.65S	29°36'36.87E	Farm Portion
310	DURABEL	548	0	26°34'17.12S	29°33'50.27E	Farm Portion
311	GOEDEGEDACHT	458	35	26°37'33.52S	29°35'8.06E	Farm Portion

312	GOEDEGEDACHT	458	21	26°38'9.96S	29°34'2.22E	Farm Portion
313	HENDRIKSPAN	459	15	26°37'57.66S	29°33'5.24E	Farm Portion
314	TWEEFONTEIN	467	3	26°45'21.44S	29°38'51.87E	Farm Portion
315	TWEEFONTEIN	467	9	26°45'3.9S	29°37'58.12E	Farm Portion
316	ZEVENFONTEIN	468	3	26°44'5.22S	29°41'17.91E	Farm Portion

Development footprint¹ vertices:
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No	EIA Reference No	Classification	Status of application	Distance from proposed area (km)
1	14/12/16/3/3/2/754	Solar PV	Approved	25
2	14/12/16/3/3/2/754	Solar PV	Approved	25

Environmental Management Frameworks relevant to the application

No intersections with EMF areas found.

Environmental screening results and assessment outcomes

The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Utilities Infrastructure | Electricity | Distribution and Transmission | Powerline.**

Relevant development incentives, restrictions, exclusions or prohibitions

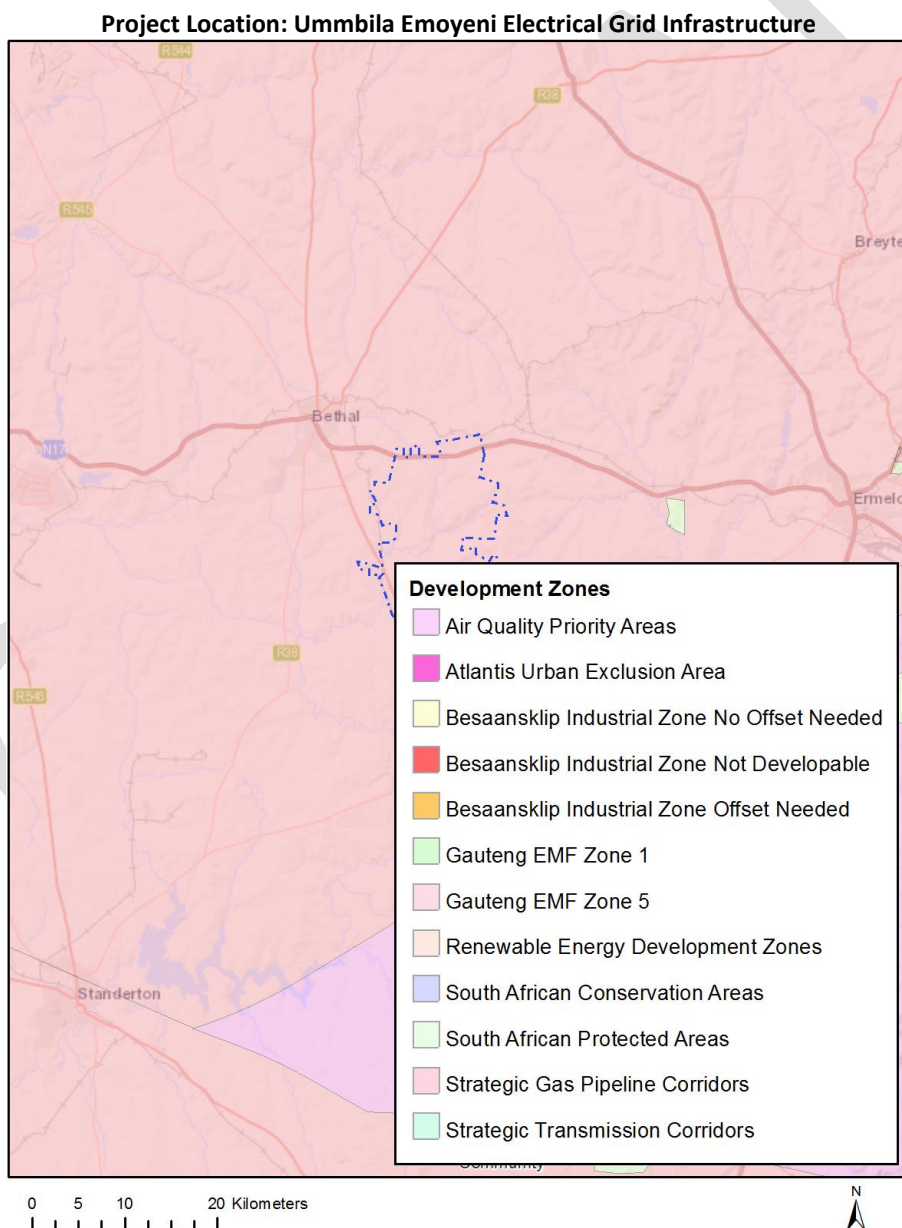
The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

Incentive, restriction or prohibition	Implication
Air	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/HIGH

¹ “development footprint”, means the area within the site on which the development will take place and includes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

Quality-Highveld Priority Area	VELD_PRIORITY_AREA_AQMP.pdf
Strategic Gas Pipeline Corridors -Phase 8: Rompco Pipeline Corridor	https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/Combined_GAS.pdf

Map indicating proposed development footprint within applicable development incentive, restriction, exclusion or prohibition zones



Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

Specialist assessments identified

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

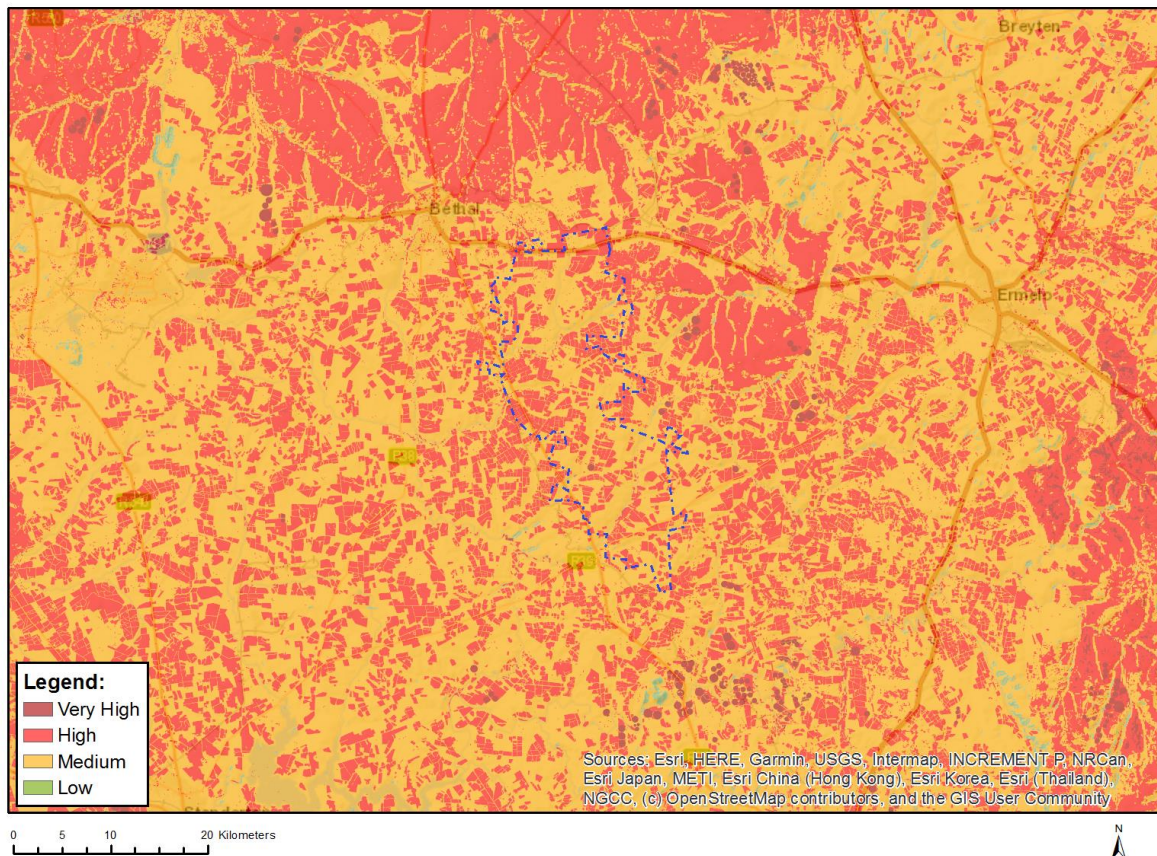
N o	Special ist assess ment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Landscape/Visual Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf

5	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted Terrestrial Biodiversity Assessment Protocols.pdf
6	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted Aquatic Biodiversity Assessment Protocols.pdf
7	Avian Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted Avifauna Assessment Protocols.pdf
8	Civil Aviation Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted Civil Aviation Installations Assessment Protocols.pdf
9	RFI Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted General Requirement Assessment Protocols.pdf
10	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted General Requirement Assessment Protocols.pdf
11	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted Plant Species Assessment Protocols.pdf
12	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted Animal Species Assessment Protocols.pdf

Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

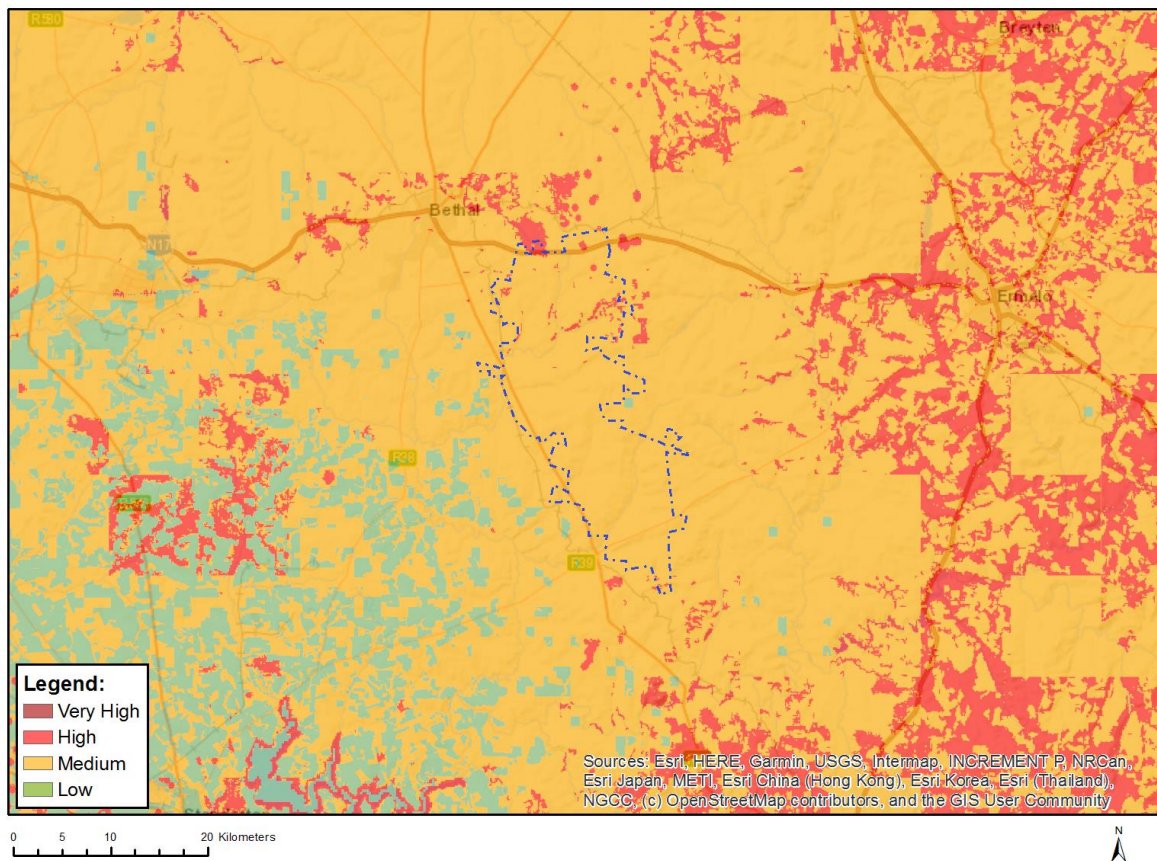


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Land capability;09. Moderate-High/10. Moderate-High
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;09. Moderate-High/10. Moderate-High
High	Old Fields;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Old Fields;Land capability;09. Moderate-High/10. Moderate-High
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

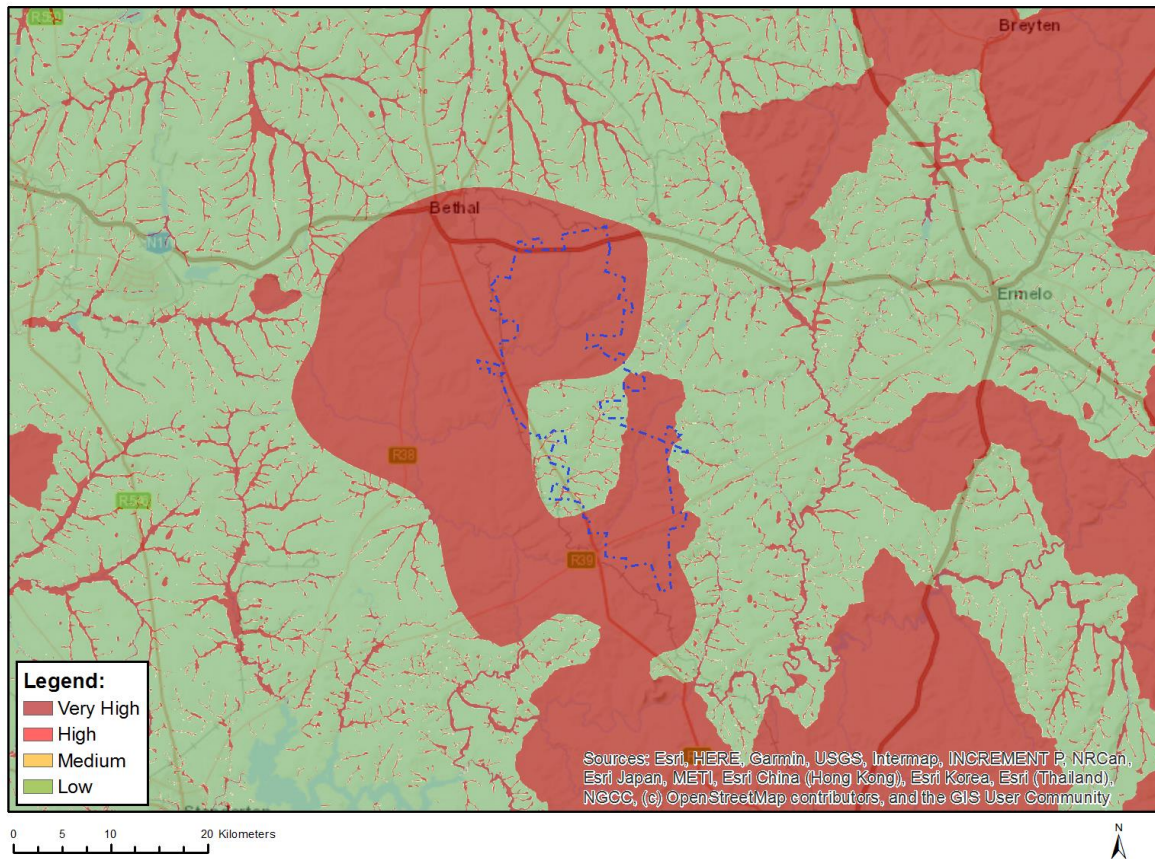
Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Aves-Balearica regulorum
High	Aves-Sagittarius serpentarius
High	Aves-Geronticus calvus
High	Aves-Mycteria ibis
Medium	Aves-Tyto capensis
Medium	Aves-Hydroprogne caspia
Medium	Aves-Sagittarius serpentarius
Medium	Aves-Geronticus calvus
Medium	Aves-Eupodotis senegalensis
Medium	Aves-Balearica regulorum
Medium	Aves-Circus ranivorus
Medium	Insecta-Lepidochrysops procera
Medium	Mammalia-Crociodura maquassiensis

Medium	Mammalia-Hydrictis maculicollis
Medium	Mammalia-Ourebia ourebi ourebi

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

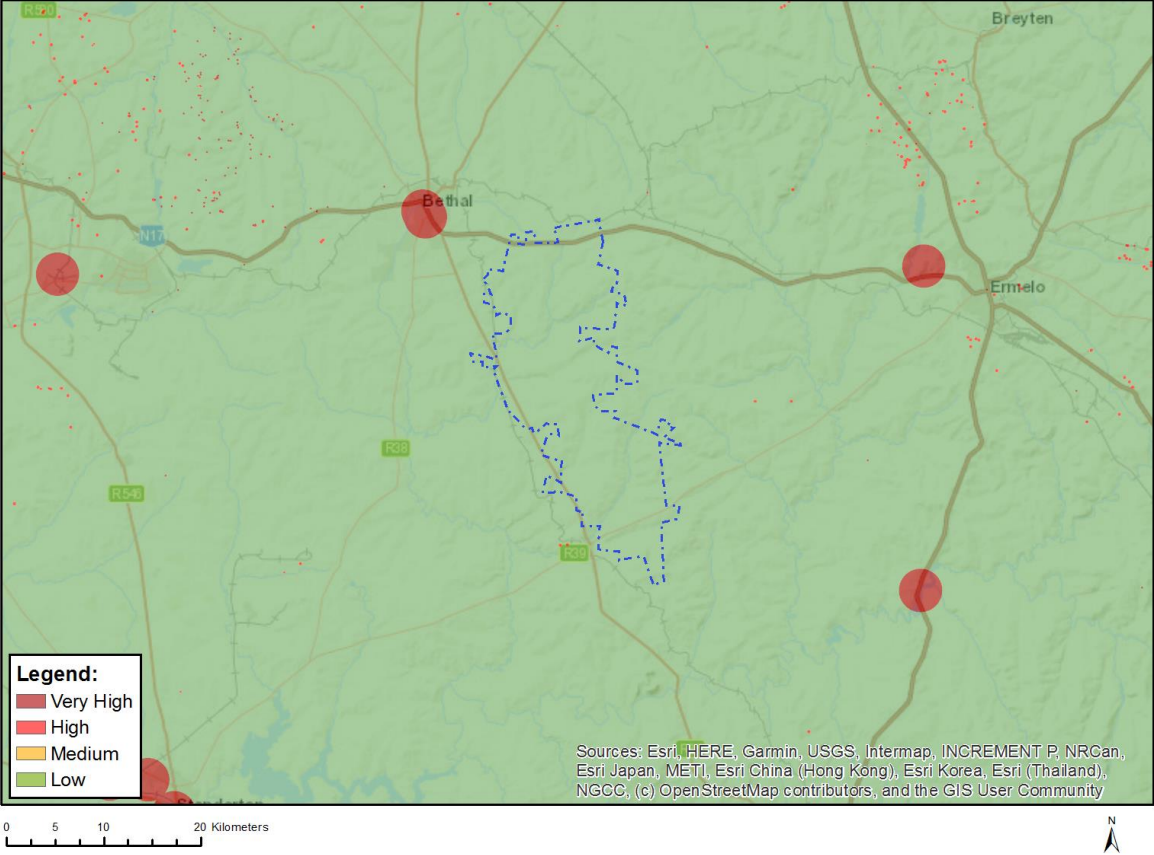


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Aquatic CBAs
Very High	Strategic water source area
Very High	Wetlands and Estuaries
Very High	Freshwater ecosystem priority area quinary catchments

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

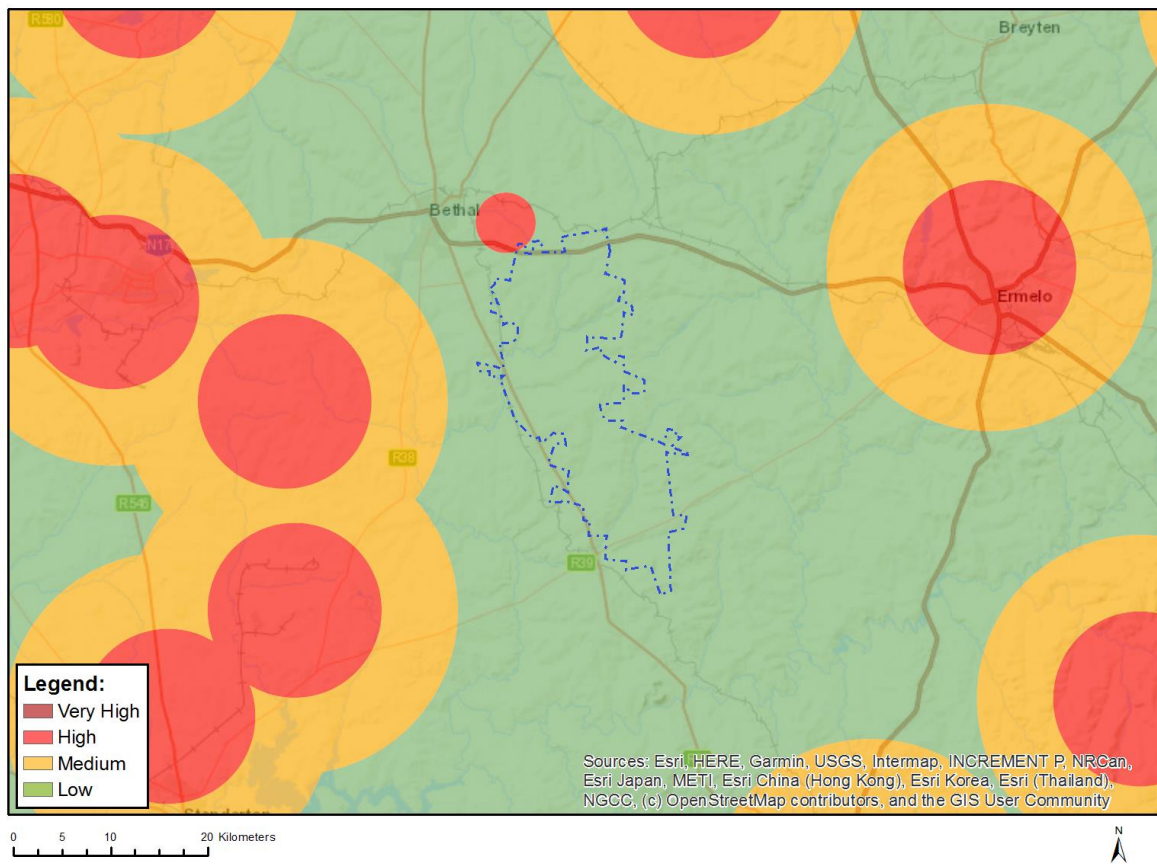


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY

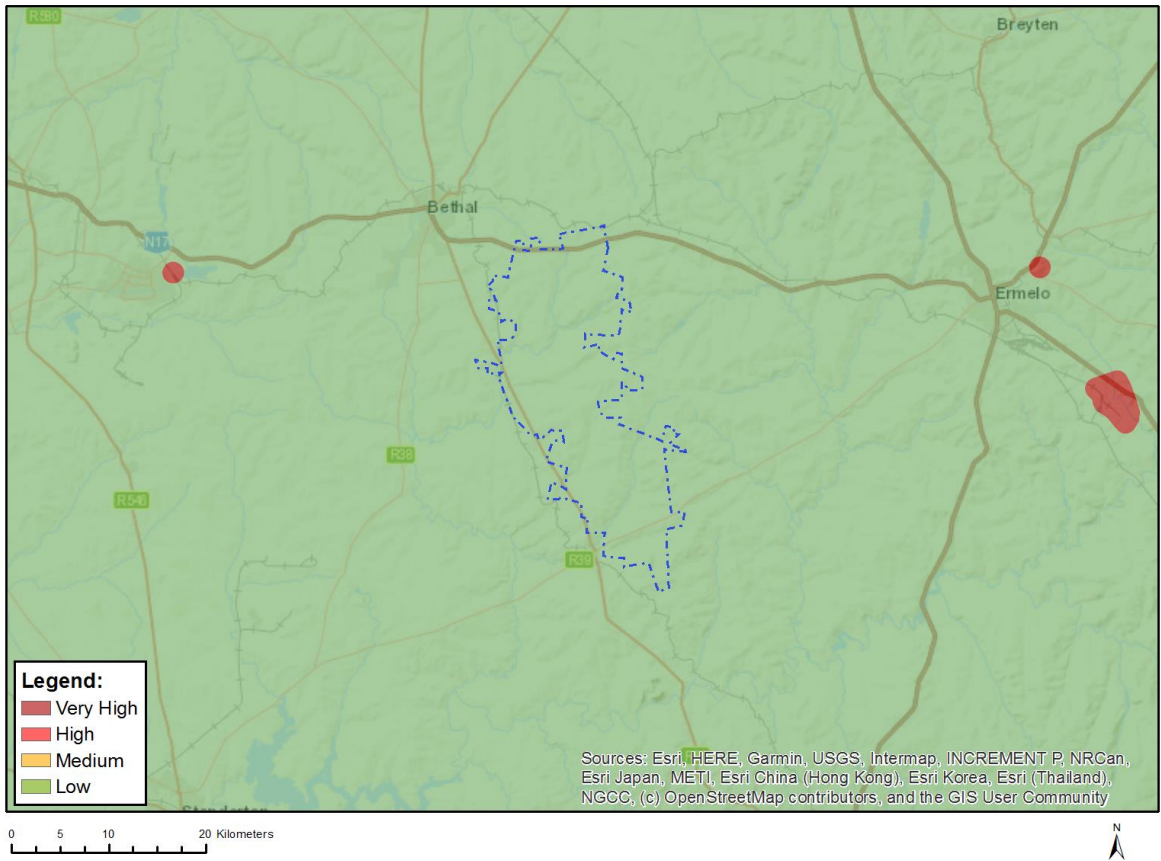


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Dangerous and restricted airspace as demarcated
Low	Low sensitivity

MAP OF RELATIVE DEFENCE THEME SENSITIVITY

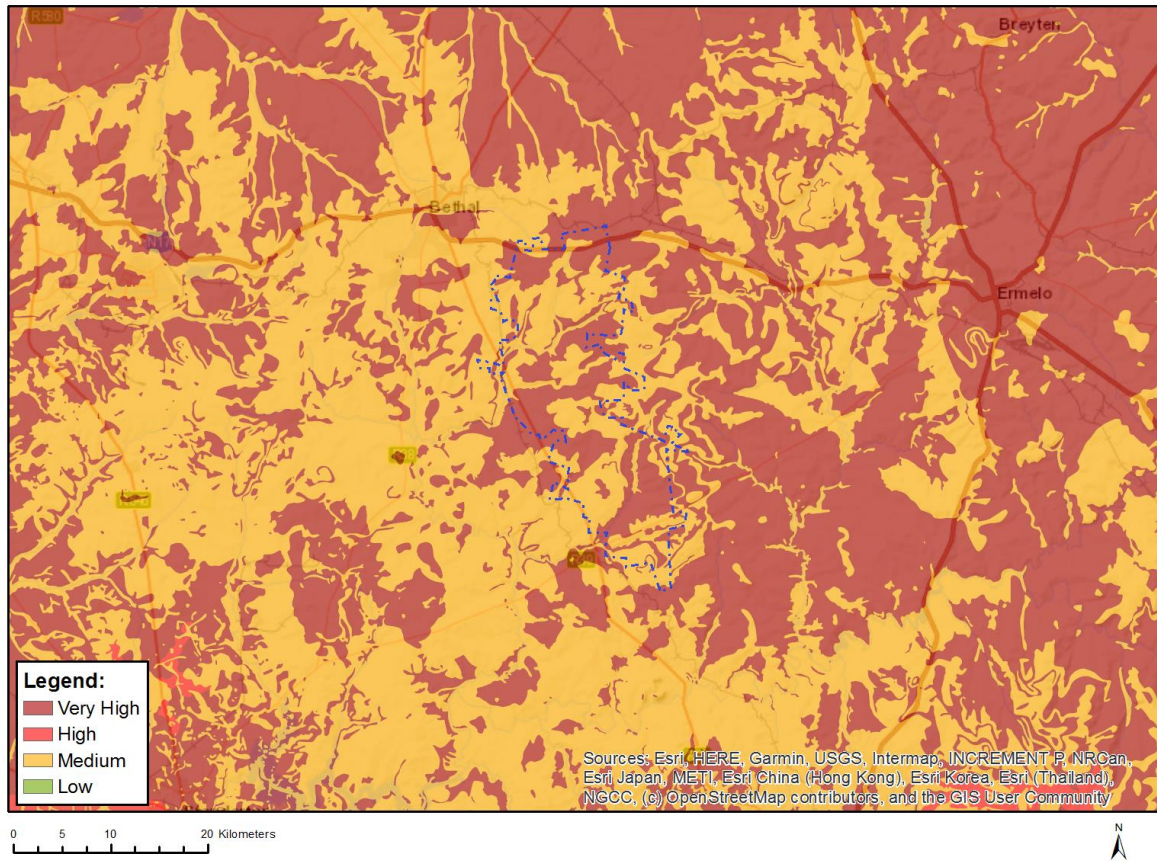


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

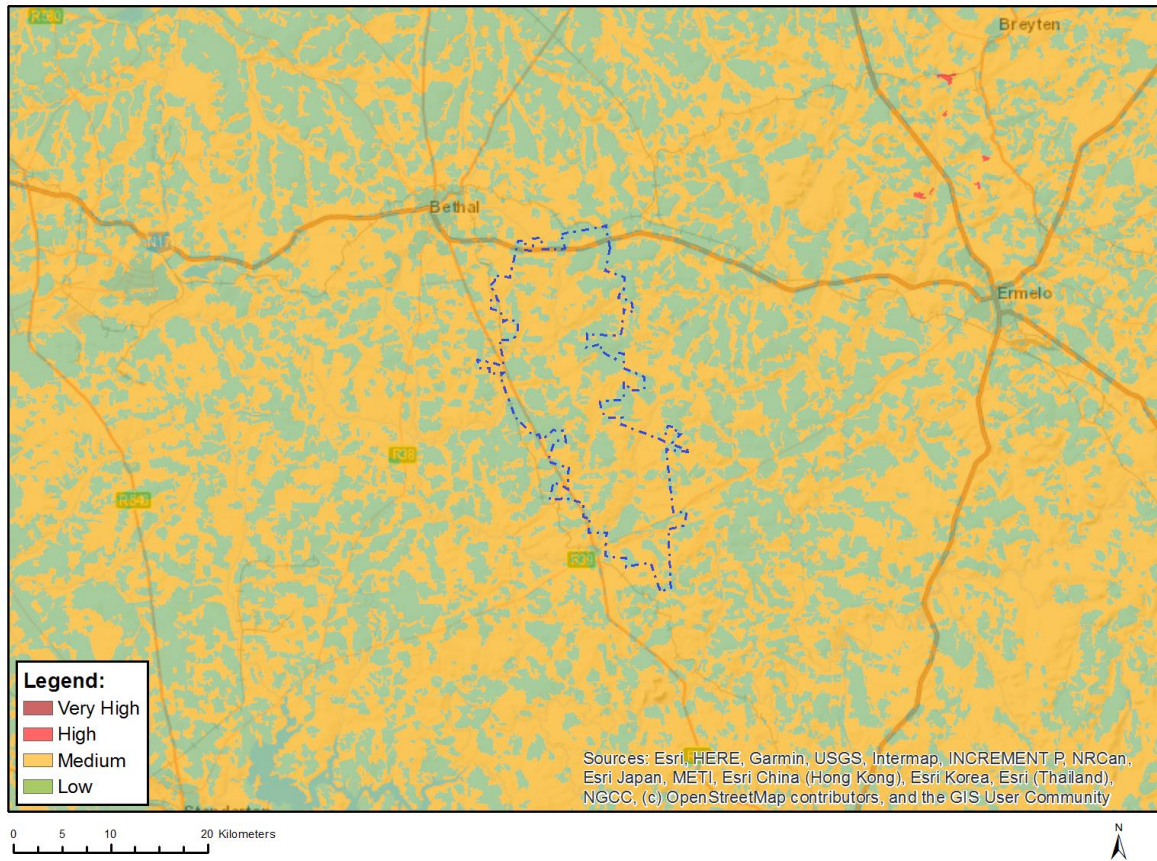


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity
Very High	Features with a Very High paleontological sensitivity

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



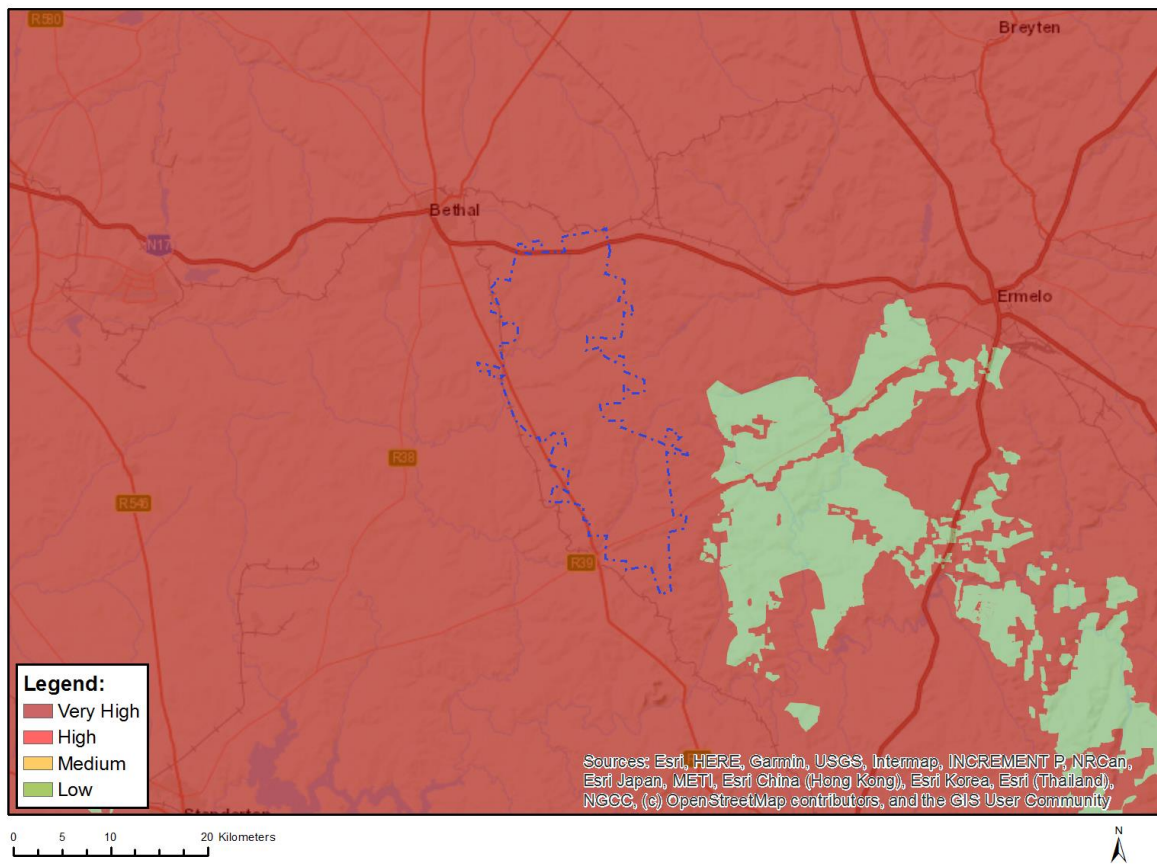
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity
Medium	Sensitive species 1252
Medium	Aspidoglossum xanthosphaerum
Medium	Miraglossum davyi
Medium	Sensitive species 691
Medium	Pachycarpus suaveolens

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

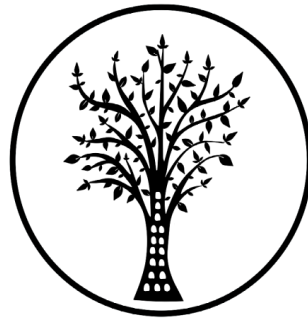
Sensitivity Features:

Sensitivity	Feature(s)
Very High	Critical biodiversity area 1
Very High	Critical biodiversity area 2
Very High	Ecological support area: landscape corridor
Very High	Ecological support area: local corridor
Very High	FEPA Subcatchments
Very High	Protected Areas Expansion Strategy
Very High	Vulnerable ecosystem

APPENDIX 4: HERITAGE MANAGEMENT PLAN

HERITAGE CONSERVATION MANAGEMENT PLAN

**UMMBILA EMOYENI RENEWABLE ENERGY WIND AND SOLAR PV
FACILITIES, MPUMALANGA PROVINCE**



CTS HERITAGE

Prepared by CTS Heritage

Jenna Lavin

For

Savannah Environmental

April 2023



CTS HERITAGE

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1. INTRODUCTION

Umbila Emoyeni Renewable Energy Farm (Pty) Ltd is proposing the development of renewable energy facilities, collectively known as the Umbila Emoyeni Renewable Energy Facility (REF), consisting of a commercial wind farm, solar PV facility, and associated grid infrastructure, including a battery energy storage system, located approximately 6km southeast of Bethal in the Mpumalanga Province of South Africa.

A preferred project focus area with an extent of 27 819ha been identified by Umbila Emoyeni (Pty) Ltd as a technically suitable area for the development of the Umbilla Emoyeni Renewable Energy Farm with a contracted capacity of up to 666MW of wind energy and 150MW of solar energy. This layout, and project capacity, will be reduced as the EIA and scoping process identifies environmental constraints that exclude areas for development.

The wind farm is proposed to accommodate the following infrastructure:

- Up to 111 wind turbines with a maximum hub height of up to 200m. The tip height of the turbines will be up to 300m.
- 33kV / 132kV onsite collector substations
- Battery Energy Storage System (BESS)
- Cabling between turbines, to be laid underground where practical
- Laydown and O&M hub (approximately 300m x 300m):
 - Batching plant of 4ha to 7ha
 - Construction compound (temporary) of 6 Ha approximately
 - Operation and Maintenance office of 1.5Ha approximately ,
- Laydown and crane hardstand areas (approximately 75m x 120m)
- Access roads of 12-13m wide, with 12m at turning circles.

The solar PV facility is proposed to accommodate the following infrastructure:

- PV modules and mounting structures with a capacity per panel of 350W to 450W and dependent on optimization and cost.
- Inverters and transformers
- 33kV/132kV onsite collector substation
- Battery Energy Storage System (BESS)
- Cabling between project components
- Laydown and O&M hub (approximately 300m x 300m):

- Construction compound (temporary),
- Maintenance office
- Access roads (up to 12m wide)

The project will include associated grid infrastructure that is required to connect the Ummbila Emoyeni Renewable Energy Facility to the national grid. The grid connection solution entails establishing a 400/132 kV MTS, between Camden and SOL Substations, which will be looped in and out of the existing Camden-Sol 400 kV line¹. The location of the MTS will be refined through an ongoing process of communication with Eskom Planning but will be within close proximity to the 400kV line in order to cut into this line.

It is anticipated that the power generated by the project will be bid into the REIPPPP tender process (DMRE) and/or into private off take opportunities. The LILO corridor will intersect with either the Camden-Zeus 1 400kV, Camden-Zeus 2 400kV or Camden-Tutuka 400kV power line.

1.1 Location of Site

The development is located on the eastern side of the R35 that runs between Bethal and Morgenon in Mpumalanga. The project site comprises the following farm portions:

Table 1: Farm Portions

Parent Farm Number	Farm Portions
Farm 261 – Naudesfontein	15, 21
Farm 264 – Geluksplaats	0, 1, 3, 4, 5, 6, 8, 9, 11, 12
Farm 268 – Brak Fontein Settlement	6,7,10,11,12
Farm 420 – Rietfontein	8,9,10,11,12,15,16,18,19,22,32
Farm 421 – Sukkelaar	2, 2, 7, 9, 9 10, 10 11, 11 12, 12 22 ,25, 34, 35, 36, 37, 37, 38, 39, 40, 42, 42
Farm 422 – Klipfontein	0, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23
Farm 423 – Bekkerust	0, 1, 2, 4, 5, 6, 10, 11, 12, 13 14, 15, 17, 19, 20, 22, 23, 2425
Farm 452 – Brakfontein	5
Farm 454 – Oshoek	4, 13, 18
Farm 455 – Ebenhaezer	0, 1, 2, 3
Farm 456 – Vaalbank	1, 2, 3, 4, 7, 8, 13, 15, 16, 17, 18, 19
Farm 457 – Roodekrans	0, 1, 4, 7, 22, 23, 23



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Farm 458 – Goedgedacht	0, 2, 4, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 21, 22, 25, 26, 27, 28, 29, 31, 32, 33, 34, 35, 37, 39
Farm 467 – Twee Fontein	0, 1, 4, 5, 6, 7, 8, 10
Farm 469 – Klipkraal	5, 6, 7, 8
Farm 548 – Durabel	0

1.2 Ownership and responsibility for site

Landowners

The land on which the Ummbila Emoyeni REF is located is privately owned:

Table 2: Landowner Contact Information

No.	Portion	Landowner	Contact Details
261	15	NICJAC PIETERSE BOERDERY CC	<u>Jacobus H Pieterse - 082 783 2687</u> <u>Simon N Pieterse - 087 550 0930</u> <u>Jacques - 082 783 2687</u> <u>Nico - 082 567 8085</u> <u>andre@njptransport.co.za</u> <u>jacques@njptransport.co.za</u> <u>nico@njptransport.co.za</u>
261	21	Johannes Fourie	
264	0	NICJAC PIETERSE BOERDERY CC	<u>Jacobus H Pieterse - 082 783 2687</u> <u>Simon N Pieterse - 087 550 0930</u> <u>Jacques - 082 783 2687</u>
264	1	NICJAC PIETERSE BOERDERY CC	<u>Nico - 082 567 8085</u> <u>andre@njptransport.co.za</u> <u>jacques@njptransport.co.za</u> <u>nico@njptransport.co.za</u>
264	3	ROOIBLOM BOERDERY NO 1 TRUST	<u>Neil Claasen - 082 809 9967 - niel@rooiblom.co.za</u>
264	4	ROOIBLOM BOERDERY NO 1 TRUST	<u>Neil Claasen - 082 809 9967 - niel@rooiblom.co.za</u>
264	5	ROOIBLOM BOERDERY NO 1 TRUST	<u>Neil Claasen - 082 809 9967 - niel@rooiblom.co.za</u>
264	6	HENNIE FOURIE TRUST	Sterk Gert' - 0828944275
264	8	GELUKSPLAATS BELEGGINGS TRUST	Bertus Louw - 082 492 0945



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264	9	PIETER FRANCOIS ERASMUS - Pietman	<u>Pietman - 082 571 5561 - pietman.bekkersrust@gmail.com</u>
264	11	JOHAN A LOMBARD	<u>JOHAN A LOMBARD - jalombard84@gmail.com - 0132915516 & 0823883103</u>
264	12	GELUKSPLAATS BELEGGINGS TRUST	Bertus Louw082 492 0945
268	6	PIETER FRANCOIS ERASMUS - Pietman	<u>Pietman - 082 571 5561 - pietman.bekkersrust@gmail.com</u>
268	7	GERT FOURIE BOERDERY TRUST	
268	10	GERT FOURIE BOERDERY TRUST	
268	11	HENNIE FOURIE TRUST	Sterk Gert - 0828944275
268	12	HENNIE FOURIE TRUST	Sterk Gert - 0828944275
420	8	ROUX FRANCINA JOHANNA 4105020022086	<u>Hennie Roux - 083 232 6236 - hennie958@gmail.com</u>
420	9	MARIUS CARINUS TRUST 1259/98	<u>Marius Carinus - 0827813662 - carienmarius@gmail.com</u>
420	10	NICJAC PIETERSE BOERDERY CC	<u>Jacobus H Pieterse - 082 783 2687</u> <u>Simon N Pieterse - 087 550 0930</u> <u>Jacques - 082 783 2687</u>
420	11	NICJAC PIETERSE BOERDERY CC	<u>Nico - 082 567 8085</u> <u>andre@njptransport.co.za</u> <u>jacques@njptransport.co.za</u>
420	12	NICJAC PIETERSE BOERDERY CC	<u>nico@njptransport.co.za</u>
420	15	DEUTRANS LANDBOU EIENDOMME CC 200903881523	Tony Brand - 0833031058
420	16	NICJAC PIETERSE BOERDERY CC	<u>Jacobus H Pieterse - 082 783 2687</u> <u>Simon N Pieterse - 087 550 0930</u> <u>Jacques - 082 783 2687</u> <u>Nico - 082 567 8085</u> <u>andre@njptransport.co.za</u> <u>jacques@njptransport.co.za</u> <u>nico@njptransport.co.za</u>

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420	18	DEUTRANS LANDBOU EIENDOMME CC 200903881523	Tony Brand - 0833031058
420	19	NICJAC PIETERSE BOERDERY CC	<u>Jacobus H Pieterse - 082 783 2687</u> <u>Simon N Pieterse - 087 550 0930</u> <u>Jacques - 082 783 2687</u>
420	22	NICJAC PIETERSE BOERDERY CC	<u>Nico - 082 567 8085</u> <u>andre@njptransport.co.za</u> <u>jacques@njptransport.co.za</u> <u>nico@njptransport.co.za</u>
420	32	MARIUS CARINUS TRUST1259/98	<u>Marius Carinus - 0827813662 - carienmarius@gmail.com</u>
421	2	HENDRIKSPAN BOERDERY CC 200205330223	<u>Flippie v Dyk - flippievandyk73@gmail.com</u>
421	2	HENDRIKSPAN BOERDERY CC 200205330223	<u>Flippie v Dyk - flippievandyk73@gmail.com</u>
421	7	Frik Human Plase cc	Brother to Hannes - Frik Human - 0824742799
421	9	Klipfontein Family Trust	
421	9	Klipfontein Family Trust	
421	10	Klipfontein Family Trust	
421	10	Klipfontein Family Trust	
421	11	Frik Human Plase cc	
421	11	Frik Human Plase cc	
421	12	Frik Human Plase cc	
421	12	Frik Human Plase cc	
421	22	Klipfontein Family Trust	
421	25	Klipfontein Family Trust	
421	34	KLIPFONTEIN BOERDERY TRUST 5771/1996	<u>Hannes Human - hanneshuman1@gmail.com - 082 550 3670</u>
421	35	Frik Human Plase cc	Brother to Hannes - Frik Human - 0824742799
421	36	KLIPFONTEIN BOERDERY TRUST 5771/1996	<u>Hannes Human - hanneshuman1@gmail.com - 082 550 3670</u>
421	37	Frik Human Plase cc	

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421	37	Frik Human Plase cc	
421	38	Klipfontein Family Trust	
421	39	Van Rooyen	
421	40	ROUX FRANCINA JOHANNA4105020022086	<u>Hennie Roux - 083 232 6236 - hennie958@gmail.com</u>
421	42	ROUX FRANCINA JOHANNA4105020022086	
421	42	ROUX FRANCINA JOHANNA4105020022086	
422	0	VON WIELLIGH CHRISTIAAN LODEWYK WENTZEL	Alida von Wielligh - 0823371218 or 0178195896
422	2	ROUX FRANCINA JOHANNA4105020022086	<u>Hennie Roux - 083 232 6236 - hennie958@gmail.com</u>
422	3	Klipfontein Family Trust	<u>Hannes Human - hanneshuman1@gmail.com - 082 550 3670</u>
422	4	PIETER FRANCOIS ERASMUS - Pietman	<u>Pietman - 082 571 5561 - pietman.bekkersrust@gmail.com</u>
422	5		

Environmental Authorisation (EA) Holder

The EA Holder would be the Project Company, Ummbila Emoyeni (Pty) Ltd, who, through the EA acquires the right to develop the project (considering all other permits and consents have been acquired from all other relevant competent authorities). The Project Company does not, however, own the land on which it intends to develop.

Contact Person: Mr Peter Carl Venn

Address: 15 Chaplin, Cnr Oxford and Chaplin Roads, Illovo, 2196

Telephone: 083 689 3063

Email: peter.venn@seritigreen.com

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Implementation of EA

The person responsible for the implementation of the conditions in the EA would be the contractors during the construction phase. However, any non-compliance would fall onto Ummbila Emoyeni (Pty) Ltd as the holder of the EA. All non-compliance would be audited by an independent ECO which would be appointed by Ummbila Emoyeni (Pty) Ltd. Ummbila Emoyeni (Pty) Ltd would operate the facility. For decommissioning, the responsible parties would again be the contractors and audited by ECO but overall compliance would fall on Ummbila Emoyeni (Pty) Ltd.

Heritage Authorities

The area proposed for development is located in the Mpumalanga Province. As such, the area is subject to two different heritage management authorities. All impacts to archaeological and palaeontological heritage in the Mpumalanga Province are managed by SAHRA. Any impacts to these resources are subject to the recommendations and best practice processes established by SAHRA for archaeology and palaeontology.

All impacts to structures that are older than 60 years in the Mpumalanga Province are managed by the Mpumalanga Provincial Heritage Resources Authority (MPHRA). Any impacts to these resources are subject to the recommendations and best practice processes established by MPHRA.

1.3 Site Description

The area proposed for development is dominated by agriculture and Soweto Highveld Grassland. The study area consists of a gentle to medium undulating landscape with a few prominent rocky outcrops visible consisting largely of shale, dolerite and sandstone.

The vegetation of the study area alternates between cultivated cornfields, grasslands for grazing, and the typical grass tundras of the Highveld plateau. There are narrow streams and small scattered wetlands present across the study area. Dirt roads, main roads and farmlands bound the site to the north, south, east and west. Evidence of crop rotation and different types of cultivation is visible in areas of the development footprint. Scraped dirt roads, large farm vehicles and cargo trucks are present, moving through wet turf soil resulting in turbation of the roads.

The area is predominantly cornfields and grasslands in various stages of harvesting. In addition, large hay bales indicate that many “natural” grasslands are grown for animal feed. Therefore, it was clear that much of the area has been subjected to continuous agricultural activities and



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anthropogenic disturbances for a very long time.



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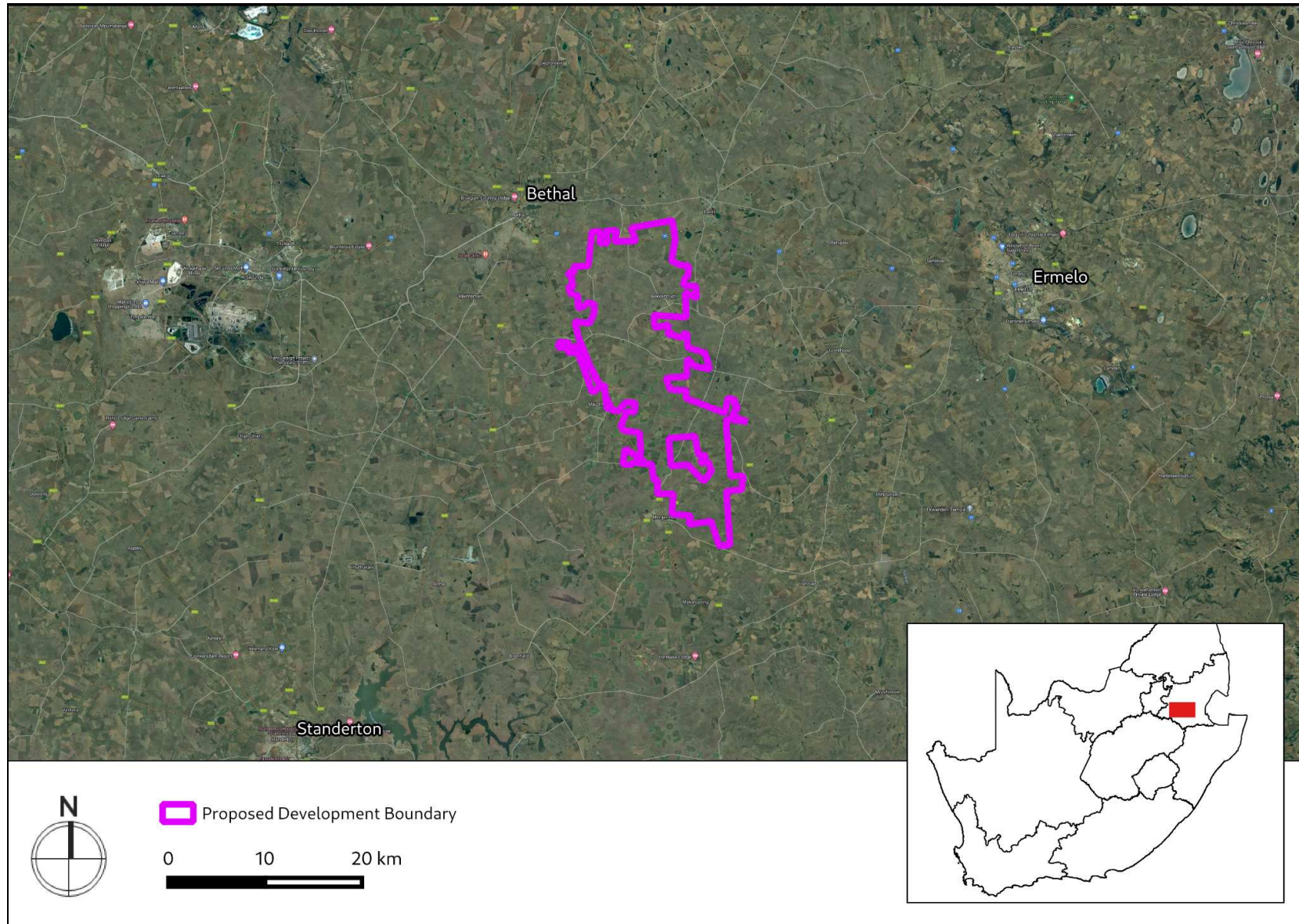


Figure 1: Location of Site

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1.4 Statement of Site significance

General points on significance

The cultural significance of a site determines the appropriateness and extent to which protection measures are required. The value or importance of the site to society in general, to specific past and present groups, and to posterity, includes:

- Spiritual/social value - the traditional and consistent use of a site for religious, spiritual or social purposes, even if the religious use no longer continues
- Aesthetic/artistic value - the recognition by scholars and the general public that a cultural site represents a high point of creative achievement
- Historic value - the achievements and knowledge of the past as vehicles for enlightening the present and future
- Scientific/research value - the site, or feature within the site, providing a source of knowledge that is unobtainable elsewhere

Since cultural significance can be interpreted differently by different people, and evaluations can change with time and circumstances, it is important to assess the significance of a site in terms of:

- The importance of a particular site in relation to other sites so as to decide on the appropriate level of management
- Ascertaining what all these values are so as not to inadvertently damage one value that a site has, while preserving another.

Details of the grading system used are provided in section 3 of the NHRA. In addition, the system outlined in Heritage Western Cape's Guideline for Grading: Implications and Management was used.

As per this system, heritage significance is indicated on a sliding scale:

- Grade I - National Significance
- Grade II - Regional/Provincial Significance
- Grade IIIA - High Local Significance
- Grade IIIB - Moderate Local Significance
- Grade IIIC - Low Local Significance
- NCW - Not Conservation-Worthy



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Significance of Heritage Resources

A number of heritage resources located within the Ummbila Emoyeni Renewable Energy Facility development area were identified through the initial Heritage Impact Assessment process (CTS Heritage 2022). All of the identified heritage resources have been graded in terms of the provisions of section 3 of the National Heritage Resources Act and the HWC Guide on the Implications of Grading (2016). As such, the grading methodology is not repeated here.

While not exhaustive, the list of known heritage resources located within the Ummbila Emoyeni Renewable Energy Facility development area provides insight into the nature and significance of the heritage resources common in the broader area.

As per the intentions of the NHRA, the grading of a heritage resource is indicative of its cultural significance and therefore informs its management and conservation strategies.



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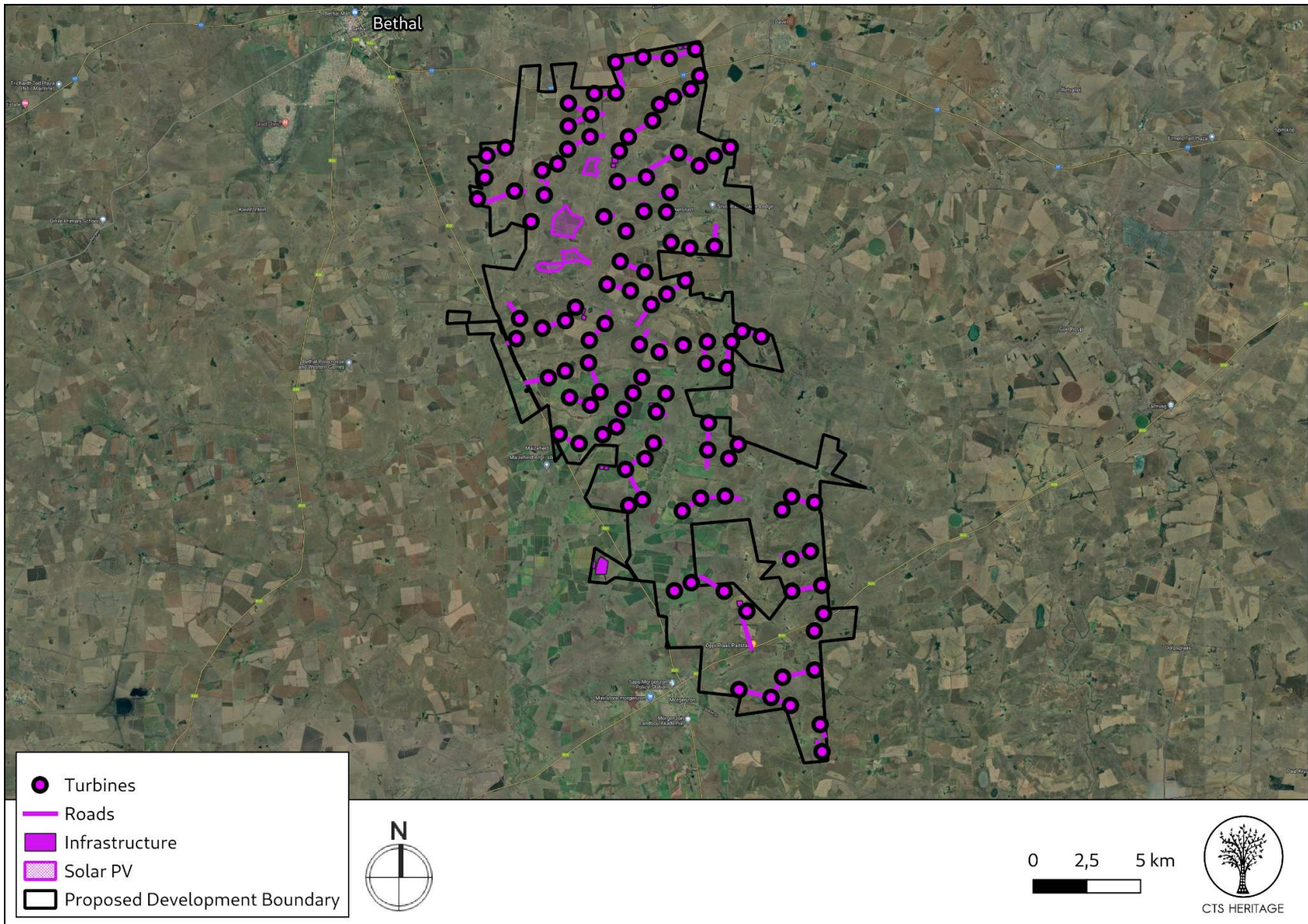


Figure 2: Umbila Emoyeni WEF and PV Layout

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1.5 Objectives of Management Plan

The purpose of this management plan is to guide the activities affecting the heritage resources to retain their significance by conserving it for future generations. A management plan is a living document in the sense that it can be updated as the situation changes and should therefore be reviewed regularly.

This management plan identifies:

- **what needs to be managed** - by surveying and recording the archaeological site in detail and summarising information on the location of sites and what they comprise;
- **who will manage the heritage resources** - by listing the people who have interests in the place and might be involved in its management;
- **the significance of the heritage** in relation to other local, provincial and national sites because the plan is designed to retain this significance;
- **key issues that must be addressed** to retain the significance through consultation with stakeholders;
- **the goals, objectives and strategies** for management and how they will be implemented; and
- **a documentation and monitoring plan** for the ruins so that any changes can be detected and the steps that have been taken can be documented.

1.6 Revision of Plan

The management plan should be reviewed every 5 years and revised as required, or as necessary when circumstances require it. Any revisions must be submitted to SAHRA for approval.

2. RECORDING AND RESEARCH

2.1 Objectives of Recording and Research

Thorough recording of archaeological and heritage sites allows site managers and heritage authorities to manage and identify the changes taking place at a site over time. The heritage resources located within this development have been previously recorded through the Heritage Impact Assessment conducted for the renewable energy facility (CTS Heritage, 2022).

It is anticipated that proposed clearance of vegetation and excavation associated with the construction of the facility and its associated infrastructure may reveal additional heritage resources that are currently hidden by the vegetation and surface soil.

The heritage resources identified within this site, and that are the subject of this management plan, are the burials and burial grounds identified in the HIA (CTS Heritage, 2022). These resources have high levels of local cultural significance and require proactive management interventions to ensure their conservation.

2.2 Background context

CTS Heritage (2022) drafted a concise background of the broader context of this area in the HIA originally drafted for the development. The background to the site is summarised here.

2.2.1 Palaeontological Background

According to the SAHRIS Palaeosensitivity Map, the area proposed for development is underlain by sediments of zero, moderate and very high palaeontological sensitivity. According to the extract from the Council of Science Map for East Rand 2628, the palaeontologically sensitive geology of the area is ascribed to the Vryheid Formation of the Ecca Group of sediments. Groenewald (2014, SAHRIS NID 167013) completed a field-based palaeontological assessment for the Waaihoek WEF in which he interrogates the palaeontological sensitivity of this formation. In this assessment, Groenewald (2014) notes that “The Vryheid Formation consists of interbedded very coarse-grained sandstone and mudstone that yields plant and trace fossils as well as some prominent coal seams.” In this assessment, Groenewald (2014) made the following recommendations for the WEF development within the Vryheid Formation “The PEA and CEO be made aware of the possibility of finding fossils in the Vryheid and Volksrust Formation sediments during excavation of the foundations for the turbines and other infrastructure. A professional palaeontologist is appointed to monitor possible palaeontological finds during excavation of turbine foundations and infrastructure where turbine

positions and infrastructure fall on Vryheid and Volksrust Formation sediments.” The sediments underlying the development area have very high levels of palaeontological sensitivity, the nature of the excavations associated with Renewable Energy facilities tends to be deep and as such, the likelihood of impacting intact Vryheid Formation sediments is high. Further investigation of the palaeontological sensitivity of the development area is recommended.

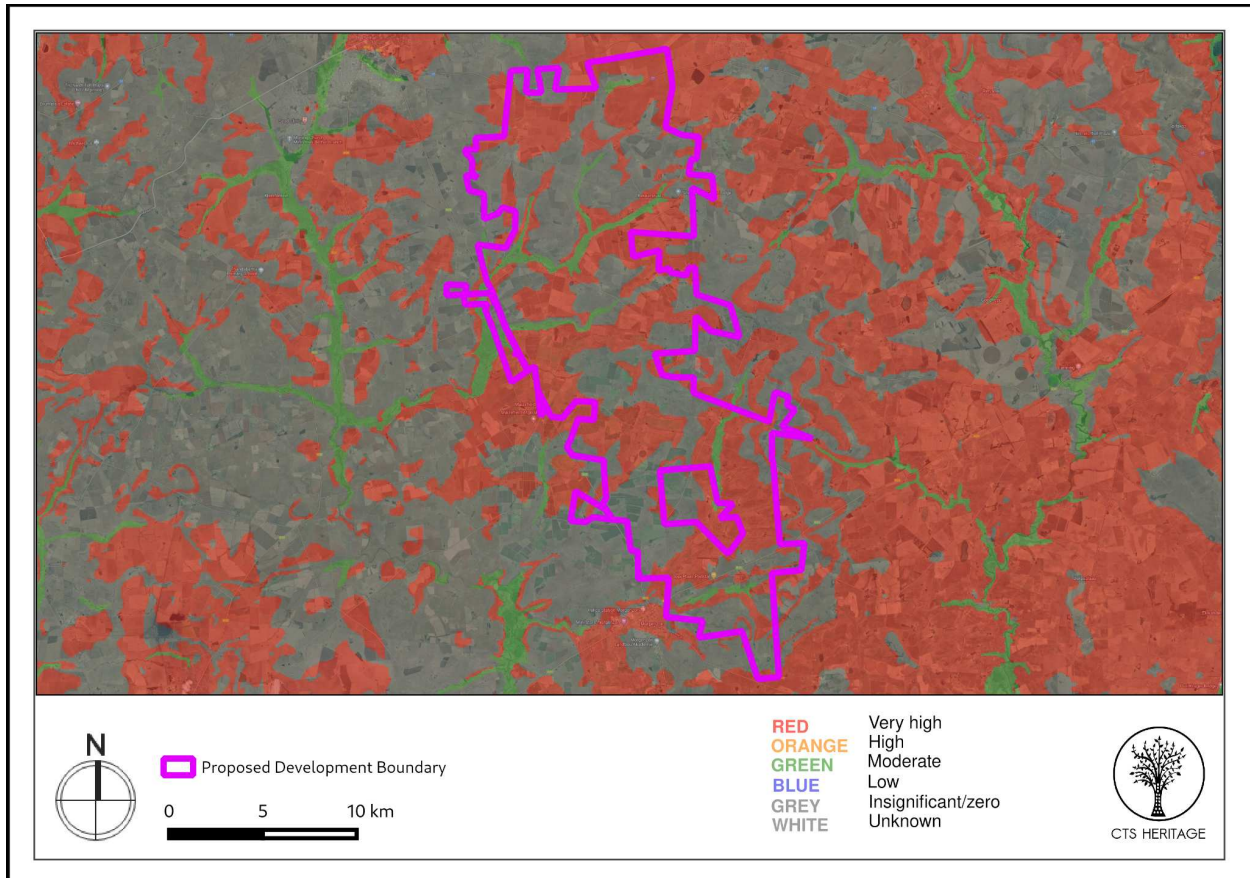


Figure 3.1: Palaeosensitivity Map. Indicating Zero to Very High fossil sensitivity underlying the study area for the facility

A PIA was completed for the renewable energy facility by Groenewald (2022). No palaeontological no-go areas have been identified within the project areas. With the exception of one fossil site of low scientific value, none of the recorded fossil sites overlaps directly with, or lies close to (< 20 m) the proposed infrastructure and no modification of the layouts through micro-siting is proposed here on palaeontological grounds.

One fossil site (UMB10) is located in close proximity to a proposed road and turbine; however, this site has low palaeontological significance and has been sufficiently recorded. No further mitigation is recommended for this site.

The potential for rare, unrecorded fossil sites of high scientific and/or conservation value is very high in the areas proposed for development located within the Vryheid Formation and where excavation depth will exceed 1.5m. These are best handled through a Chance Fossil Finds Protocol as per the recommendations below.

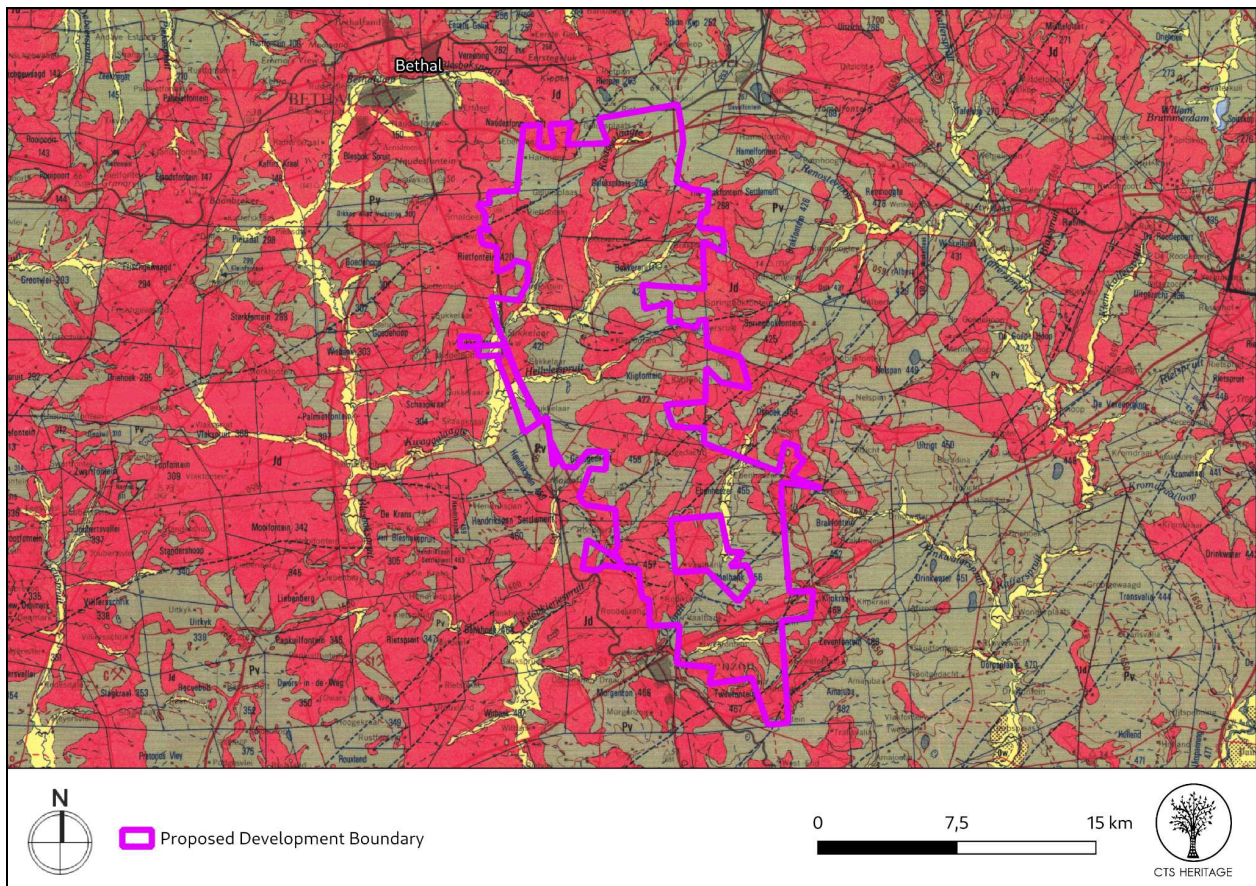


Figure 3.2: Geology Map. Extract from the CGS 2628 East Rand Map indicating that the development area for the REF development is underlain by sediments of Pv: Vryheid Formation of the Eccca Group and Jd: Jurassic Dolerite as well as Quaternary Sands

2.2.2 Archaeological Background

Heritage Impact Assessments have been completed nearby for projects in Secunda and these can be used to infer the archaeological sensitivity in the development area. Van Vollenhoven (2015) notes that the geographical area around the towns of Standerton and Bethal is not known to conserve Stone Age archaeology. He notes that “No such sites are indicated on maps contained in a historical atlas of this area (Bergh 1999: 4-5). However, this may only be since no research has actually been done in this area. The closest known Stone Age occurrences are a Late Stone Age site at the town of Ermelo and rock art sites far to the west of Standerton (Bergh 1999: 4-5).” Van Vollenhoven (2015) noted no natural shelters during the survey; however, the good vegetation in the surrounding area and the rivers indicate that ample grazing and water may have been available, making it a prime spot for hunting in the past. Therefore one may assume that Stone Age people probably would have moved through the area. Late Iron Age sites are found in a large area around the towns of Bethal and Standerton and number at least 585 such sites.

In the heritage assessment of a powerline upgrade at the nearby Syferfontein Mine, Nel & Karodia (2013), noted that *“a heritage assessment was conducted in 2000 by the National Cultural History Museum and included in the Syferfontein Mine EMP in 2010. During the survey, a few Stone Age artefacts were identified. These artefacts were not considered to have any primary context and therefore were interpreted to have low significance value. No Early Iron Age sites were identified. The Late Iron Age sites found here conform to those identified in the literature for the Southern Highveld area (former southern Transvaal, northern Orange Free State) as Type V sites. As the soil is mostly turf, Iron Age settlement usually took place on the various dolerite outcrops. The added benefit of choosing these locations was that it was located at the source of building material used in constructing the settlements. One such site shows interesting features as the living units were actually excavated to obtain enough building material for the surrounding walls. A few of the farmsteads dating to early part of this century were identified as possibly having historical-architectural significance. A number of abandoned homesteads are located in the areas that were investigated. These seem to belong to farm labourers and were all abandoned within the last few years. They are therefore not viewed to be of cultural or historical significance. However, some graves are located in the vicinity of the homesteads and it is possible that more graves will be located nearby”*.

In the field assessment completed for the renewable energy facility development (CTS Heritage, 2022), no Stone Age or Iron age archaeology was identified during the field assessment. Some historical ruins and kraals of contextual historic significance, graded III C, were identified; however, none of these are likely to be impacted as per the layout provided.

A number of burial grounds and/or graves were identified during the field assessment (Grade IIIA) and some of these fall within areas likely to be impacted as per the proposed layout.

2.3 Heritage Resources Identified

The development area has been thoroughly assessed by CTS Heritage in the report dated August 2022. In this assessment, a number of sites of heritage significance were identified:

Sites identified during the field assessment development area

ID	Site Name	Description	Co-ordinates		Grading	Mitigation
1	Umbila Emoyeni 001	10? GRAVES Not all the cairns are intact	-26.50822222	29.57985	IIIA	No direct impact anticipated. Part of historic cluster
2	Umbila Emoyeni 002	STONE STRUCTURE Part of the historical identity of the area, including stone structures and foundations.	-26.51131389	29.57884167	IIIC	No direct impact anticipated. Part of historic cluster
3	Umbila Emoyeni 003	STONE FOUNDATION Part of the historical identity of the area, including stone structures and foundations.	-26.51185278	29.57861111	NCW	Likely to be impacted by the Solar PV Layout
4	Umbila Emoyeni 004	AREA WITH OLD STONE HOUSE STONE CIRCLES STONE KRAAL Part of the historical identity of the area, including stone structures and foundations.	-26.74378611	29.69147222	IIIC	Not impacted by the current development layout
5	Umbila Emoyeni 005	41 GRAVES Fieldstone cairns, with a few cement headstones. Headstones are marked, challenging to discern dates. Graves are situated right next to a cornfield, with a wire fence dissecting what may be more graves	-26.7268	29.68093056	IIIA	No direct impact anticipated however possibility of more burials in the area
6	Umbila Emoyeni 006	15 GRAVES Fieldstone cairns. No inscriptions that could be read. Graves are situated on top of the koppie, within the wind turbine footprint.	-26.69272778	29.67026111	IIIA	Turbine must be relocated more than 300m east of its present location
7	Umbila Emoyeni 007	OLD STRUCTURES Part of the historical identity of the area, including stone structures and foundations.	-26.51163056	29.64264722	NCW	Not impacted by the current development layout
8	Umbila Emoyeni 008	POSSIBLE GRAVE One stone cairn	-26.50435	29.59498889	IIIA	No direct impact anticipated
9	Umbila Emoyeni 009	HISTORIC YARD MIDDEN Part of the historical identity of the area, including stone structures and foundations.	-26.50869722	29.58020833	IIIC	No direct impact anticipated. Part of historic cluster



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		foundations.				
10	Umbila Emoyeni 010	HISTORICAL HOUSE AND YARD Part of the historical identity of the area, including stone structures and foundations.	-26.50905278	29.58053611	IIIC	No direct impact anticipated. Part of historic cluster
11	Umbila Emoyeni 011	LARGE STONE KRAAL Part of the historical identity of the area, including stone structures and foundations.	-26.51104444	29.58501667	IIIC	No direct impact anticipated. Part of historic cluster
12	Umbila Emoyeni 012	5 GRAVES Metal cross, fieldstone cairns. Graves are along the proposed powerline route	-26.54944722	29.56575833	IIIA	No direct impact anticipated
13	Umbila Emoyeni 013	80 GRAVES Fieldstone cairns and headstones, painted cement frames and headstones, cement and concrete slabs and headstones. Some of the graves have inscriptions; dates indicated as the 1940s and 1950s. Approximately 80 graves within a rectangular packed stone border. Graves are along the proposed powerline route	-26.58522222	29.60138611	IIIA	Road/grid must be realigned to ensure a minimum of a 50m no development buffer is implemented around the site
14	Umbila Emoyeni 014	HISTORICAL PUMP	-26.58596389	29.60083611	NCW	No direct impact anticipated
15	Umbila Emoyeni 015	SITE SURFACE SCATTERS METAL Surface scatters of glass, large metal objects, farm implements and a cast-iron pot. Could be associated with the graveyard at WP 013 GR	-26.58672222	29.59949444	IIIC	No direct impact anticipated

These sites have been mapped in Figure 4 below.



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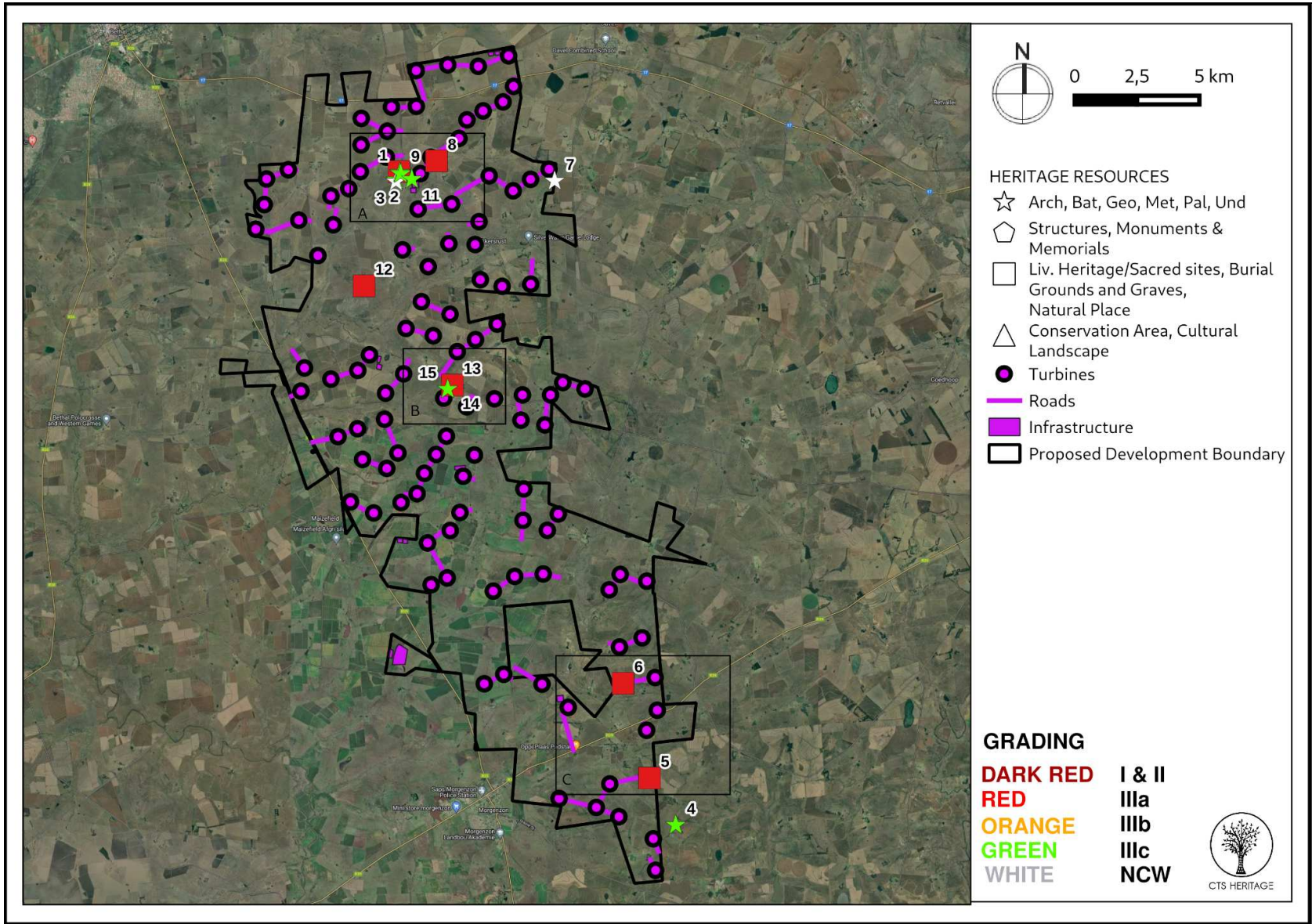


Figure 4.: Map of archaeological heritage resources within the proposed development area

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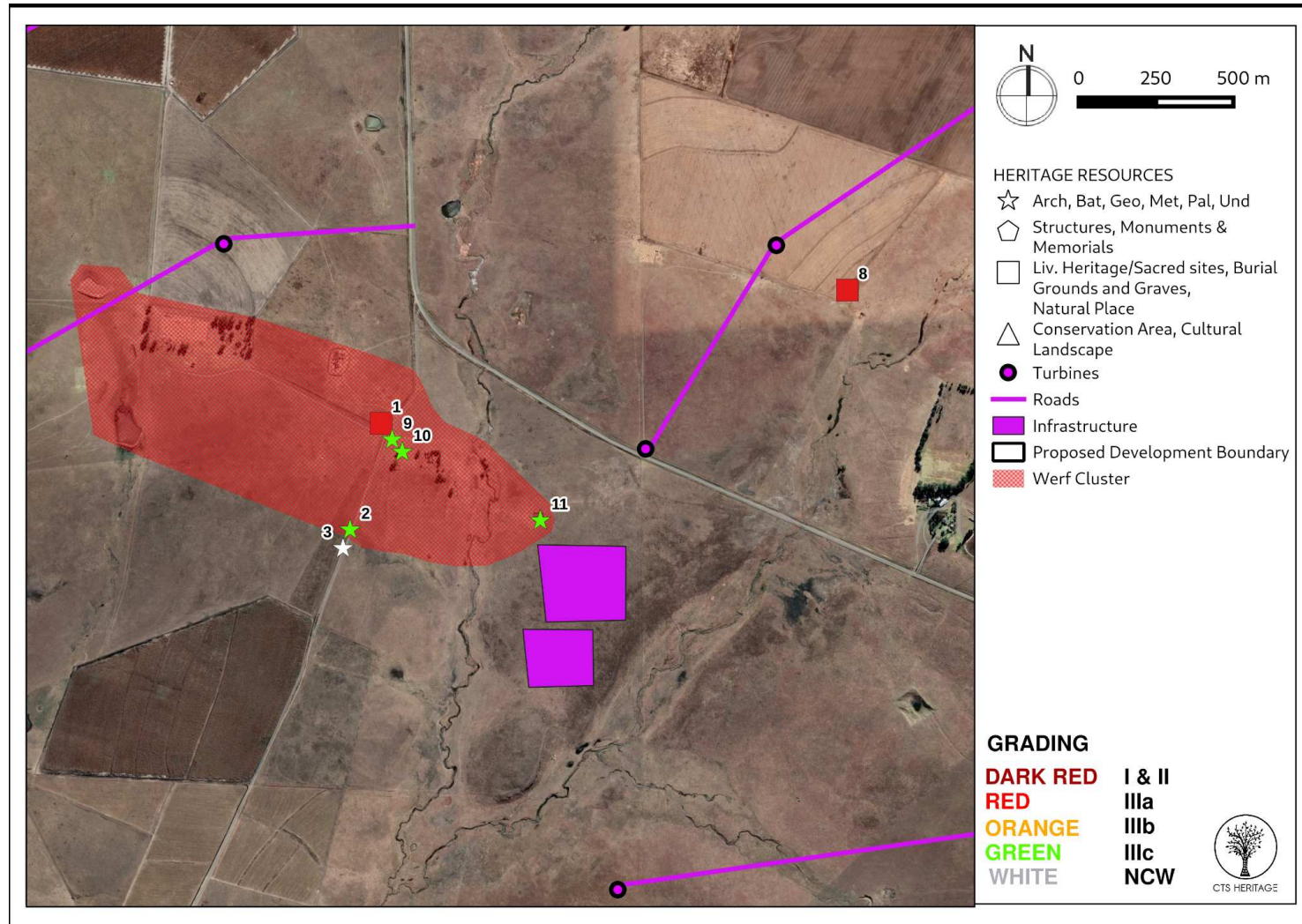


Figure 4.1: Map of all sites and observations noted within the development area - Inset A



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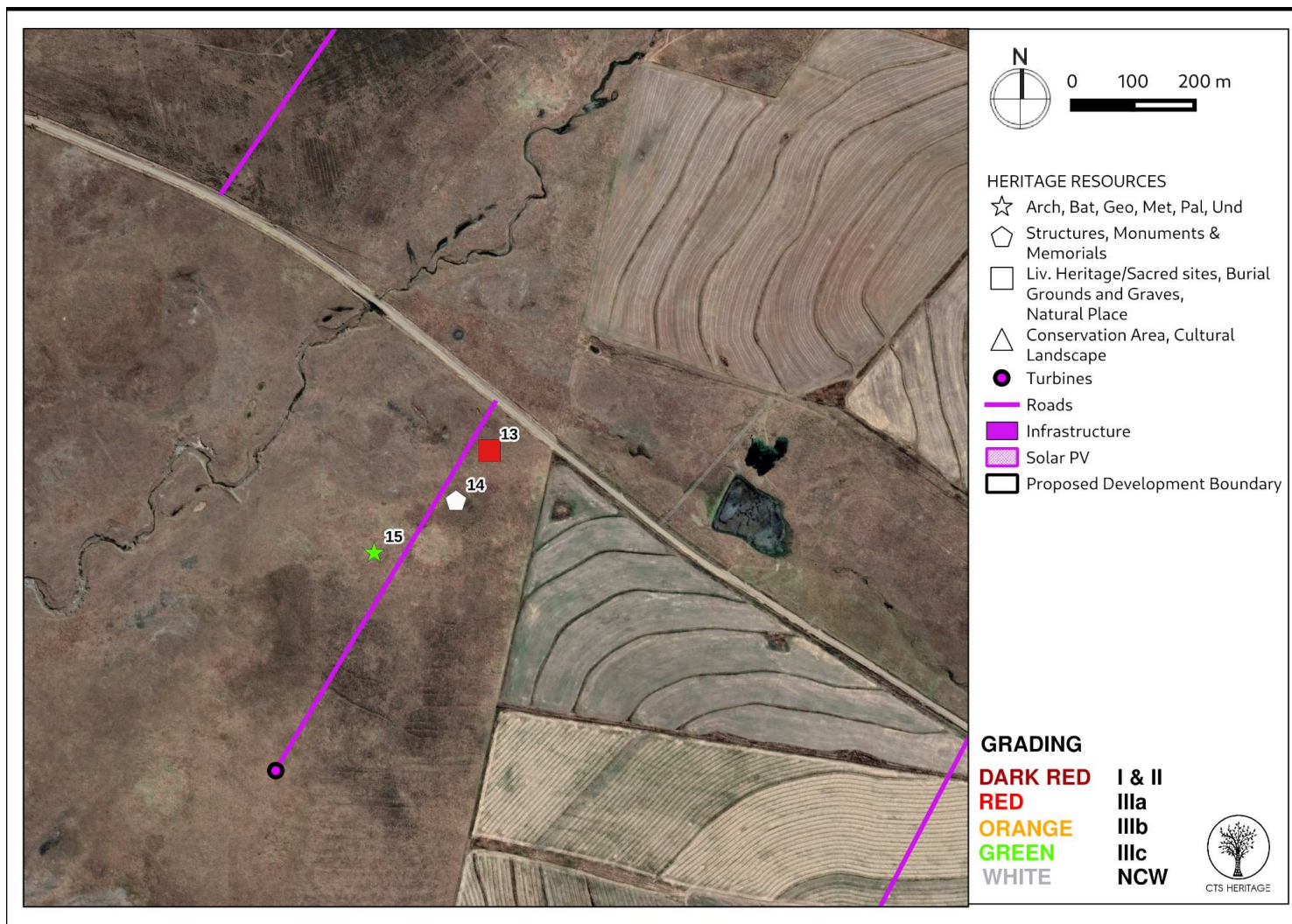


Figure 4.2: Map of all sites and observations noted within the development area - Inset B



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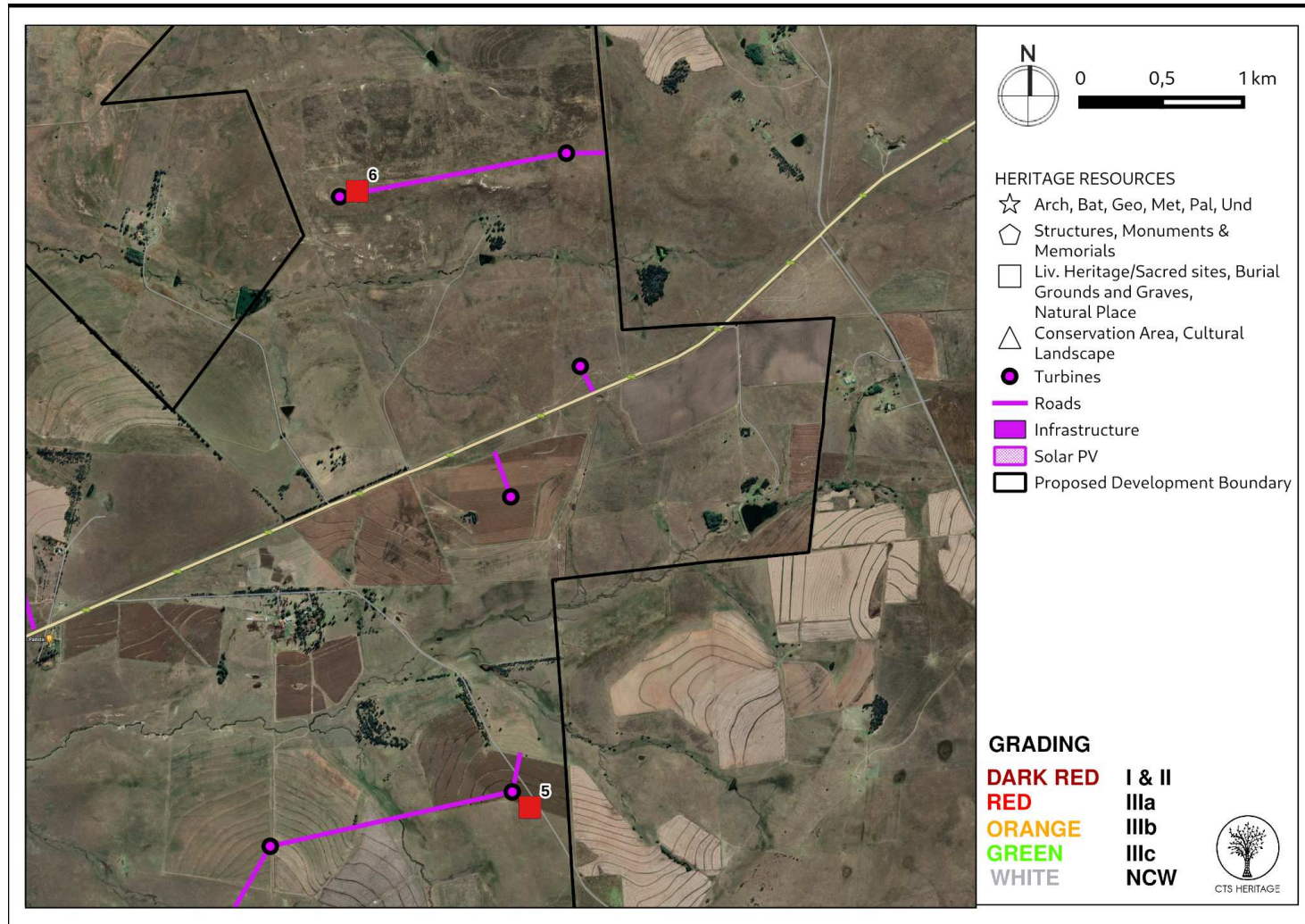


Figure 4.3: Map of all sites and observations noted within the development area - Inset C

3. SITE MANAGEMENT

3.1 Objectives of site management

The objectives of the heritage management plan for the Renewable Energy Facility are to ensure that the heritage resources identified within the area proposed for the development are properly conserved and any further impacts to these heritage resources are appropriately managed.

The Heritage Management Plan identifies the steps required for the appropriate management of these heritage resources including:

- Regular monitoring of the physical integrity of the identified heritage resources
- Details regarding procedures and processes to follow in the event of negative impact to identified or new heritage resources during the construction or operational phases of the development
- Mitigation of potential impacts resulting from the construction, operational and decommissioning phases to the identified heritage resources

3.2 Potential Impacts to identified heritage resources

A. Construction Phase

- *Palaeontology*

The final layout does not impact any known palaeontological heritage resources. The construction of any infrastructure that requires excavation into bedrock or is located at sites of surface exposures of bedrock may have **high** impacts to fossil resources and as such, the attached Chance Fossil Finds Procedure (Appendix 2) must be implemented. However, due to the lack of irreplaceable, unique or rare fossils within the development footprint, and the extensive superficial deposits overlying the sensitive deposits, the significance of the overall impact of the development is expected to be **very low**.

- *Archaeology*

The final layout does not impact any known archaeological heritage resources of significance. Stone Age archaeology is very sparse in this area, with only a very few, isolated artefacts found in the vicinity of the development footprint.

- *Burial Grounds and Graves*

A number of significant burial sites have been identified within the development area. High cultural value is placed on human remains and as such, no impact to these sites can take place. There is a high risk of accidental impact or disturbance to these sites during the construction phase of

development. Recommendations pertaining to the management of impact to these sites are included below. Furthermore, buried burial grounds or graves may be accidentally uncovered during this phase.

- ***Built Environment***

The final layout does not impact any known structures directly. Structures of low significance have been identified within the development area; however no impact to these structures is anticipated. Should it be necessary that structures that have been graded or structures that are older than 60 years require alteration or demolition during this phase, MPHRA must be contacted regarding permission in terms of section 34 of the NHRA. Contact details are provided in Appendix 1.

B. Operational Phase

- ***Palaeontology***

Operational activities will not impact any known palaeontological heritage resources and impacts are unlikely during the operational phase. Should any palaeontological heritage be accidentally uncovered during this phase, the Chance Fossil Finds Procedure (Appendix 2) must be implemented.

- ***Archaeology***

Operational activities will not impact any known archaeological heritage resources of significance and impacts are unlikely during the operational phase. Should any archaeological resources be accidentally uncovered during this phase, SAHRA must be contacted regarding a way forward. Contact details are provided in Appendix 1.

- ***Burial Grounds and Graves***

A number of significant burial sites have been identified within the development area. High cultural value is placed on human remains and as such, no impact to these sites can take place. Allowance must be made for access to these burial sites by relatives and relevant communities. Recommendations pertaining to the management of impact to these sites are included below.

Other than this, operational activities will not impact any known burial grounds or graves and impacts are unlikely during the operational phase. Should any burial grounds or graves be accidentally uncovered during this phase, SAHRA must be contacted regarding a way forward. Contact details are provided in Appendix 1.

- ***Built Environment***

Operational activities will not impact any known structures directly and impacts are unlikely during the operational phase. Should it be necessary that structures that have been graded or structures

that are older than 60 years require alteration or demolition during this phase, HFS must be contacted regarding permission in terms of section 34 of the NHRA. Contact details are provided in Appendix 1.

C. Decommissioning Phase

- Palaeontology

Infrastructure removal should not impact any known palaeontological heritage resources and impacts are unlikely during the decommissioning phase. Should any palaeontological heritage be accidentally uncovered during this phase, the Chance Fossil Finds Procedure (Appendix 2) must be implemented.

- Archaeology

Infrastructure removal should not impact any known archaeological heritage resources of significance and impacts are unlikely during the decommissioning phase. Should any archaeological resources be accidentally uncovered during this phase, SAHRA must be contacted regarding a way forward. Contact details are provided in Appendix 1.

- Burial Grounds and Graves

Infrastructure removal should not impact any known burial grounds or graves and impacts are unlikely during the decommissioning phase. Should any burial grounds or graves be accidentally uncovered during this phase, SAHRA must be contacted regarding a way forward. Contact details are provided in Appendix 1.

- Built Environment

Infrastructure removal should not impact any known structures directly and impacts are unlikely during the decommissioning phase. Should it be necessary that structures that have been graded or structures that are older than 60 years require alteration or demolition during this phase, HFS must be contacted regarding permission in terms of section 34 of the NHRA. Contact details are provided in Appendix 1.

3.3 Conservation and management requirements

Mitigation measures to reduce the anticipated negative impacts to the identified heritage resources during the various phases of the development include:

- A 500m no development buffer should be implemented on either side of the N17, R35 and R39
- A 200m no development buffer should be implemented on either side of the secondary routes that run through the development area
- A 500m no development buffer must be implemented around the identified farm werfs



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- A 50m no-go development buffer is implemented around all burial ground sites including Observations 001, 005, 006, 008, 012 and 013.
- A Management Plan for the ongoing conservation of these burials is developed prior to construction, along with a Guide on how to identify marked and unmarked burials and how to proceed should previously unidentified burials be uncovered during the construction process.
This document satisfies this requirement
- The historic farm werf cluster is not impacted by the development.
- Turbine 101 must be relocated 300m east along the road alignment to ensure that no human remains are impacted by the development.
- The road to Turbine 60 must be relocated to ensure that a no-development buffer of at least 50m is implemented around the burial site 013 so that no impact takes place.
- The Chance Fossil Finds Procedure (Appendix 3) must be strictly adhered to for excavations exceeding 1.5m located within the Vryheid Formation
- Although all possible care has been taken to identify sites of cultural importance during the investigation of the study area, it is always possible that hidden or subsurface sites could be overlooked during the assessment. 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, burials or other categories of heritage resources are found during the proposed development, work must cease in the vicinity of the find and SAHRA must be alerted immediately to determine an appropriate way forward.

3.4 Consultation

The main stakeholders for the site currently are the owners of the property, the Local Authorities, the managers of the facility and the heritage authority for the Mpumalanga Province (SAHRA and MPHRA).

Additional stakeholders include the present occupants of the property as well as the relatives and relevant community members associated with the burial sites identified within the development area.

4. MONITORING

4.1 Objectives of Monitoring

The following recommendations are made for long-term management of the identified heritage resources to conserve the significance of the place as part of the irreplaceable history and shared cultural heritage of the landscape. The following management goals provide guidelines for use and maintenance of the heritage, acceptable physical protection and conservation, visitor education, monitoring and research.

4.2 Monitoring and Site Maintenance

Action	Responsible party	Performance Indicators	Evidence
CONSTRUCTION PHASE			
All site crew should be informed of the heritage significance of the resources in the study area	ECO	Once-off meeting held with site crew	Minutes of meeting
All sites within the development area should be inspected by the ECO during the construction phase to ensure they are being respected and that no impact takes place	ECO	Site inspections conducted at all sites at regular intervals	Monthly Site Inspection and Monitoring Report to be submitted to SAHRA
All burial sites must be fenced using clearview fencing to ensure visual permeability and continuity in terms of sense of place. A gate must be created for access purposes for relatives and relevant community members. The position of this gate must be such that it can be accessed without risk to the renewable energy facility. This fencing must be placed 5m from the nearest identifiable burial.	ECO	Fences appropriately erected with gates	Existing fences with gates
No impact may take place within the fenced area. All development associated with the facility must take place more than 45m from the erected fence providing a 50m buffer between the burials and construction activities as per the recommendations in the HIA	ECO	Site inspections conducted at all sites at regular intervals	Monthly Site Inspection and Monitoring Report to be submitted to SAHRA
Contact must be made with the present and past occupants of the property in order to identify relevant relatives of the deceased	ECO	Engagement with occupants and family members	Contact list for visitors



and relevant community members. A list of relevant relatives and community members that are likely to want access to the burial sites must be compiled and lodged with the WE Facility management. The individuals on this list will have access to the burial sites as required.			
Significant fossil finds to be reported to the South African Heritage Resources Agency (SAHRA) for recording and sampling by a professional palaeontologist;	ECO	Implementation of the Chance Fossil Finds Procedure	Written correspondence with relevant heritage authority regarding the find and minutes of relevant meetings
Implementation of the Chance Fossil Finds Procedure	ECO	Implementation of the Chance Fossil Finds Procedure	Written correspondence with relevant heritage authority regarding the find and minutes of relevant meetings
If any archaeological material or human burials are uncovered during the course of development, then work in the immediate area should be halted at once. The find should be reported to the heritage authorities (SAHRA) and may require inspection by an archaeologist to determine whether mitigation should take place and what form that mitigation should take.	ECO	No unplanned impact or unplanned impact managed Halted within 4 hours	Written correspondence with relevant heritage authority regarding and minutes of relevant meetings
Should it be necessary that structures that have been graded or structures that are older than 60 years require alteration or demolition during this phase, HFS must be contacted regarding permission in terms of section 34 of the NHRA. Contact details are provided in Appendix 1.	ECO	Section 34 permit application to MPHRA	Permit issued in terms of section 34 from the relevant heritage authority or correspondence in this regard.
OPERATIONAL PHASE			
Keep all disturbance within existing development footprint and ensure identified buffers and no-go areas are adhered to	Site Manager	No unplanned impact or unplanned impact managed halted within 4 hours	Site Inspection every 5 years and Monitoring Report to be submitted to SAHRA



All site crew should be informed of the heritage significance of the resources in the study area	Site Manager	Meeting held with site crew	Minutes of meeting
Visitors are to be allowed access to the burial sites as per the list of identified relatives and community members. A visitor protocol must be developed and implemented	Site Manager	Record of names and dates of visitors to be kept Visitor protocol to be developed.	Database of names and dates of visitors to the burial sites
Implementation of the Chance Fossil Finds Procedure	Site Manager	Implementation of the Chance Fossil Finds Procedure	Written correspondence with relevant heritage authority regarding finds and minutes of relevant meetings
If any archaeological material or human burials are uncovered during the course of operations, then work in the immediate area should be halted at once. The find should be reported to the heritage authorities (SAHRA) and may require inspection by an archaeologist to determine whether mitigation should take place and what form that mitigation should take.	Site Manager	No unplanned impact or unplanned impact halted within 4 hours	Written correspondence with relevant heritage authority regarding finds and minutes of relevant meetings
Should it be necessary that structures that have been graded or structures that are older than 60 years require alteration or demolition during this phase, HFS must be contacted regarding permission in terms of section 34 of the NHRA. Contact details are provided in Appendix 1.	Site Manager	Section 34 permit application to MPHRA	Permit issued in terms of section 34 from the relevant heritage authority or correspondence in this regard.
DECOMMISSIONING PHASE			
Keep all disturbance within existing development footprint and ensure identified buffers and no-go areas are adhered to	Site Manager/ECO	No unplanned impact or unplanned impact managed halted within 4 hours	Monthly Site Inspection and Monitoring Report to be submitted to SAHRA
All site crew should be informed of the heritage significance of the resources in the study area	Site Manager/ECO	Meeting held with site crew	Minutes of meeting
Implementation of the Chance Fossil Finds Procedure	Site Manager/ECO	Implementation of the Chance Fossil Finds Procedure	Written correspondence with relevant heritage authority regarding



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			and minutes of relevant meetings
If any archaeological material or human burials are uncovered during the course of operations, then work in the immediate area should be halted at once. The find should be reported to the heritage authorities (SAHRA) and may require inspection by an archaeologist to determine whether mitigation should take place and what form that mitigation should take.	Site Manager	No unplanned impact or unplanned impact halted within 4 hours	Written correspondence with relevant heritage authority regarding and minutes of relevant meetings
Should it be necessary that structures that have been graded or structures that are older than 60 years require alteration or demolition during this phase, HFS must be contacted regarding permission in terms of section 34 of the NHRA. Contact details are provided in Appendix 1.	Site Manager	Section 34 permit application to HFS	Permit issued in terms of section 34 from the relevant heritage authority or correspondence in this regard.

4.3 Guide on how to identify marked and unmarked burials and how to proceed should previously unidentified burials be uncovered during the construction process

4.3.1 Marked Burials

Marked burials are visible on the ground surface and are often marked by headstones or markers, or by cement blocks. Historic and modern burials are usually fenced or walled, and can be clearly discerned.





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Sometimes, especially in more rural areas, burials are marked by piles of stones stacked on top of each other, laid out parallel to one another. Often, burials are oriented in an east-west direction to reflect the movement of the sun.



4.3.2 Unmarked Burials

Unmarked burials will not be visible from the ground surface, and often the only evidence of human remains is once the skeletal material itself is disturbed.

During excavation activities, the site foreman must be aware of any changes or variation in soil colour or texture. Often, the soil immediately surrounding buried human remains is dense and rich in nutrients. Buried human skeletal material is soft to the touch, and often orange in colour, and can break very easily.

4.3.3 How to proceed

At the first signs of any skeletal material in the construction phase, work must cease at the site of the observation, the area must be cordoned off and SAHRA and SAPS must be contacted to complete a site inspection. As noted in the comment from SAHRA, “If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Ngqabutho Madida 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offence in terms of section 51(1)e of the NHRA and item 5 of the Schedule.”

The site inspection should determine: whether or not the skeletal material is:

- Modern (SAPS) or
- Archaeological (older than 60 years, SAHRA)

Should the human remains be determined to be younger than 60 years, SAPS must determine the way forward. Should the human remains be older than 60 years, SAHRA must determine the way forward.

It must first be noted that human remains have very high levels of social cultural value and as such, the removal of human remains from their place of internment must be considered a last resort. It is preferable to leave the human remains *in situ* and relocate infrastructure. Should it be impossible to relocate the infrastructure, for any reason, application must be made to relocate the human remains.

Should the skeletal material be determined to be older than 60 years but younger than 100 years, the processes for applying for a permit to impact burial grounds and graves as per section 36 of the NHRA and as per the guidelines published by SAHRA must be followed.



Should the skeletal material be determined to be older than 100 years, the processes for applying for a permit to excavate archaeological material remains as per section 35 of the NHRA and as per the guidelines published by SAHRA must be followed.

5. APPLICABLE LEGISLATION

The development of the Wind Energy facility triggers sections 38(1) and 38(8) of the National Heritage Resources Act (Act 25 of 1999) as this proposed development constitutes a change of character to a site exceeding 5000m². As such, this proposed development requires an evaluation of impacts to heritage resources in terms of other legislation (NEMA). This section states that the consenting authority must ensure that the assessment completed for impacts to heritage satisfies the requirements of the relevant heritage authority in terms of section 38(3) of the NHRA (SAHRA in Mpumalanga), and that the recommendations of the relevant heritage authority must be taken into consideration prior to the granting of consent.

Section 38(3) of the NHRA details the information that **MUST** be included in a Heritage Impact Assessment drafted in terms of section 38 of the NHRA. Furthermore, SAHRA has published Minimum Standards for Archaeological and Palaeontological Impact Assessments. All such guidelines and minimum standards have been complied with in the HIA that was conducted for the Umbila Emoyeni Renewable Energy Facility (CTS Heritage, 2022).

In terms of section 38(10) of the NHRA, if the applicant complies with the recommendations and requirements of the relevant heritage authority issued in terms of section 38(8) of the NHRA, then the applicant **MUST** be exempted from compliance with all other (general) protections included in the NHRA. As such, as long as the requirements of the heritage authority are satisfied, no permit application is required for the destruction of or impact to any heritage resource ***that has been identified in the HIA.***

In the instance of the Section 38 process followed for the Umbila Emoyeni WEF, PV Facility and EGI, no further additional specific conditions are provided for the development in the comments received from SAHRA.

Should any heritage resources be newly uncovered during excavation activities ie. heritage resources that were not identified in the HIA, then as per the monitoring table above, work must cease in that area and the relevant heritage authority must be contacted regarding a way forward. Any alteration



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or destruction to or of heritage resources NOT anticipated in the HIA remains subject to the general protections and require permission from the relevant heritage authority.

- Impacts to any structures older than 60 years require a permit from MPHRA (Mpumalanga) in terms of section 34 of the NHRA
- Impacts to archaeological or palaeontological heritage not anticipated in the HIA requires a permit from SAHRA (Mpumalanga) in terms of section 35 of the NHRA
- Impacts to burial grounds or graves that are older than 60 years requires a permit from SAHRA (Mpumalanga) in terms of section 36 of the NHRA

6. DOCUMENTATION AND MONITORING

All site record sheets, digital photos and mapping have been loaded securely to SAHRIS so that the EA holder, site manager and ECO are able to access the information online. Access to the database is governed by SAHRA and certain categories of information are not freely available to the general public without special permission such as GPS coordinates of archaeological sites.

Please see the following links for information:

- Case Application on SAHRIS - WEF (Case ID 18576)
<https://sahris.sahra.org.za/cases/ummbila-emoyeni-renewable-energy-wind-facilities-mpumalanga-province>
- Case Application on SAHRIS - PV (Case ID 18577)
<https://sahris.sahra.org.za/cases/ummbila-emoyeni-renewable-energy-solar-pv-facilities-mpumalanga-province>
- Case Application on SAHRIS - EGI (Case ID 18578)
<https://sahris.sahra.org.za/cases/ummbila-emoyeni-renewable-energy-facilities-egi-mpumalanga-province>

It is important that any new or previously unrecorded heritage resources identified during the course of the Construction, Operational or Decommissioning Phases are recorded on SAHRIS.



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7. REFERENCES

Heritage Impact Assessments				
Nid	Report Type	Author/s	Date	Title
157393	Heritage Statement	Shahzaadee Karodia Khan, Johan Nel	01/02/2014	HERITAGE STATEMENT FOR THE BASIC ASSESSMENT UNDERTAKEN FOR A POWERLINE UPGRADE, SYFERFONTEIN MINE, SECUNDA, MPUMALANGA PROVINCE
358403	HIA Phase 1	Anton van Vollenhoven	10/08/2015	A report on a Cultural Heritage Impact Assessment for the Development of a De-stoning Plan at the New Denmark Colliery, close to Standerton, Mpumalanga Province
5014	AIA Phase 1	Julius CC Pistorius	01/06/2007	A Phase 1 Heritage Impact Assessment Study for the Proposed New 88 kV Power Line Running from the Majuba Power Station near Amersfoort to the Camden Power Station near Ermelo in the Mpumalanga Province
5059	AIA Phase 1	Johnny Van Schalkwyk	01/05/2003	Archaeological Survey of a Section of the Secunda-Mozambique Gas Pipeline Bethal and Highveld Ridge
5700	AIA Phase 1	Johnny Van Schalkwyk	01/10/2002	A Survey of Cultural Resources for the Proposed New Tutuka-Alpha Standerton Power Transmission Line, Standerton District
7920	AIA Phase 1	Johnny Van Schalkwyk	01/02/2004	Heritage Impact Assessment for the Planned Sivukile Extension 4 Township Lekwa Municipality

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APPENDICES



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APPENDIX 1:

A Summary of the SAHRA Minimum Standards for Archaeological Site Museums and Rock Art Sites open to the Public

The archaeological heritage of South Africa is unique and it is non-renewable. Archaeological sites, including those with rock paintings or rock engravings, are especially vulnerable to damage caused by visitors. All such sites are protected by the National Heritage Resources Act (Act No. 25 of 1999). Anyone opening a site to the public, either as a formal site museum or simply as a place of interest, must take basic precautions to ensure the safety of the site and its contents. This guide is also applicable to mitigate the negative impacts of increased human activity in proximity to significant archaeological sites.

Expert advice should be sought from the South African Heritage Resources Agency (SAHRA) and/or from one of the museums or university departments listed below. Interventions should be reversible and the integrity of the site should be maintained as far as possible. No site should be opened to the public without a prior professional investigation that includes a conservation management plan approved by the appropriate heritage agency and, for rock art sites, complete documentation in case of later damage.

Remember that a permit is required for ANY disturbance at an archaeological site for activities that fall outside of those activities assessed in a formal Heritage Impact Assessment process and this includes erecting noticeboards, boardwalks, fences, etc. Liaison with the local publicity office and regional services council is recommended.

THE FOLLOWING MINIMUM STANDARDS MUST FORM PART OF THE MANAGEMENT PLAN:

1. Notify SAHRA of intention to open site

2. Engage a professional with specialist knowledge to document the site, draw up a conservation management plan and advise on interpretation of the site.

3. Approach to the Site

3.1 Arrangements for visiting

* if the site is open at all times, there should be adequate signposting;



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- * if the site is kept locked, there should be clear arrangements for the collection and return of a key;
- * if it is open only by appointment, there should be a specialist guide or a specially trained local guide who has had clear instructions on what to do and say.

3.2 Provision for vehicles

- * there should be an adequate and well-maintained road, preferably paved to limit dust, with off-road parking;
- * the parking should not encroach on the site: vehicles should not park closer than about 100 m from the edge of the site;
- * the parking area should be marked by a barrier between it and the start of the path.

3.3 Facilities

- * there should be a litter bin at the parking lot and it should be emptied regularly;
- * consider the need for toilets and the supply of refreshments and other facilities such as a shop, public telephone, restroom, etc., depending on the number of visitors expected;
- * consider the need to establish an interpretive centre separate from the site, where people can see displays and where you may be able to store material, provide accommodation, etc. Remember that a permit from HWC is required to collect any archaeological material and so displays are best done in collaboration with a professional or institution.

3.4 Design of the path

- * make sure that the path to the site is distinct;
- * the path should follow the contours to avoid unnecessary erosion of any hill slope;
- * make sure there are discreet signs to indicate direction where the path crosses a rocky area;
- * the path should not enter the site at a position where the deposits or the rock art can be damaged;
- * the introductory notice board should be displayed at the end of the path and the beginning of the site, where it will not interfere with good photographic views.

4. Provision of Information

- * at least an introductory notice board explaining that the site is protected by law;
- * where appropriate, a display with more detailed information on what can be seen at the site and what it means;



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- * a visitors' book in a container to protect it from the weather, or at a farmhouse or other convenient place (copies of these can be sent to HWC for record purposes);
- * a leaflet or pamphlet explaining visitor etiquette.
- * an explanatory leaflet or pamphlet that is specific to the site.

5. Guides

- * specialist guides or specially trained local guides ensure that the meaning of the rock art or, in the case of archaeological sites, the story of the people who used the site is interpreted and so enhance the experience for the visitor. They also teach appropriate visitor etiquette and contribute to the safety of the site.

6. Protection of the Site

- * measures used to protect archaeological deposits should be effective, reversible and recognisable, yet harmonious. It is important that visitors appreciate that the site is being well looked after, so it should be clean and as natural as possible. Remember that a permit is required for any disturbance or intervention at a site.

7. Protection of the Art

- * a psychological or physical barrier should be set up between the visitor and the rock art, or display area, in the form of anything from a low wooden railing to a fence that encloses the entire site, depending on the vulnerability of the site or precautions necessary for the safety of the visitor;
- * boardwalks are recommended and may include railings. They must be of treated wood or non-flammable material,
- * every effort should be made to remove graffiti from the site, as it attracts more graffiti. A permit is required to remove graffiti at a rock art site.

8. Protection of the Surface and Deposits

- * an effective cover should be put on the floor of the site to prevent dust being kicked up and damaging rock art and to stop people picking up material on the surface. Cover can be provided by a boardwalk, geotextile, or medium to large slabs of natural rock from the surrounds of the site.
- * excavated sections should be backfilled, in consultation with HWC

9. Regular Maintenance

- * arrangements should be made with the appropriate heritage agency or museum for a monitoring programme.



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* provision should be made for regular visits to the site by the manager or property owner to check on litter, damage, graffiti, etc., which should be reported to the heritage agency.

* there should be regular monitoring of vegetation around the site so that, if necessary:

- measures can be taken to protect it against trampling,
- potentially dangerous plants such as those with thorns can be controlled,
- dead wood can be removed so that damage by veld fires can be avoided,
- firebreaks can be maintained.

10. Avoid having:

* a litter bin on site unless very large groups are catered for;

* braai or picnic places on the site or right next to it;

* camping places within 500 m of an archaeological site;

* plastic sheeting or plastic bags exposed to view unless there is no other option;

* concrete barriers or surfaces;

* metal poles or wire in contact with rock shelter or cave walls as they rust and stain the rock;

* a sandy surface on the outer side of a fence as this will be eroded by people walking there and the fence will be under-cut.

11. Contact Information

South African Heritage Resources Agency (SAHRA)

Contact Person: Mr Phillip Hine

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APPENDIX 2:
Chance Fossil Finds Procedure

APPENDIX 5: REHABILITATION PLAN



Freshwater Rehabilitation Plan & Monitoring for the Umbila Wind Energy Facility (WEF) Project

Bethal, Mpumalanga Province

April 2023

CLIENT

savannah
environmental

Prepared by:

The Biodiversity Company

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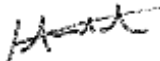
Report Name	Freshwater Rehabilitation Plan & Monitoring for the Umbila Wind Energy Facility (WEF) Project
Submitted to	
Report Writer	<p>Andrew Husted </p> <p>Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.</p>
Declaration	<p>The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.</p>

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1 Introduction

The Biodiversity Company was commissioned by Savannah Environmental to develop an aquatic Rehabilitation and Monitoring Plan for the Umbila Emoyeni Wind Energy Facility (WEF), located in the Lekwa Local Municipality, Mpumalanga Province. This plan is a requirement of the issued environmental authorisation (EA).

The rehabilitation plan has been compiled to facilitate the rehabilitation of degraded freshwater systems, including wetlands associated with the WEF development area.

A wetland rehabilitation plan is required for the degraded wetlands in accordance with the requirements of the Department of Water & Sanitation (DWS) and in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA) and National Water Act (Act No. 36 of 1998) (NWA) with regards to wetland protection and remediation.

1.1 Background

A freshwater resource study and assessment was completed by Nkurenkuru Ecology and Biodiversity (2022) for the area, and the following is summarised from the assessment:

- The development area is located within Kwaggalaagt River's catchment which is an important tributary of the Blesbokspruit River. The development is likely to have a cumulative impact on this important freshwater resource feature as well as the wetland features associated with this river;
- Based on the proposed location of the Umbila Emoyeni Solar Photovoltaic (PV) facilities as well as the Umbila Emoyeni WEF's turbine locations, no freshwater resource features will be directly impacted by the mentioned infrastructure as the infrastructure are located well outside of any freshwater resource features as well as their recommended buffer areas; and
- The most significant potential impact associated with the Umbila Emoyeni Renewable Energy project are as a result of the associated infrastructure, most notably access roads and watercourse/wetland crossings.
- A total of 27 freshwater resource features were identified and delineated within the proposed development area and include:
 - Twenty-six (26) wetland features have been delineated within the 132 kV grid corridor, whilst no wetland features were recorded within the 400 kV grid corridor;
 - Of these 26 wetland features, located within the survey area, approximately 22 - 24 features will likely be spanned by the power line and crossed by service roads;
 - No wetland features have been identified within the footprint of the Main Transmission Substation;
 - No wetland features have been identified within the footprint of Collector Substations 1 and 2;

- A small seepage wetland has been identified and delineated within the footprint of the Collector Substation 3.
- All of the freshwater resource features on and around the site are intermittent or ephemeral, being inundated only for brief periods each year, with periods of drought that are unpredictable in duration;
- A wetland buffer area of 11 m from the outer edge of wetland features are recommended, and should be implemented; and
- All freshwater features with their buffer areas have been classified as either Very High- or High sensitive and should be regarded as “No-Go” areas apart from the following activities and infrastructure which may be allowed (although restricted to an absolute minimum footprint):
 - only activities relating to the route access and the spanning of the gridlines;
 - the use/upgrade of existing roads and watercourse crossings are the preferred options; and
 - Where no suitable existing roads and watercourse crossings exist, the construction of new access roads and watercourse crossings can be allowed, however this should be deemed as a last resort.

1.2 Strategic Framework

A strategic framework for improved wetland management in eThekweni’s Northern Spatial Development Plan Area (Macfarlane, 2015) was consulted for the provision for infrastructure requirements. The framework recognises that some infrastructure development may be required in these areas and with the need for supporting service infrastructure, further impacts can be expected. It is however important that infrastructure development (including roads and service infrastructure) minimises impacts to wetland management zones and seeks to avoid disruption of natural corridors as far as practicable. The following design principles are applicable to roads and underground cables:

- **Road** crossings should be aligned perpendicular to flow (not near-parallel), located in areas of least sensitivity (along existing corridors of disturbance), placed at a narrow section of the wetland / riverine system and designed in a manner that causes least disturbance to natural habitat through the incorporation and implementation of the following objectives and best practice design measures:
 - i) Avoid and/or minimize the constriction of riverine and/or wetland flows. This should be achieved through the establishment of an adequate number and adequately sized culverts across the riverine and wetland systems, taking into account the full extent / width of these systems.
 - ii) Avoid and/or minimize the deactivation of valley bottom and floodplain areas. This should be achieved through ensuring impedance of flow and sediment distribution is limited through appropriate bridge design and by minimizing encroachment of road fill embankments. In this regard, bridges should be widened and/or culverts should be installed within fill embankments to maintain the natural distribution of flows and sediment across the relevant fluvial surfaces.

- iii) Maintenance and/or establishment of faunal movement and habitat connectivity. Wetland, aquatic and terrestrial faunal movement and habitat connectivity must be maintained (or improved) as far as practicable through the establishment of adequately sized culverts and bridges.
- iv) Reduce visual impact. Infrastructure features should be designed to be aesthetically pleasing and not detract from the open space.
- **Pipeline** crossings should be aligned perpendicular to flow (not near-parallel), located in areas of least sensitivity (along existing corridors of disturbance), placed at a narrow section of the wetland / riverine system and designed in a manner that causes least disturbance to natural habitat through the incorporation and implementation of the following objectives and best practice design measures:
 - i) Avoid and/or minimize the extent of direct physical disturbance. Pipe bridges are preferred over underground trenched crossings. In this regard, the number of piers/plinths established within the riverine / wetland habitat must be minimized and where possible the riverine / wetland habitat must be spanned. Where possible, such infrastructure should be accommodated alongside existing road networks.
 - ii) Minimize indirect erosion, sedimentation and pollution / water quality impacts. Where relevant:
 - (1) Sewer pipelines should not be located within 30 m of the riverine and wetland systems and where crossings are unavoidable, pipelines must cut across the watercourses at as close to perpendicular to flow as possible.
 - (2) Sewer manholes should not be located within 30 m of the riverine and wetland systems except at unavoidable crossings. In this regard, no manholes should be located within 10 m of the riverine and wetland habitat.
 - (3) No sewer pump stations must be located within 10 m of the riverine and wetland systems and the pump stations must have emergency generators and at least 24hrs freeboard.
 - iii) Reduce visual impact. Infrastructure features should be designed to be aesthetically pleasing and not detract from the open space.

1.3 Key Legislative Requirements

Section 24 of the Constitution of South Africa states that, '*everyone has the right to an environment that is not harmful to their health or well-being; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*'.

There are several legal stipulations that require wetlands to undergo rehabilitation. These stipulations are referred to in some capacity in the following Acts:

- National Environmental Management Act 107 of 1998 (NEMA);

- National Environmental Management: Biodiversity Act 10 of 2004 (NEM:BA);
- National Water Act 36 of 1998 (NWA); and
- Conservation of Agricultural Resources Act 43 of 1983 (CARA).

A key consideration is the requirement of 'duty of care' with regards to environmental remediation: stipulated in Section 28 of NEMA (National Environmental Management Act, Act 107 of 1998): *'Every person who causes has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot be reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment.'*

2 Project Area

Emoyeni Renewable Energy Farm (Pty) Ltd is proposing the development of a commercial wind farm. The authorised Umbila Emoyeni WEF, referred to as the Project Area for the purposes of this report, is situated ~8 km south-east of the town of Bethal in the Lekwa Local Municipality, Mpumalanga (Figure 2-1).

The energy facility infrastructure comprises:

- 25 wind turbines;
- On-site 132 kV substation;
- Power line linking to the existing Eskom transmission infrastructure;
- Underground cables linking the turbines to the substations;
- Crane platforms;
- Operations and maintenance compound area;
- Car park;
- Storage area; and
- Internal access roads (12-13 m wide) to each turbine.

Figure 2-2 presents the details of the Infrastructure Area and its relation to nearby important habitat features.

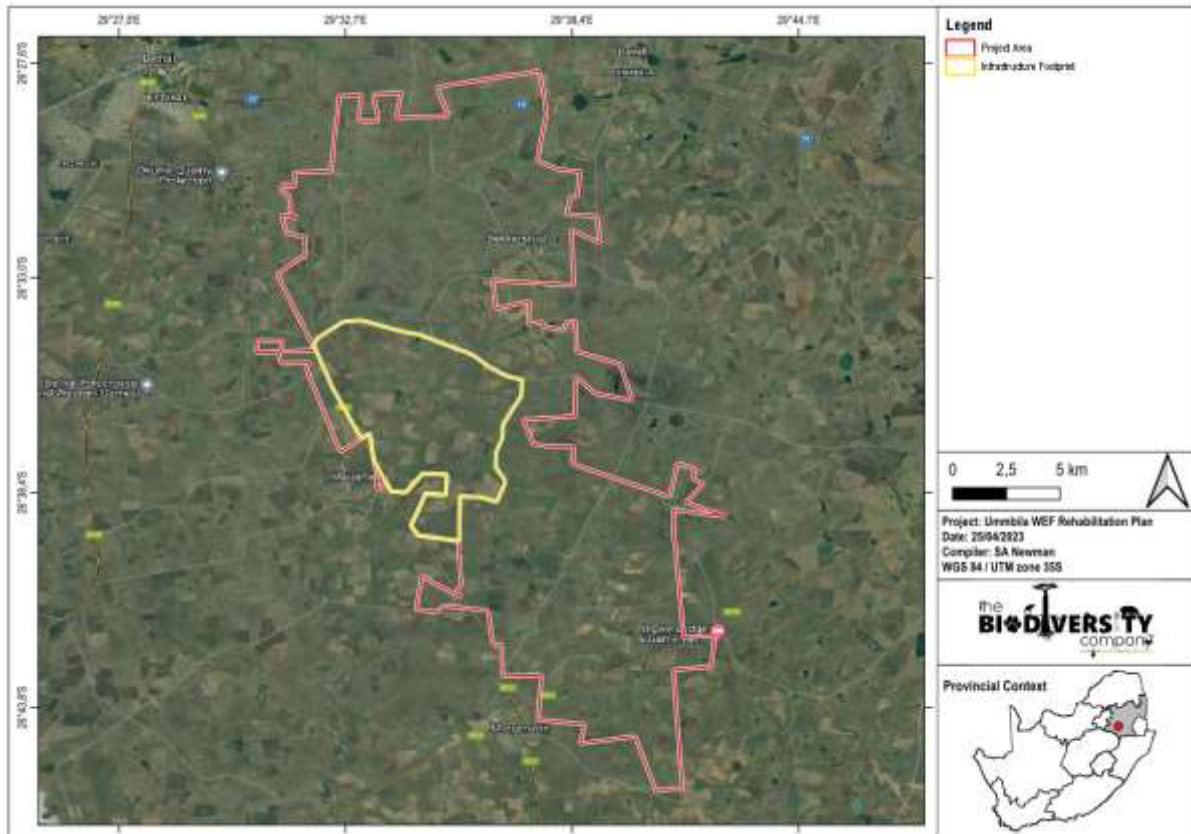


Figure 2-1 Map illustrating the proposed Umbila Emoyeni Phase One Area (yellow) and the overall Project Area (red)

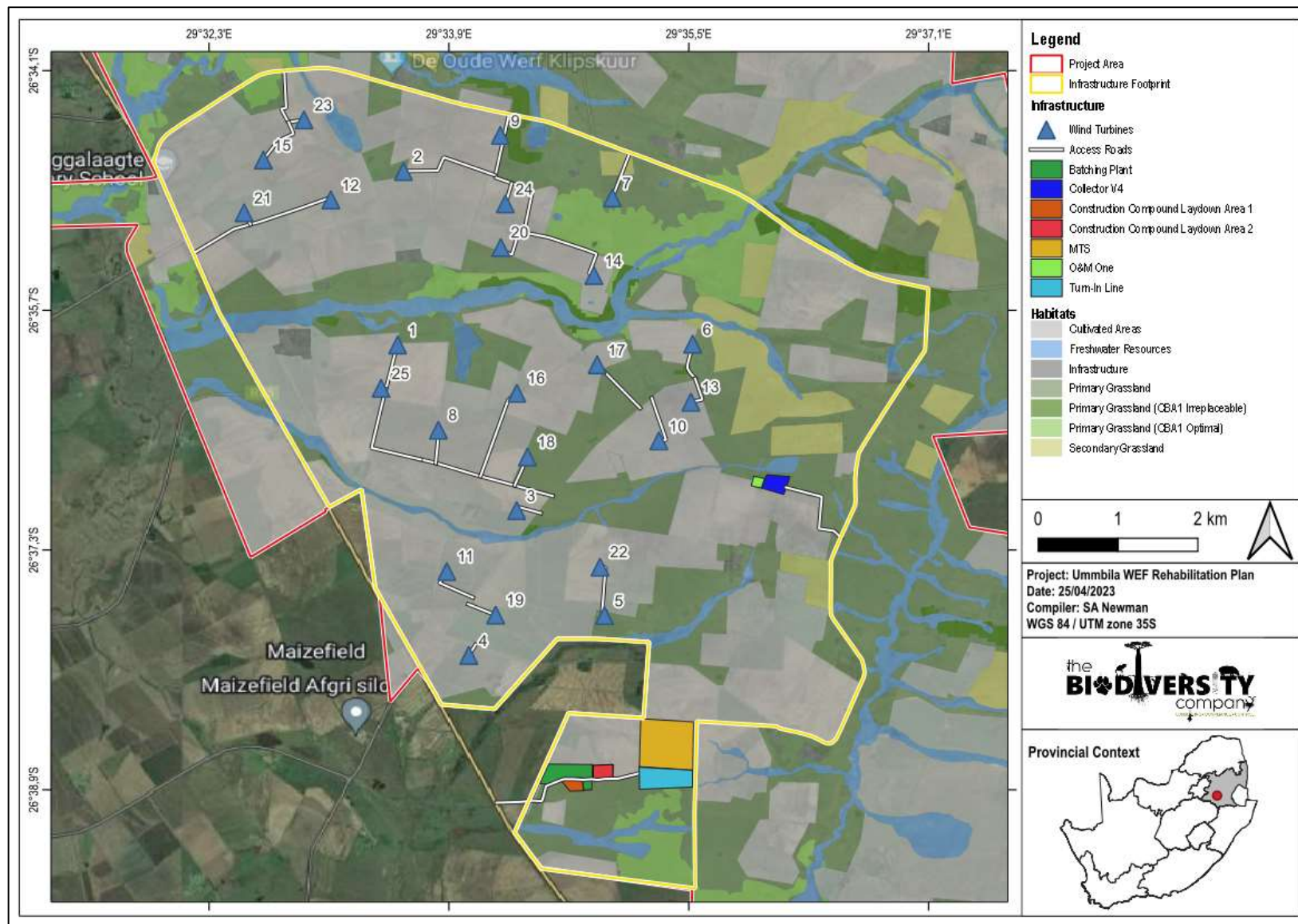


Figure 2-2 The location and details of the Project Area, including associated important habitat features

3 Rehabilitation Plan

3.1 Rehabilitation Measures

The assessment completed by Nkurenkuru Ecology and Biodiversity (2022) indicated that no freshwater resource features will be directly impacted by the mentioned infrastructure as the infrastructure are located well outside of any freshwater resource features as well as their recommended buffer areas. The most significant potential impact associated with the Umbila Emoyeni Renewable Energy project are because of the associated infrastructure, most notably access roads and watercourse/wetland crossings. These infrastructure areas are the priority (and focus) for the rehabilitation plan. However, the subsequent measures remain applicable for the entire development area.

3.1.1 Re-vegetation / landscaping for vegetation establishment

Agricultural crops located within the delineated water resources and associated buffers must be removed from these areas, and these areas re-vegetated with indigenous vegetation. The following is recommended for this measure:

- Remove crops from delineated resources and associated buffer areas;
- Crops located on the development area beyond the water resources and buffers must be cleared on a needs basis only. These areas are to be cleared as development progresses, minimising the extent of open and bare ground in the catchment area. This clearing must be undertaken in a phased approach; and
- The buffer areas must be re-vegetated with an indigenous grass species by means of seed application. The establishment of this ground cover will minimise erosion of the cleared areas, stabilising soils for the establishment of vegetation.

All planting and seed-mix application must be carried out as far as is practicable during the period most likely to produce beneficial results but as soon as possible after the soil properties are estimated to be adequate. The seasonal period is from the beginning of April to the end of October.

3.1.1.1 Ripping compacted areas

The buffer areas that will be cleared and all other areas that may be degraded (by means of vehicles, laydown yards, ablution facilities etc.) must be ripped where compaction has taken place. According to the Department of Primary Industries and Regional Development (Agriculture and Food) (2017), ripping tines must penetrate to just below the compacted horizons (approximately 300 – 400 mm) with soil moisture being imperative to the success of ripping. Ripping must take place within 1-3 days after seeding, and also following a rain event to ensure a higher moisture content. To summarise;

- Rip all compacted areas outside of the wetland delineations that have been compacted;
- This must be done by means of a commercial ripper that has at least two rows of tines; and

- Ripping must take place between 1 and 3 days after seeding and following a rainfall event (seeding must therefore be carried out directly after a rainfall event).

3.1.1.2 Vegetation composition

Areas denuded by disturbances, site clean-up (soil scraping and washing) and landscaping activities must be re-vegetated. Re-vegetation must follow landscaping activities in a phased approach over two consecutive growing seasons. This approach ensures that the entire system is not denuded of vegetation all at once and that any challenges / short comings identified in the first phase can be rectified in the second phase. Several zones for re-vegetation have been identified and a species composition recommended. These re-vegetation zones essentially represent different water resources and also varying zones of saturation.

Rehabilitation must seek to re-establish a wetland vegetation comprised of short, dense hydromorphic grasses in the temporary to seasonal zone with slightly taller sedges becoming more prevalent in the permanent zones along the flow path. Avoid creating a monoculture, species diversity is the key to wetland health and the provision of important ecosystem services such as erosion control and water quality enhancement. To achieve this outcome the following approach is advocated:

- Attempts must be made to maximise the diversity of low hydromorphic grasses and sedges throughout;
- Re-vegetation must involve the use of both re-seeding and mechanical transplanting. Re-seeding must occur in both the flow path and banks to establish a vegetation base while mechanical transplanting of wetland plant sods must take place mainly within the flow path;
- As the saturation, nutrient and oxygen levels will vary markedly depending on the hydrological zonation (permanent, seasonal and temporary) care must be taken to sow or plant the appropriate plant species in each re-vegetation zone (flow path or bank). The species are generally common and adaptable species that show a tolerance to disturbed soil conditions;
- Only locally indigenous species that are adapted to local climatic conditions must be used. Perennial species must be prioritised for transplanting. Good quality planting material or seed must be readily available;
- Re-vegetation must commence immediately after landscaping and the preparation of the seedbed, preferably in early spring when conditions for germination and rootstock establishment are optimal. Planting must preferably be timed to take place 1-3 days following a significant rainfall event when soils are within 10% of the field capacity (maximum saturation level);
- Topsoil must be stored for later use and where necessary supplemented with imported topsoil. With correct storage and replacement of topsoil species diversity must improve rapidly as species present in the seedbank also germinate;
- Transplanted vegetation can be sourced from nurseries and / or sustainably harvested from local wetlands, with due authorisation. Most of the plants must be harvested from

the areas that will be scraped during the site clean-up and landscaped and supplemented with plants from surrounding wetlands. Harvesting must target sedges, rushes and grasses;

- Harvesting would involve carefully digging up parent plants and separating the material into as many individual sods as possible. Parent plants must be large specimens with a high root biomass. These plants must be temporarily stored onsite and transplanted later. Try to minimise the time the harvested plants spend in nurseries between harvesting and replanting back in the wetland;
- Try to limit collection and disturbance to wetlands when collecting sods by sticking to the designated collection areas and utilising a single access path. Once complete the soil along the collection paths must be loosened;
- The sods must be planted to an approximate depth. This will vary depending on the size of the plant but will be around 200 mm on average. The recommended planting density depends on plant size (range from 1 plant / m² for large plants such as rushes to 8 plants / m² for small sedges and grasses) but is generally around 2–3 plants / m² for average sized plants. When transplanting sods attempt to retain as much of their roots and soil as possible and maintain saturation levels similar to where they were removed from;
- For larger sedges and rushes trim the foliage (about 100 to 150 mm) to reduce evaporative losses during transplanting. At least some live foliage must remain above ground after planting to drive water uptake and survival;
- Keep plants that are being prepared for later transplanting out of direct sunlight (fodder bags work well) and bag / re-plant as soon as possible. Uprooted plants left in the sun for several hours will die. Conversely, those left in bags for several days will begin to rot; and
- Avoid the use of fertilizers or any other chemicals or soil enhancers during re-vegetation.

Table 3-1 Recommended species for revegetation

Embankment	Seep	Saturated Zone / Channels
<i>Digitaria eriantha</i>	<i>Imperata cylindrica</i>	<i>Echinochloa pyramidalis</i>
<i>Cynodon dactylon</i>	<i>Agrostis lachnantha</i>	<i>Leersia hexandra</i>
<i>Eragrostis curvula</i>	<i>Setaria sphacelata var sericea</i>	<i>Cyperus congestus</i>
<i>Eragrostis chloromelas</i>		<i>Cyperus longus</i>
<i>Eragrostis lehmanniana</i>		<i>Cyperus esculentus</i>
<i>Themeda triandra</i>		<i>Cyperus marginatus</i>
<i>Setaria sphacelata var sphacelata</i>		<i>Setaria pumila</i>
		<i>Schoenoplectus decipiens</i>

3.1.1.3 Re-vegetate wetland areas

According to Russell (2009), areas characterised by a loss of soil resources must be revegetated by means of vegetation with vigorous growth, stolons or rhizomes that more or less resembles the natural vegetation in the area.

The dominant hydrophytes within the permanently saturated wetland zones, should be sustainably harvested throughout the wetland areas that are to remain intact to ultimately use to revegetate degraded areas. According to Russell (2009), the following is crucial when revegetating whole plants;

- The planting of whole plants must take place just before or at the beginning of the wet season;
- Whole plants must be dug up with as much of the root intact as possible;
- Roots must be dug up with the soil around it still intact and undisturbed;
- After the plants have been dug up/harvested, all plants must be stockpiled in damp or wet bags and be kept in the shade;
- The soil around the revegetated plants must be manually compacted after planting;
- Holes excavated for re-vegetation must be approximately 300 to 500 mm deep;
- Soil must be stockpiled according to relevant horizons and backfilled in the same order prior to re-vegetation (the first 300 mm must be stockpiled separately from the rest of the soil reserves).

3.1.1.4 Re-vegetate buffer areas

The associated buffer areas must be re-vegetated by means of indigenous grass species. Mixed stands or monocultures will work sufficiently for re-vegetation purposes. Mixed stands tend to blend in with indigenous vegetation species and are more natural. Monocultures however could achieve high productivity. In general, indigenous vegetation must always be preferred due to various reasons including the aesthetical presence thereof as well as the ability of the species to adapt to its surroundings.

The areas to be grassed must consist of suitable material and the areas must be scarified to a minimum depth of 100 mm with furrows spaced at 250-300 mm centres. Scarifying along slopes must run parallel to the contours, forming horizontal terraces. All loose stones and other excess material must be removed during trimming. Where topsoil is required the surface must be left slightly rough during trimming to ensure a proper bond between the topsoil and the sub-soil. The topsoil must be placed on the prepared surfaces and trimmed to the uniform thickness and unless otherwise specified, a 75 mm layer of topsoil must be placed. The top 150 mm of the prepared surfaces must have the adequate amount and type of chemical soil properties required for establishing proper growth conditions for grass.

Plant phase plants which are characterised by fast growing and rapid spreading conditions. Seed germination, seed density and seed size are key aspects to consider before implementing re-vegetation activities. The amount of seed must be limited to ensure that competition between plants are kept to a minimum. During the establishment of seed density, the percentage of seed germination must be taken into consideration. *Cynodon dactylon* is

one of the species recommended due to the ease with which it germinates. This species is also easily sown by means of hand propagation and hydro seeding. The following species are recommended for re-vegetation of the buffer areas:

- *Digitaria eriantha*;
- *Cynodon dactylon*;
- *Eragrostis curvula*
- *Eragrostis chloromelas*;
- *Eragrostis lehmanniana*; and
- *Themeda triandra*.

3.1.2 Alien vegetation removal & control

It is recommended that all invasive species located within the water resources and buffer areas be controlled/removed. This is to improve the conditions of the wetland as well as to, most importantly, decrease competition between the revegetated and alien invasive species. The main species of Alien Invasive Plants (AIP) can be seen listed in Table 3-2 below.

Table 3-2 Some dominant AIP species recorded in the Project Area (Terrestrial Biodiversity and Ecological Study and Impact Assessment, Gerhard Botha and Dr. Jan-Hendrik Keet)

Family	Taxon	Common Name	NEMBA Category
Asteraceae	<i>Cirsium vulgare</i>	Spear thistle	1b
Asteraceae	<i>Xanthium strumarium</i>	Large Cocklebur	1b
Fabaceae	<i>Gleditsia triacanthos</i>	Honey Locust	1b
Myrtaceae	<i>Eucalyptus camaldulensis</i>	River Red Gum	1b
Rosaceae	<i>Pyracantha angustifolia</i>	Narrowleaf Firethorn	1b
Rosaceae	<i>Pyracantha crenulata</i>	Nepal Firethorn	1b
Rosaceae	<i>Rosa rubiginosa</i>	Sweet Brier	1b
Solanaceae	<i>Datura stramonium</i>	Common Thorn Apple	1b
Verbenaceae	<i>Verbena bonariensis</i>	Tall Verbena	1b
Verbenaceae	<i>Verbena brasiliensis</i>	Brazilian Vervain	1b
Verbenaceae	<i>Verbena rigida</i>	Slender Vervain	1b

3.1.2.1 Monitoring and Mitigation

Regular monitoring and maintenance (such as removing AIP/weeds and encroachment) are required for successful revegetation/rehabilitation projects. Monitoring consists of photo points and documentation of observations. It is recommended seasonally for the first two years of establishment and at least annually thereafter;

- General maintenance will involve AIP and weed control as well as thinning of encroachment. Continued weed control is critical to the success of re-vegetation and must be high priority. Weeding may be necessary to avoid competition and stress;

- AIP & Weed control during the first 2 years after rehabilitation established would likely control the undesired species until they can be outcompeted or shaded out. As with site preparation, weed maintenance after can be accomplished by mechanical means. Care must be taken not to damage the emerging plants or the soil layer. Stringent weed management eventually will increase the site's resistance to further weed invasion by favouring the growth and establishment from the seedbank;
- If possible, the rehabilitated areas must be irrigated at regular intervals, taking care not to cause erosion or damage the soil surface by using an excessive force of water; and
- The project area is to be left undisturbed and all access prohibited, except when maintenance is being undertaken and domestic animals must be kept out of the area.

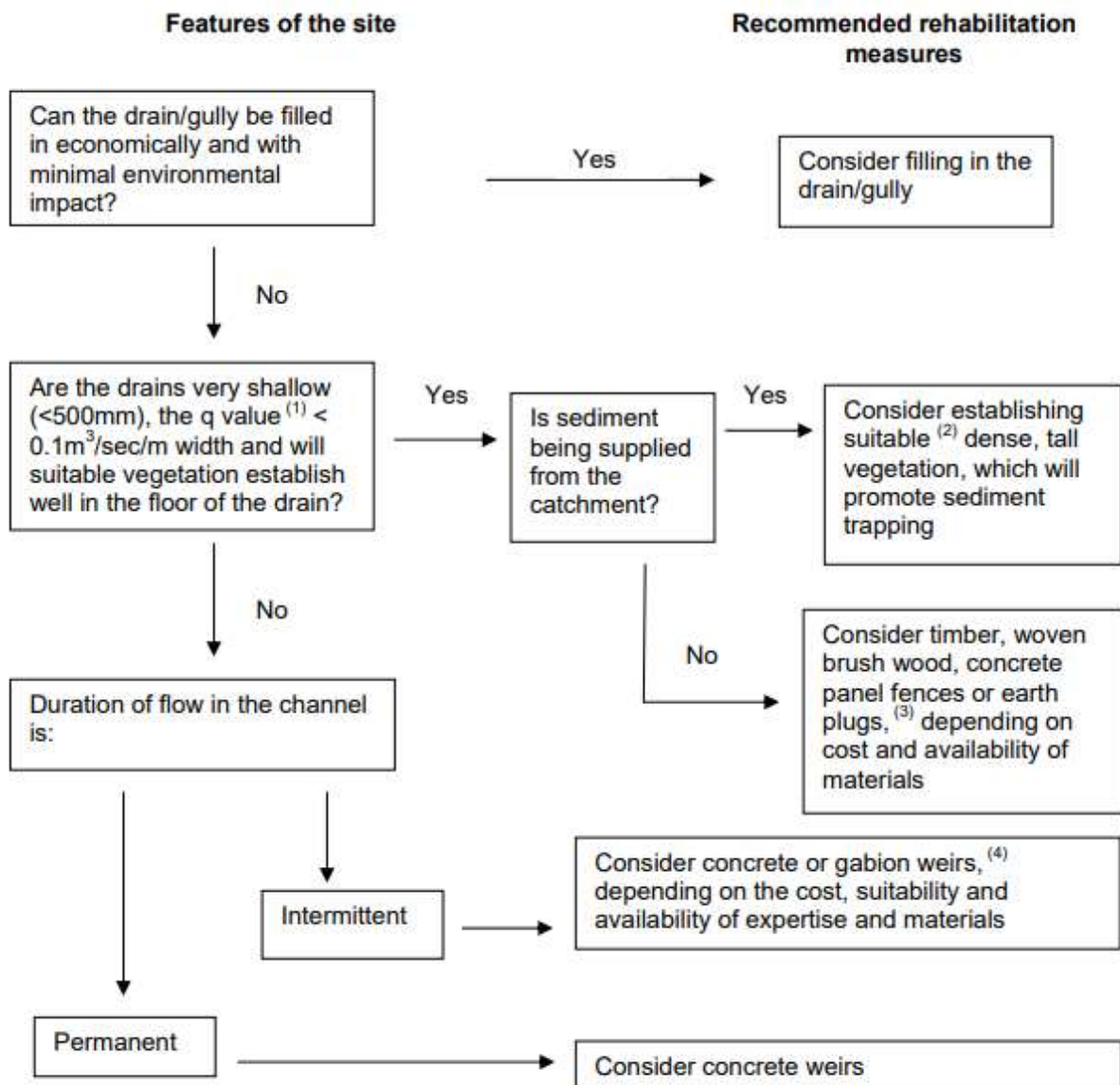
3.1.3 Shaping to reinstate drainage & stormwater measures

Russell (2009) states it would possibly be more cost effective to accept an objective of stabilisation rather than restoration.

Figure 3-1 presents a guiding approach for a particular intervention for the development. The following is recommended for the decommissioning of drainage channels:

- Topsoil sources from the development area, sourced during construction can be filled into the drainage channels within the water resources and buffers (Figure 3-2). Topsoil material must not be mixed with the excavated material. These backfilled channels must then be re-vegetated. Backfilling drains is preferred for smaller and shallower drains;
- An alternative measure is to install 'earth plugs' at frequent (15 – 20 m) intervals along each drain. The construction of a series of smaller structures within the drain (or gully) would be required, which will catch up some sediment (Figure 3-3). The channels will become silted-up upstream of the plug and these silted areas will establish vegetation naturally in due course. Earth plugs are preferred for deeper and larger drains. Rock packs could be implemented for smaller drains that are not susceptible to high run-off volumes (and velocities) (Figure 3-4); and
- The stormwater management plan (Struxit Projects, 2022) proposes gabion structures be installed in the channels to prevent the stormwater from flowing out of the site at an uncontrolled rate and high velocity. These facilities will improve attenuation of the systems and also trap suspended sediment.

It is recommended that in principle, as part of the rehabilitation measures the top 300 mm of the excavated soil resources (topsoil) must be stockpiled separately from that below 300 mm. The soil resources can then be utilised across the development for rehabilitation efforts. Avoid mixing of soil layers.



Note that the above is in respect of treating the gully only; where runoff needs to be re-routed back into the wetland the design must cater for this.

Figure 3-1 Decision tree for choosing appropriate rehabilitation measures for gullies and drainage ditches in wetlands (Russell, 2009)

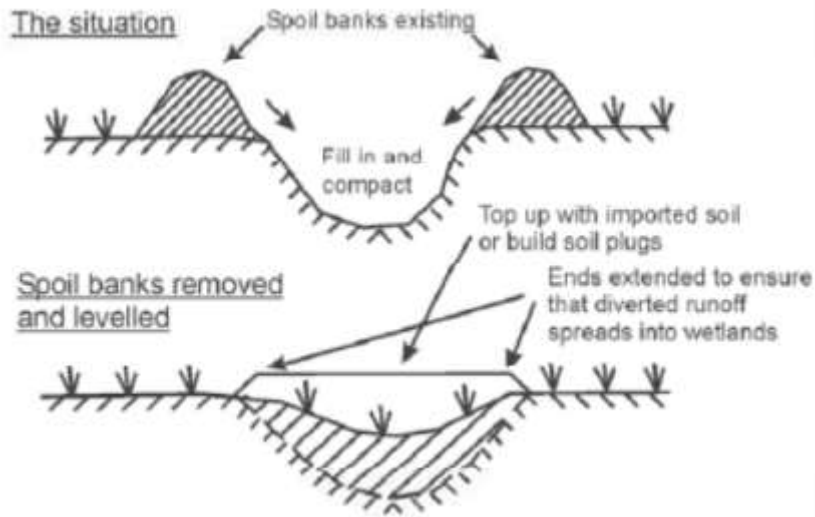


Figure 3-2 Example to backfill a drain / gully (Russell, 2009)

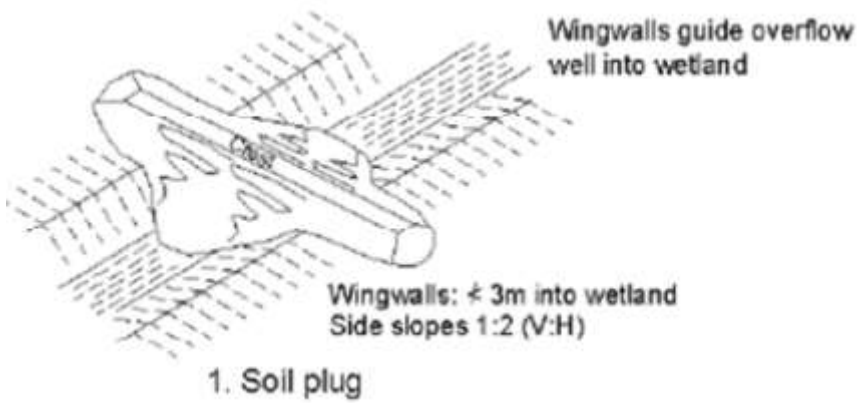


Figure 3-3 Example of an 'earth plug' (Russell, 2009)

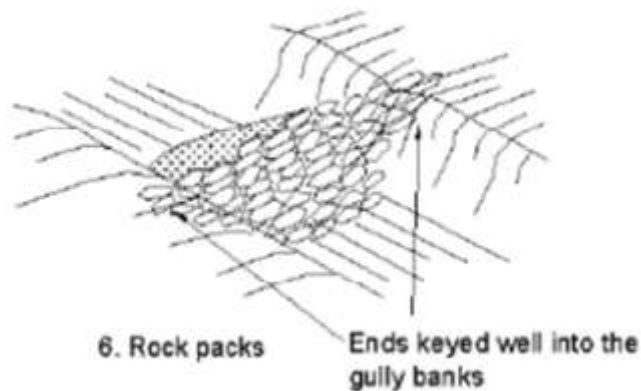


Figure 3-4 Example of 'rock packs' for drains (Russell, 2009)

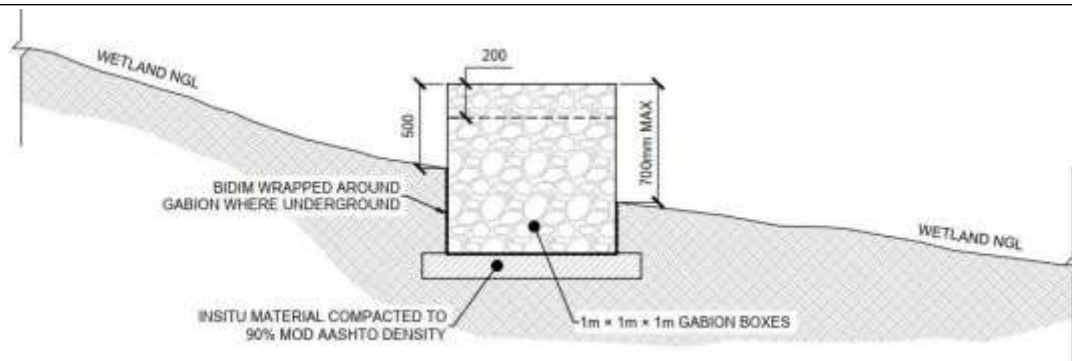


Figure 3-5 Gabion 'plugs' designed for the development (Struxit Projects, 2022)

3.1.3.1 Gully erosion

The water resource units must be inspected for areas of headcut erosion. These headcuts, erosion gullies and channels that are incised or susceptible to erosion and that extend from the water resource area into the upper catchment area must be addressed. Figure 3-8 presents a guiding approach for a particular intervention for the development. The following is recommended for the decommissioning of incised channels:

- Dryland eroded channels can be backfilled with topsoil and sub-soils from the development area, together with other non-toxin materials and compacted to these channels (Figure 3-6). The following is recommended:
 - Stockpile excavated material according to horizons (the top 300 mm separate from the rest of the material);
 - First introduce the sub-soil into the channel and then gently compact the soil; and
 - Then introduce the topsoil into the channel and then compact the soil gently.
- In the event the backfilling on channels is unsuccessful, then investigate the feasibility of hard-engineering structures such as weirs with aprons (Figure 3-7).

These measures must be informed by the stormwater management plan developed for the project, and a hydrologist must advise on the feasibility and suitability of the preferred option.

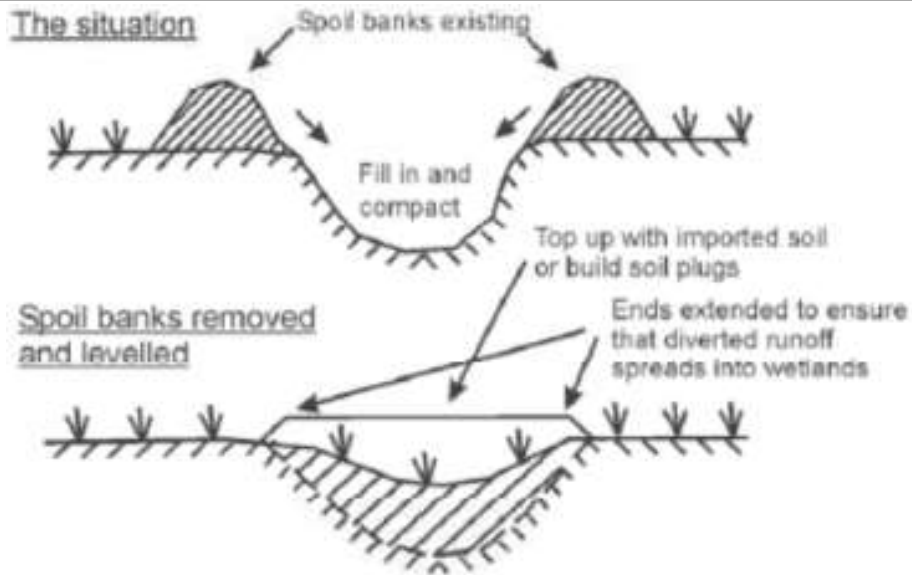


Figure 3-6 Back-filling of drains / gullies (Russell, 2009)

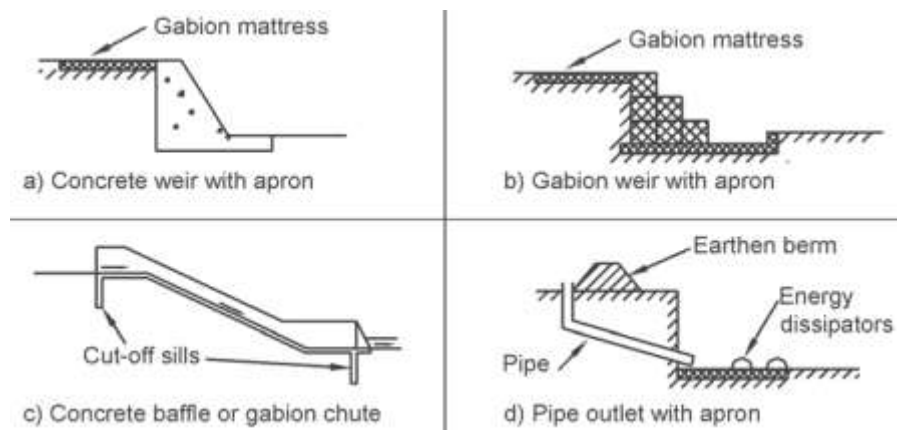


Figure 3-7 Side views of various structures to stabilize headcuts (Russell, 2009)

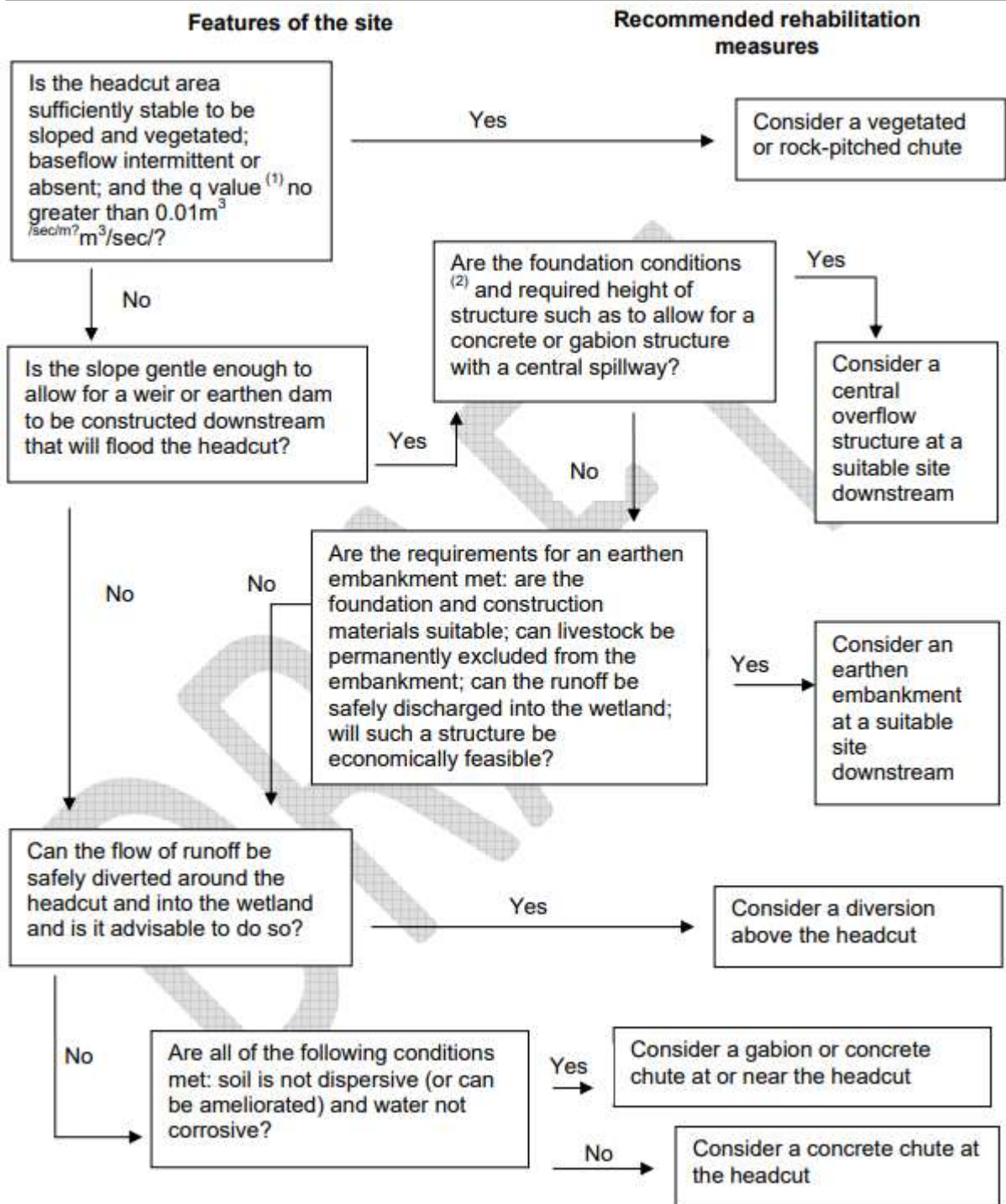


Figure 3-8 Decision tree for choosing a mechanism to stabilize active headcut erosion (Russell, 2009)

3.1.3.2 Backfill

During the period in which the excavated material is stockpiled, some of the material may be lost due to wind and water carrying lighter particles away. To compensate for the loss of this material, topsoil must be used to completely fill the excavated areas as well as degraded areas that have experienced a loss of soil reserves. It is worth noting that the topsoil material must not be mixed with the excavated material, but rather introduced to the surface. The surface of

this topsoil area outside of the delineated wetland must be slightly compacted to compensate for subsidence of this material.

As part of the rehabilitation measures, the top 300 mm of the excavated soil resources must be stockpiled separately from that below 300 mm. The soil resources must be reintroduced back into the excavated pits/trenches according to the order excavated. In cases where stockpiled material has been lost, topsoil must be reintroduced into areas with insufficient material. It is imperative that weed free topsoil be used.

To summarise;

- Stockpile excavated material according to horizons (the top 300 mm separate from the rest of the material);
- Reintroduce the sub-soil into the excavated areas and then gently compact the soil; and
- Reintroduce the topsoil into the excavated area and then compact the soil gently.

3.1.4 Bank stabilisation, reduce erosion risk

The clearance of vegetation from the water resources must be used as an opportunity to inspect the resources for signs of erosion. These erosion risk areas must be identified and demarcated for interventions. These areas will likely need to be shaped and re-vegetated to provide bank / channel stability. The following is recommended for bank stabilisation:

- Shape the embankments manually using labour and a Bobcat excavator to create a slope / embankment that represents the natural topography of the catchment. The profile of the bank must be consistent with the slope of the catchment, avoid creating unnecessarily steep or raised slopes. These areas can then be re-vegetated following the same processes presented in previous sections; and
- In the event the abovementioned soft engineering approach does not succeed, then the suitability of gabion baskets and reno mattresses must be investigated.

3.1.4.1 Shaping

The natural slope or topography of the area that has been affected by the clearing needs to be restored in order to ensure that the flow of water and the growth of vegetation occurs naturally. The re-adjustment of the topography will also improve the general aesthetics of the area. The removal of all the piles within the project area such as vegetation, soil and old rubble is compulsory. The building rubble and general litter must be removed entirely from the area and disposed of at licensed facilities. The following are methods that can be used to reshape the slope of the area, and are also applicable to dryland areas:

- Sand Bags
 - Only biodegradable bags are to be used, this includes Geojute sacks or similar. No plastic bags may be utilised. The bags must be filled with a sand or rock mixture under no circumstances may any contaminants be put into the bags (i.e., cementitious material, soil with chemical spill or fuel etc.). This must be checked by the Environmental Control Officer (ECO).
- Terracing and Soil Stabilisation

- For this process rows of straw, hay or bundles of cut vegetation may be used. The hay, straw or vegetation is dug into the soil in contours, in order to help slow surface wash and capture eroded soil. The spacing between rows would be dependent on slope and the specific area.
- Geojute Netting
 - Netting or matting (biodegradable) can also be utilised on slopes to protect the soil from wind and water erosion. This assists with soil retention, weed control and vegetation establishment. Plants can be installed by making small incisions for planting. This would be an effective method in this area due to the high level of wind present. It is however important that this cannot be placed over existing vegetation growth and can only be used right after sloping have been performed.
- Geojute Rolls
 - Cylindrical rolls of Geojute fabric filled with sand (as described in the sandbag section) are effective on slopes and large cleared areas. This method is very effective in assisting with erosion control. Geojute rolls are kept in place with the use of pegs (alien invasive plant material can be utilised for this).
- Gabion Baskets and Reno Mattresses
 - These represent engineered solutions to steep slopes and banks; in this instance it would be relevant to the edges of the water resources. These methods are to be utilised in areas where drainage and flooding is a concern. Gabion baskets are 1m x 1m x 1m wire baskets that are filled with uniform sizes rocks. Reno mattresses are generally used to cover a larger area and is made of flat baskets. These two features are often used to enhance one another.

3.2 General Rehabilitation Measures

The following procedures will apply to site rehabilitation activities:

- The construction footprint must be kept as small as possible in order to minimise the impact on the surrounding environment;
- All personnel and contractors must undergo Environmental Awareness Training, with particular reference to the watercourses and the associated buffer areas;
- The ECO must ensure that the contractor and all subcontractors are aware of their roles and responsibilities;
- The ECO must oversee the immediate rehabilitation of any accidental disturbance to habitat falling outside of the demarcated construction footprint area;
- It is important that a stormwater management plan be implemented from the onset of the project, and continued for the life of the project to prevent significant impacts on the hydrological functioning of the system;
- Areas which are to be cleared of vegetation, must remain as small as possible to reduce the risk of further proliferation of alien vegetation, and in order to keep a level

of protection to the watercourses during construction through slowing stormwater runoff and sediment trapping;

- Clearing should take place in a phased approach in order to reduce the overall extent of exposed land, which will contribute to minimising large sediment depositions into the watercourse areas;
- Make use of existing access routes;
- Only indigenous plant species, preferably species that are indigenous to the natural vegetation of the area, should be used for revegetating transformed areas;
- Naturally occurring flora should be preserved as far as possible, especially in the watercourse and buffer areas;
- Alien invasive plant species are to be removed along the project area and are to be disposed of in the correct manner;
- Restrict construction activities within the designated areas as indicated on the construction layout plan;
- Any discharge of runoff must be done in such a way as to prevent erosion;
- Energy dissipaters should be installed at stormwater outlet structures;
- Silt traps or sandbags should be installed at stormwater outlets to prevent silt laden water from entering the watercourse;
- Litter traps should be at stormwater outlets to prevent litter from entering the watercourse;
- Dewatering of trenches must pass through a silt fence/sock to prevent siltation of the watercourses;
- No stockpiling of soils is to take place within the watercourse or their associated buffer zones, and stockpiles may not exceed 2 m in height;
- Any remaining soils following the completion of construction activities are to be levelled and re-seeded with indigenous flora species to minimise the risk of further sedimentation of the watercourses;
- Properly marked waste collection bins should be supplied by the contractor and all solid waste collected shall be disposed of at a licensed waste disposal facility;
- Topsoil must be preserved and used during the rehabilitation phase;
- Any possible contamination of topsoil by hydrocarbons, concrete or concrete water must be avoided. Spill kits must be available and on hand to clean these spills; and
- Hazardous materials must be stored in bunded areas that can accommodate the required volumes.

3.2.1 Erosion and Sedimentation of Watercourses

The following management measures must be implemented to prevent erosion and sedimentation of watercourses:

-
- Where possible, construction activities in close proximity to watercourses should be limited to the dry winter months in order to reduce erosion and sedimentation as a result of stormwater runoff;
 - Clearing should take place in a phased approach in order to reduce the overall extent of exposed land, which will contribute to minimising large sediment depositions into the watercourse areas;
 - Temporary and permanent erosion control methods should be implemented and may include silt fences, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed areas, erosion mats, and mulching;
 - Areas which are to be cleared of vegetation, must remain as small as possible in order to keep a level of protection to the watercourses during construction through slowing stormwater runoff and sediment trapping;
 - Erosion control measures must be implemented with guidance from the ECO;
 - Any discharge of runoff into a watercourse must be done in such a way as to prevent erosion. This can include the diversion of stormwater runoff and sheet runoff away from areas susceptible to erosion;
 - Energy dissipaters should be installed at stormwater outlet structures;
 - Silt traps or sandbags should be installed at stormwater outlets to prevent silt laden water from entering the watercourse;
 - Should silt fences or traps be installed these should be cleared of sediment on a regular basis, at least once a week;
 - The contractor must ensure silt fences / traps are adequately maintained. The ECO must monitor that this is undertaken;
 - The contractor/ECO must inspect the site and watercourses for erosion damage and sedimentation after heavy rainfall events and on the completion of construction;
 - Should erosion or sedimentation be noted the damage must be rehabilitated immediately under the guidance of the ECO. Rehabilitation measures may include the filling of erosion gullies and rills and the stabilization of gullies with silt fences;
 - Topsoil and sub-soil removed during construction must be stockpiled separately at designated stockpile areas for future rehabilitation activities;
 - No stockpiling of soils is to take place within the watercourse or their associated buffer zones, and stockpiles may not exceed 2 m in height;
 - If necessary, stockpiles should be stabilised with geotextiles in order to prevent erosion;
 - Any possible contamination of topsoil by hydrocarbons, concrete or concrete water must be avoided. Spill kits must be available and on hand to clean these spills;
 - The topsoil stockpiles must be kept free of alien invasive species, litter, building materials, excess vegetation and any other foreign materials; and

- Cleared vegetation and soils which will not be utilised for rehabilitation purposes must be disposed of at a registered waste disposal facility.

3.2.2 Alien and Invasive Species Management

The following measures must be implemented to control the proliferation of alien and invasive vegetation:

- Alien and invasive species encountered during clearing activities must be eradicated and the residual plant material kept separate in order to avoid spreading thereof;
- The use of herbicides should be avoided; and
- Alien and invasive species removed must be disposed of at a registered waste disposal facility.

3.2.3 Water Quality Management Measures

- Restrict construction activities within the designated areas as indicated on the construction layout plan;
- The contractor must inspect heavy machinery on a daily basis for possible leaks;
- Servicing of vehicles and refuelling may not take place on site or in close proximity of any watercourse;
- All Hazardous Chemical Substances (HCS) should be stored within suitable secondary containment structure(s) and may not be stored within the watercourses or their buffer zones;
- Drip trays or other suitable secure weather-proof containers should be kept on site in the event of a vehicle leakage or spillages;
- No vehicle or machinery is allowed to be washed within a watercourse or its buffer area, and should preferably take place of site;
- Drip trays or any form of oil absorbent material must be placed underneath construction vehicles/machinery and equipment when not in use;
- Leaking equipment shall be removed from site to facilitate repair; and
- The contractor is responsible for cleaning up any spillages (e.g. concrete, oil, fuel), immediately and contaminated soil must be removed and disposed of appropriately.

3.2.4 Hydrological Management Measures

The following measures must be implemented to prevent alterations to the hydrological regime of watercourses:

- Ensure that hydrological connectivity between areas upstream and downstream of construction activities are maintained throughout the construction phase;
- The crossings must cater for hydrological and ecological connectivity over the width of the watercourses;

- The crossings design must allow for sufficient dispersion of water through the watercourses to prevent the concentration of flow and the resultant scouring and incision of the channels of the systems; and
- Ensure that the beds and banks of the watercourses at the road crossing area are restored to the natural base level to prevent erosion or upstream ponding.

4 Monitoring Plan

The monitoring plan (Table 4-1) has been designed to be achievable and realistic for the nature of the project. The plan provides details as to the frequency of the monitoring efforts, the location of these efforts and what should be monitored. The primary focus for the monitoring plan is to evaluate the success of the rehabilitation efforts. Numerous monitoring frequencies have been proposed for this aspect of the project.

Rehabilitation: During rehabilitation, monitoring is essential to ensure that all recommended rehabilitation aspects are successfully applied. This monitoring must be undertaken by the ECO appointed to oversee the rehabilitation process.

Post-rehabilitation: After completion of the rehabilitation phase wetland areas should be monitored to evaluate the success of the rehabilitation efforts. In the unlikely event of potential “risks” to the systems being identified, this inspection may allow for corrective measures to be applied. This monitoring must be undertaken by the appointed ECO.

Seasonal monitoring: The applicant must appoint an independent service provider to conduct seasonal (wet season) monitoring for a period of two years after the completion of the rehabilitation measures. The monitoring should be conducted during October or shortly after the first summer rains, and then towards the end of the growing season. The monitoring should inspect the following:

- Recovery of the vegetation layer;
- Extent of alien vegetation establishment;
- Hydrology and inundation of the systems;
- The formation of erosion gullies and sedimentation of the wetlands; and
- The removal of solid waste from the wetland and buffer areas.

Table 4-1 The proposed monitoring plan for the project

Variables	Methods	Monitoring Frequency	Indicators	Targets
Wetland (unit) monitoring	<ul style="list-style-type: none"> Wetland Present Ecological State, Functioning & Ecological Importance & Sensitivity Determine if habitat quality deterioration is occurring. 	<ul style="list-style-type: none"> Bi-annual for 2-years as a minimum, thereafter to be determined by the wetland specialist in agreement with the relevant Department. 	<ul style="list-style-type: none"> Wetland WET-Series Monitor for presence erosion, alien vegetation, wetland rehabilitation succession, and sedimentation 	Wetland unit Recommended Ecological Class
	<ul style="list-style-type: none"> Determine if water quality deterioration is occurring. 	<ul style="list-style-type: none"> Quarterly for 2-years as a minimum, thereafter to be determined by the wetland specialist in agreement with the relevant Department. 	<ul style="list-style-type: none"> Changes in water quality trends, spatial and temporal. Samples must include a reference site and a minimum of three monitoring sites. 	Target Water Quality Requirements for aquatic ecosystems (DWAF, 1996)
Variables	Methods	Monitoring Frequency	Indicator	Corrective Action
Vegetation cover	<ul style="list-style-type: none"> Monitor species and cover abundance; Monitor indigenous vs alien plant encroachment; and Fixed point photography 	<ul style="list-style-type: none"> After rehabilitation; and Seasonal for the first two years. 	<ul style="list-style-type: none"> Establishment of primarily indigenous plants; and Ground cover abundance is approximately 60% after the first year, and 80% after year two and 100% thereafter. 	Replanting of indigenous grass species should be implemented if natural Re-vegetation is not successful after one year.
Erosion	<ul style="list-style-type: none"> On-site inspection; Fixed point photography; and Compare to adjacent areas 	<ul style="list-style-type: none"> After rehabilitation; and Seasonal for the first two year. 	<ul style="list-style-type: none"> Areas with no cover; Erosion gullies; Wetland outlet; and Eroded wetland systems 	<ul style="list-style-type: none"> Short term: Rocks / boulders, and on-site debris; Medium term: Replanting of indigenous vegetation; and Long term: Rehab methods that may include gabion baskets, mattresses and should be discussed with specialists
Sedimentation	<ul style="list-style-type: none"> On-site inspection; and Fixed point photography 	<ul style="list-style-type: none"> After rehabilitation; and Seasonal for the first two years. 	<ul style="list-style-type: none"> Excess sediment in wetlands 	Sources of sedimentation should be noted and addressed If possible, excess sediment can be removed manually.
Invasive Plant Species	<ul style="list-style-type: none"> Monitor invasive plant encroachment; On-site inspection; and Fixed point photography 	<ul style="list-style-type: none"> After rehabilitation and follow-up clearing; and Seasonal for the first two years. 	<ul style="list-style-type: none"> Establishment of invasive plant species 	Removal of invasive plants. Consult a botanist on what removal measures are best suited per species. Do not use chemicals for the removal process.
Solid waste	<ul style="list-style-type: none"> On-site inspection; and Fixed point photography 	<ul style="list-style-type: none"> After rehabilitation and follow-up clearing; and Monthly (by O&M or Project Company / representatives) 	The presence of: <ul style="list-style-type: none"> Litter; Dumping material; and/or Building rubble. 	Removal of solid waste and disposal at a licensed facility.

5 Conclusion

The Rehabilitation Plan must be implemented, with particular focus placed on the associated infrastructure, most notably access roads and watercourse/wetland crossings. Measures prescribed in the plan remain applicable to the development area (as a whole).

The plan must be implemented from the onset of the construction phase of the project. The accompanying monitoring plan is to be implemented in support of the rehabilitation plan.

6 References

Macfarlane, D.M., 2015. A strategic framework for improved wetland management in eThekweni's Northern Spatial Development Plan Area. Unpublished report prepared by Eco-Pulse Environmental Consulting Services. Version 0.3. December 2015.

Rodriguez, J. 2019. Backfilling Trenches and Other Excavations. Backfill is the key to a solid stable grading.

Russell, W. 2009. WET-RehabMethods. National guidelines and methods for wetland rehabilitation.

Soil Classification Working Group. (1991). Soil Classification A Taxonomic system for South Africa. Pretoria: The Department of Agricultural Development.

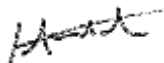
Soil Classification Working Group. (2018). Soil Classification A Taxonomic system for South Africa. Pretoria: The Agricultural Research Council.

7 Appendix A: Specialist Declarations

DECLARATION

I, Andrew Husted, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Andrew Husted

Freshwater Ecologist

The Biodiversity Company

April 2023

APPENDIX 6: FIRE MANAGEMENT PLAN



Fire Management Plan for the Ummbila Renewable Energy Facility (REF) Project

Bethal, Mpumalanga Province

April 2023

CLIENT

savannah
environmental

Prepared by:

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Report Name	Fire Management Plan for the Umbila Renewable Energy Facility (REF) Project
Submitted to	
Report Writer	<p>Sarah Newman </p> <p>Sarah Newman is a terrestrial environmental consultant (Cand. Sci. Nat. 158474) with experience working in the fields of ecology, conservation and biodiversity. Sarah obtained her Master of Science degree in Entomology from the University of Pretoria in 2018.</p>
Report reviewer	<p>Andrew Husted </p> <p>Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 13 years' experience in the environmental consulting field.</p>
Declaration	<p>The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.</p>

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1 Introduction

The Biodiversity Company was appointed by Savannah Environmental to compile a fire management plan for the Umbila Emoyeni Renewable Energy Facility (REF), located in the Lekwa Local Municipality, Mpumalanga Province. This plan is a requirement of the issued environmental authorisation (EA).

1.1 Project Background and Location

Umbila Emoyeni (Pty) Ltd is proposing the development of electrical grid infrastructure. The authorised Umbila Emoyeni (Phase 1) EGI, referred to as the Project Area for the purposes of this report (Figure 1-1) is situated ~8 km south-east of the town of Bethal in the Lekwa Local Municipality, Mpumalanga (Figure 1-2).

The grid connection infrastructure will include:

- » A new 400/132 kV Main Transmission Substation (MTS), to be located adjacent to the Camden SOL Overhead Lines (OHLs).
- » New collector stations: with:
 - 132 kV feeder bays
 - 132 kV busbar
 - 132 kV switchgear
 - 90 MVA 132/33 kV transformers
 - 33 kV switchgear
 - Capacitor Bank
- » 33 kV network connecting wind turbines to IPP substation
- » 400kV loop-in loop-out OHLs to the existing Camden-Sol 400kV transmission line from the MTS.
- » On-site switching stations (132kV in capacity), adjacent to the IPP substation.
- » 132kV power line from the collector substation to the new MTS.
- » On-site IPP substation where the generated power will be transformed from 33 kV to 132 kV so it can be evacuated to the switching station and from there to the Collector station and MTS.
- » Access roads up to 12m wide.

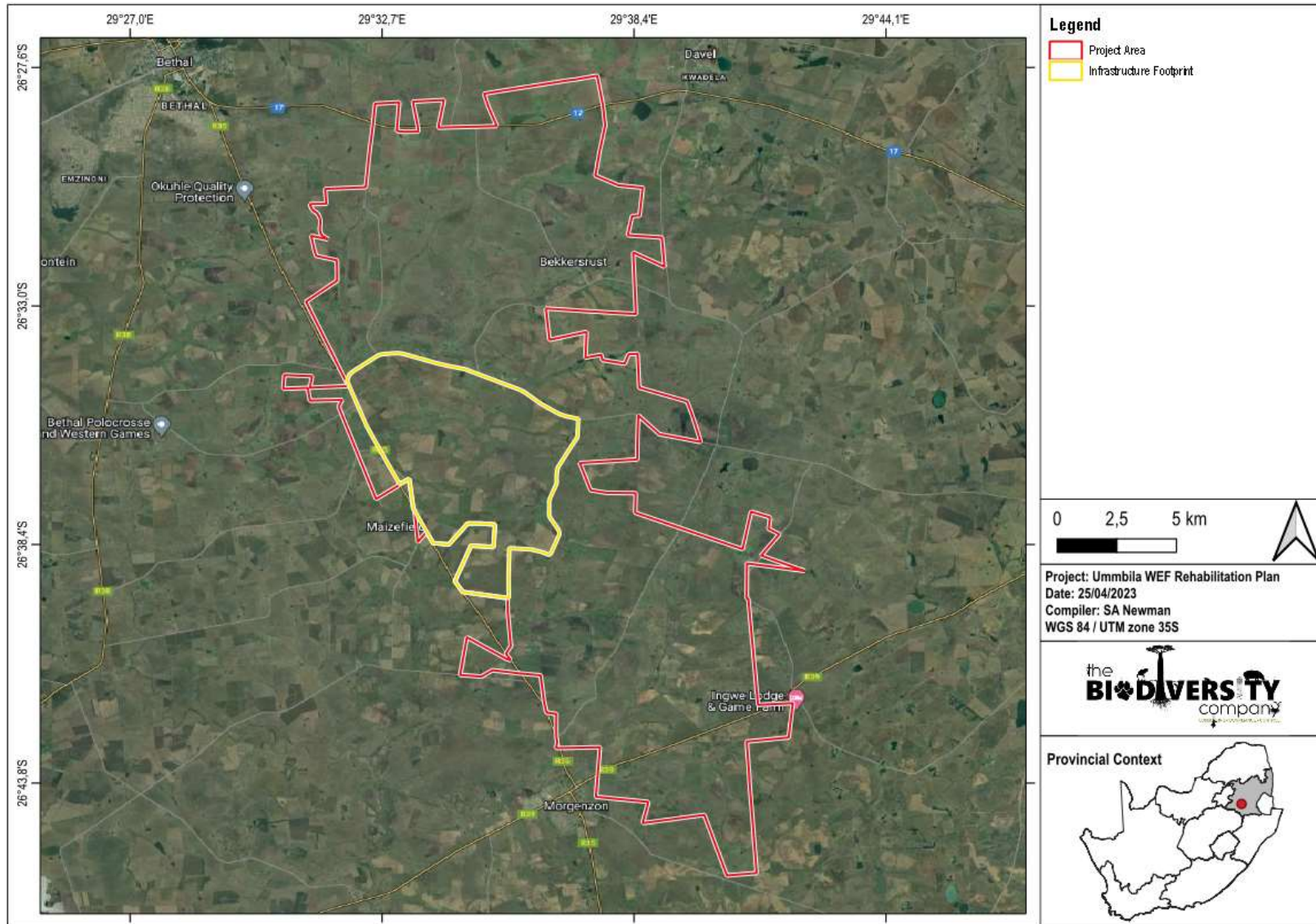


Figure 1-1 Map illustrating the Umbhila Emoyeni Phase 1 Footprint (yellow) and the overall Project Footprint (red)

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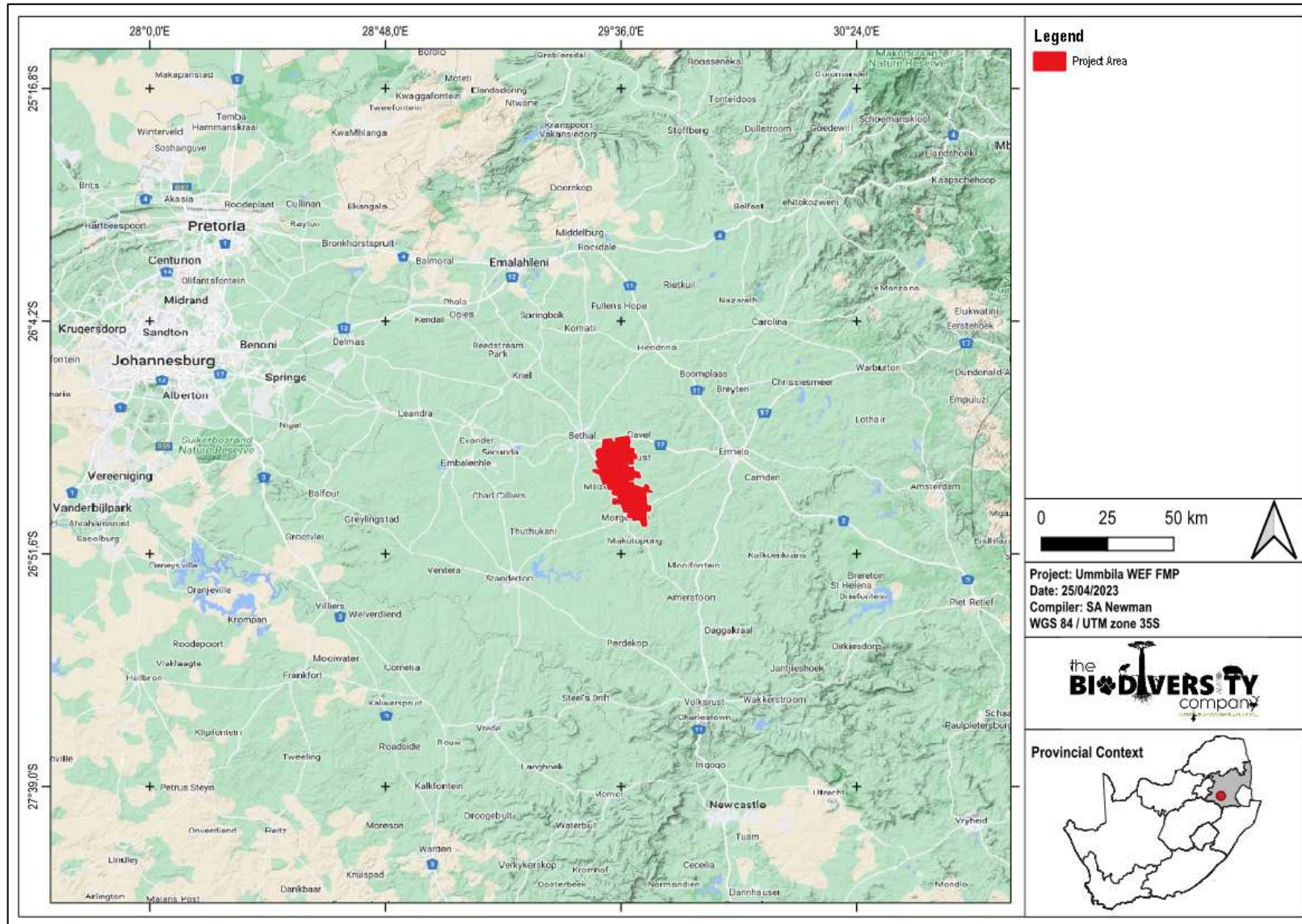


Figure 1-2 Map illustrating the regional context of the Project Area

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1.2 Terms of Reference

A Fire Management Plan for the Renewable Energy Facility (REF) is a necessity due to the risk of unplanned fires which may result in damage to the energy facility and surrounding areas. Some systems are in place to prevent this, but in case of an unplanned fire, a management plan needs to be in place. The fire management plan includes management protocols to ensure that the surrounding natural environment will not be affected by an unplanned fire sourcing from the facility, thus meeting the condition of the Environmental Management Programme (EMPr).

1.3 Legislation

The following legislation is pertinent to the project:

- National Veld and Forest Fire Act No. 101 of 1998. Chapter 4 of the Act prescribes requirements for veldfire prevention through firebreaks; and
- Emergency preparedness, and incident and accident-reporting requirements as required by the Occupational Health and Safety Act, 1993 (Act No 85 of 1993).

1.4 Limitations

The following limitations should be noted in the development of this plan:

- No survey was conducted for this fire management plan;
- The fire risk of any associated powerlines or power stations have not been included; and
- The project description is based on information provided by Savannah (2023) and is regarded as accurate.

2 Desktop Vegetation Assessment

Vegetation type is an important aspect to consider as it affects the management of fire, determining the material present that may burn. The project area is found within the Soweto Highveld Grassland vegetation type (Figure 2-1). This vegetation type forms part of the grassland biome.

2.1 Grassland Biome

The Project Area is situated within the grassland biome. This biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the grassland biome include:

- Seasonal precipitation; and
- The minimum temperatures in winter (Mucina & Rutherford, 2006).

The grassland biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal and the Eastern Cape. The topography is mainly flat and rolling but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localised habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

The Project Area is situated in the Soweto Highveld Grassland vegetation type (Figure 2-1).

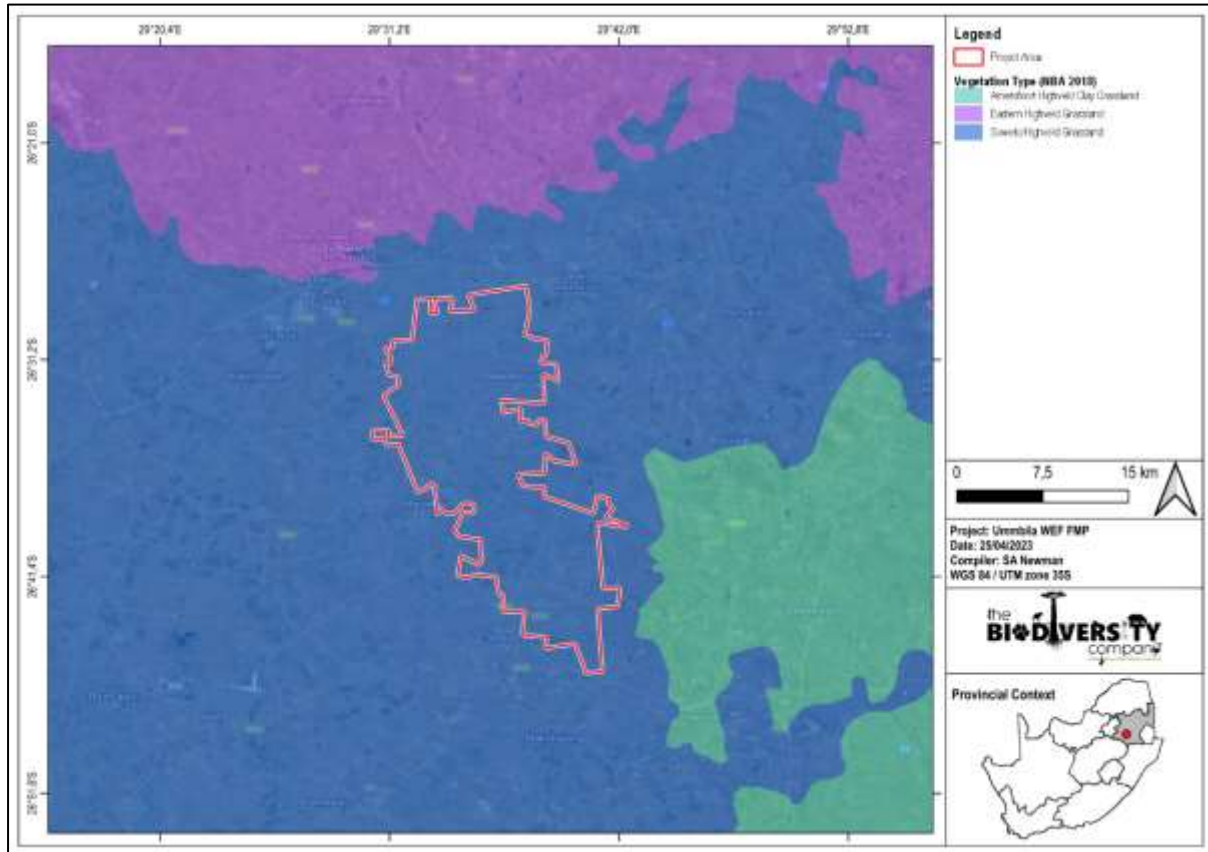


Figure 2-1 Project area in relation to the SA vegetation map (SANBI, 2018).

2.2 Fire History

Based on the FIRMS: Fire Information for Resource Management System for the period between 1 January 2000 and 31 March 2023, numerous fires have occurred in the project area, although the exact number of fires is unknown. The frequency of fires within the project area has been found to be low (Figure 2-2) but should be considered in conjunction with the Veldfire Risk outlined in the following section. This highlights the importance of a fire management plan as the area has historically been prone to fires, albeit relatively few, and does have sufficient fuel to sustain a fire.

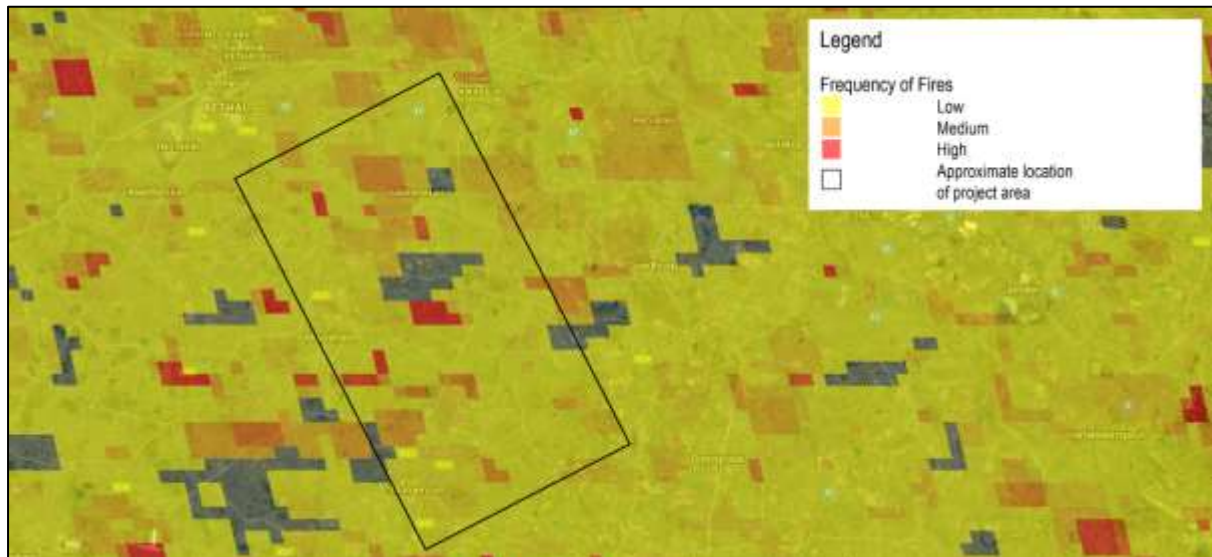


Figure 2-2 The frequency of fires in the area based on data for the period between 1 January 2000 and 31 March 2023 (FIRMS, 2021).

2.3 Fire Risk

SANBI (2010), provides a shape file of the fire risk of areas for the implementation of veldfire management interventions. This model is based on the social, economic and environmental risk scenarios. The level of risk for each fire scenario was then assessed using the product of likelihood and consequence and categorised as being Extreme, High, Medium or Low (Forsyth *et al.*, 2010). The risk associated with the Project Area was rated as High, with a small portion rated as Extreme (Figure 2-3). Based on the surrounding land use it can be speculated that this risk is mainly due to the grassland habitat that has high levels of available fuel that would also be fast burning.

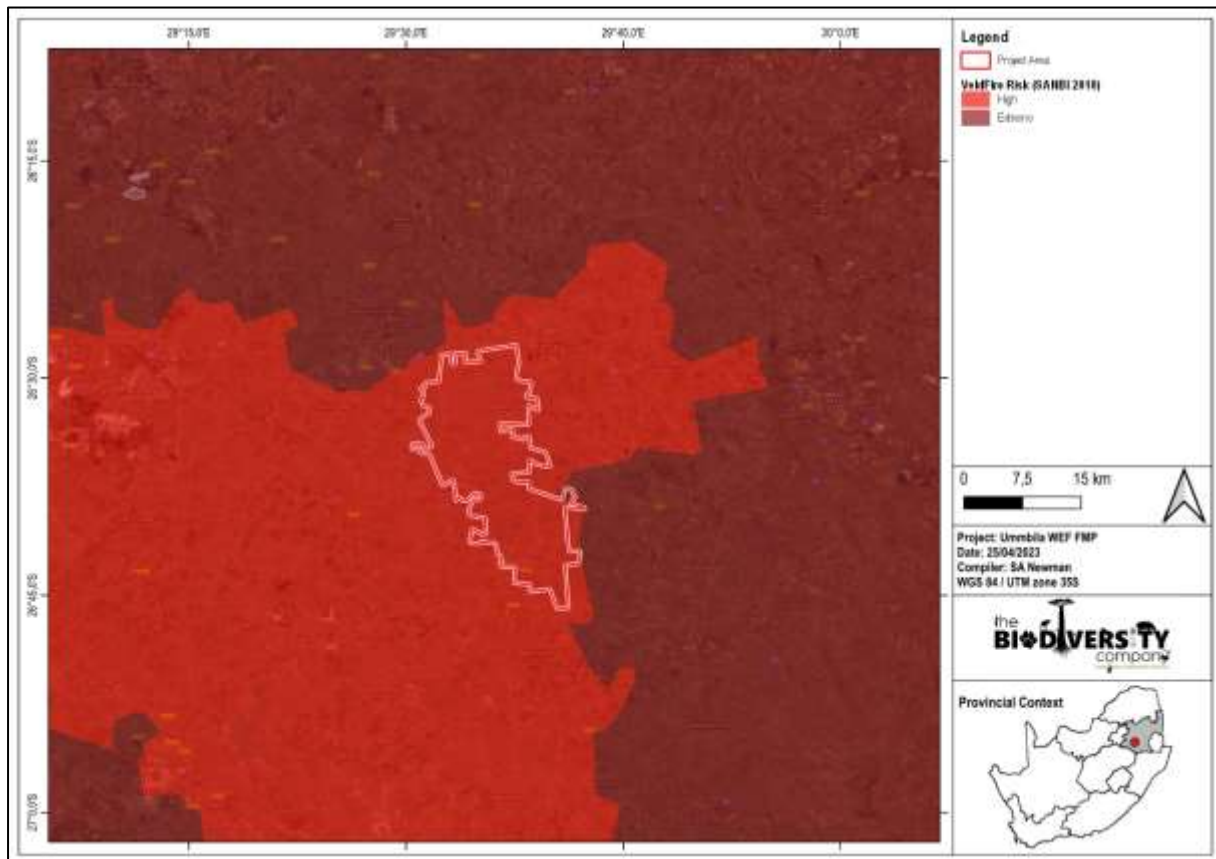


Figure 2-3 Project area in relation to the Veldfire Risk (SANBI, 2010)

3 Background

3.1 Fire management

“Fire is regarded as a natural factor of the environment of southern Africa; it is thought to have occurred from time immemorial” (Tainton, 1999).

The type of fire that burns influences vegetation differently and will play a part when determining the fire that will be used for various applications. According to Brown & Davies (1973) as well as literature by Luke & McArthur (1978) three types of fires are recognised:

- Crown fires, which burn the canopies of trees and shrubs;

- Surface fires, which burn in the surface fuels, including grass, small shrubs and forbs. This is the most common fire that occurs throughout South Africa; and
- Ground fires, which burn below the surface of the ground in layers of organic material, for example, if a wetland dries up and is burnt, the peat that burns will be known as a ground fire.

According to Tainton (1999) the way a fire behaves is controlled by various environmental factors, which need to be considered and monitored when planning a controlled fire or the management of fire:

- Fuel load: The amount of vegetation available that can be burned (Tainton,1999). The fuel load influences the intensity of the fire and consists mainly of the amount of phytomass (biomass) available to burn;
- Air temperature: The higher the air temperature the more intense the fire will be (i.e. a fire in cold conditions is less intense);
- Moisture content: The moisture content of fully dried out fuels is relative to the humidity in the immediate area of the fuel at any given time, therefore affecting the intensity of the fire. The higher the humidity, the less intense the fire will be (Tainton, 1999);
- Wind: Controls the direction and speed of a fire. The direction as well as the speed of the wind will affect the possibility and the type of burn. A fire occurring in high velocity winds will create a scenario where the fire will behave in an unpredictable way, creating an unfavourable situation (Tainton, 1999). The direction of the wind has to be considered depending on your objectives; a head fire burns with the wind whereas a back-burn progresses against the wind, a head-fire causes less damage to the herbaceous layer when compared to a back-burn, thus indicating how wind can be used; and
- Angle or the slope in the terrain in the given area: This affects the controllability of the fire and thus the difficulty of controlling the fire itself. “The forward spread rate of surface fires is influenced by the slope by modifying the extent to which the material ahead of the fire is pre-heated” (Tainton, 1999). Burning up a slope causes a situation where the fire will behave as a head fire due to the material being pre-heated while material burning down slope will act as a back burn.

The tools of the trade that may be required when doing controlled burning/firebreaks and fighting fires (Krynauw, 2013):

- Ignition torches that can easily make a line of fire, this will be needed to create a fire where needed as quick as possible;
- Knapsack sprayers carried on the back of personnel which sprays a controllable stream of water. Firefighting machines that consist of a water tank, which can be loaded onto a vehicle and has a petrol motor which pumps water into a hosepipe to spray large amounts of water; and
- Fire beaters which usually consist of rubber conveyer belt used to beat fires.

4 Fire Management Plan

Fires caused by wind turbines are rare, but not impossible. In rare cases, overheating or faulty wiring may result in a fire. In the case of an unplanned fire, a management plan needs to be in place to reduce damage to the infrastructure and surrounding areas. The fire management plan includes management protocols to ensure that the surrounding natural environment will not be affected by an unplanned fire sourcing from the facility. The main objective of the fire management plan is to prevent fires on site, and to extinguish fires locally inside the areas before they spread.

4.1 WEF Specific Fire Management Systems

The systems that are standard to be part of the fire protection protocol for the specific WEF project will be addressed superficially below, as it is assumed these systems are in place. The structure and design of the WEF is also assumed to follow national standards and no further guidelines are provided.

Standard mitigations that should be followed include:

- A fire officer must be appointed who is responsible for ensuring appropriate action in the event of a fire;
- All personnel should be made aware of the procedure to be followed in the event of a fire;
- Fire fighting equipment must be made available on site, particularly near grid connection points;
- Tall woody plants within 10 m of the wind turbines and electrical connections/high risk areas must be cut on a regular basis and removed to minimise the fire risk;
- The grass cover within 10 m of the wind turbines and electrical connections/high risk areas must be kept short to minimise the fire risk;
- No making of fires for any purpose will be allowed within the site unless specifically for controlled fire break creation;
- Fire breaks must be maintained. The roads network in the WEF must be planned to act as fire breaks;
- Advisory and warning signage must be visibly displayed throughout the site, particularly with reference to not flicking cigarette butts into vegetated areas;
- Smoking should only be permitted in designated areas and appropriate waste disposal containers must be provided for the disposal of cigarette butts;
- Inform and invite the local fire department closest to your property to discuss WEF hazards. An adequate emergency response is the key to avoiding an uncontrolled fire;
- Standard Operating Procedures (SOP) and Standard Operating Guidelines (SOG) are of major importance and must be updated and tested on a regular basis;
- All joints must be checked on a monthly basis for the presence of any loose cables;

- All the underground powerline connections must be checked routinely on an annual basis; and
- Mobile electrostatic equipment must be used on a yearly basis to ensure the system is grounded correctly.

4.2 Fire Breaks

Fire breaks prevent external fires from entering a farm property and obstruct internal fires from spreading to neighbouring areas. Firebreaks are enforced by law and are found in the:

- National Veld and Forest Fire Act, 101 of 1998:
 - Duty to prepare and maintain fire breaks: A fire break is recommended by law; it must exist to prevent any veld fire from spreading from an area owned by one person to an area owned by another person. The fire break must be long and wide enough to defend oneself in court as well as prevent soil erosion (Bothma & Du Toit, 2010).

Fire breaks are usually essential on the periphery of any portion of owned land. Firebreaks are created/burnt as soon as the herbaceous component starts losing moisture, which is a few months after the last summer rainfall; usually in autumn (April-May). It is important to burn at this time of year due to many accidental fires occurring because of the dry state of vegetation where any ignition source, like an ember, cigarette or matchstick, could lead to an unstoppable accidental fire. Roads usually act as the main fire breaking tool, in order to increase the width of the firebreak, the vegetation on the roadside can also be slashed or burned. The width of the vegetation burned on the roadside should not exceed 3 m to restrict the impact on the vegetation community.

The periphery of the farm portion/property and the WEF footprint areas must have a fire break to prevent any fires from spreading, firstly, from the footprints onto the rest of the property, and, secondly, onto neighbouring farms in the case that the fire cannot be contained within the infrastructure footprints.

The creation/burning of a fire break can be completed by consulting a contractor, however, based on the maintenance road around the periphery of the property it may be constructed internally if large earth moving machinery is available. This being said, it is assumed all Environmental Authorisations (EA) are in order for any suggested actions contained within the Environmental Impact Assessment (EIA). Should protected tree and plant species occur in the project area, permits are required to have them removed, i.e., it is assumed that if any protected trees or plants may need to be destroyed for the creation of a firebreak or areas need to be cleared, that the correct permit/EA will be in hand. It is recommended that regular photos are taken of the fire breaks, especially the size and extent of the fire break, to be able to defend the WEF site in the case of presumption of negligence.

4.3 Management Plan

The aim of this section is to present actions which should be incorporated into the existing EMPr which will allow for the successful implementation and auditing of mitigation and monitoring actions. The proposed summarised actions are presented in Table 4-1.

Table 4-1 Management measures, including requirements for timeframes, roles and responsibilities for this report

Fire			
Impact Management Actions	Implementation	Aspect	Monitoring
	Responsible Party		Frequency
Staff/contractors or visitors must be educated about fire risk associated with smoking and cooking actions, discarding of lit cigarette butts and/or glowing embers from cooking fires. A designated smoking area within the project area must be provided and should have a fireproof sand filled container for extinguishing cigarettes. Smoking shall otherwise be prohibited across the site and in the work areas. Educate construction workers regarding risks and correct disposal of cigarettes.	Project manager, Environmental Officer & Health and Safety Officer.	Fire Risk Awareness and training	Ongoing
Portable firefighting equipment must be provided at strategic locations throughout the site, in line with the Building Code of South Africa and the relevant provincial building code. All emergency equipment including portable fire extinguishers, hose reels and hydrants must be maintained and inspected by a qualified contractor in accordance with the relevant legislation and national standards.	Health and Safety Officer.	Portable firefighting equipment	As per the standards
Each employee, subcontractor or any other visitor must be made aware of the provisions of the fire management plan and made familiar with the location and proper use of firefighting equipment, as well as the location of assembly points.	Health and Safety Officer.	Fire's safety awareness and training	Ongoing
Fire management training for all staff about the correct steps to take in case of an accidental fire, including the reporting of a fire as well as the use of the available equipment.	Health and Safety Officer.	Fire's safety awareness and training	Monthly
Fire occurrence emergency protocol training.	Project manager, Environmental Officer	Fire emergency drill tests	From April until October, every two months
The creation and maintenance of a firebreak wide enough to prevent a fire from crossing as well as the monitoring of this fire break.	Environmental Officer	Size and condition of fire break	Bi-annually (Wet and Dry season) but also every two weeks at the end of the dry season (July-Sep) when the risk is high
The state and size of the firebreak must be assessed to ensure that it is large enough and devoid of vegetation that may allow a fire to pass across. The establishment and proliferation of Alien Invasive Plants (AIP) at the firebreaks must be monitored.	Environmental Officer & Contractor	Assess the state of fire break and establishment /encroachment of alien vegetation	Quarterly, especially during the dry season.

Fire			
Impact Management Actions	Implementation Responsible Party	Monitoring Aspect	Frequency
Fire risk must be reduced by removing the dry vegetation or combustible materials from any hazardous material storage areas, cooking areas, smoking areas or vehicle/equipment that may create a spark.	Project manager, Environmental Officer & Health and Safety Officer.	Removal of dry vegetation or combustible material	Daily
Local firefighting/fire protection agencies must be contacted in order to establish a relationship and must have access to the WEF and the access road must allow any relevant fire fighting vehicle/truck to travel without hinder.	Project manager, Environmental Officer & Health and Safety Officer.	Access to wind energy facility	Ongoing
The number of the Goven Mbeki Municipality Emergency Services (017 624 3171) and Lekwa Local Municipality (Fire: 017 712 9681/2 / 017 712 5551) must be displayed in the site offices.	Health and Safety Officer.	Number displayed in site office	Ongoing
Adjacent landowners must be informed in the case of any fire.	Environmental Officer & Health and Safety Officer.	Case of fire	In the occurrence of any fire
No open fires are allowed at sites. Fires for cooking must be restricted to designated areas, extra care should be taken to ensure to prevent veld fires from occurring. Cooking facilities within a designated area must be provided.	Project manager, Environmental Officer & Health and Safety Officer.	Incidence of open fires and cooking within designated areas	Daily
A Fire Prevention and Fire Emergency Method must be in order and limited to the following: <ul style="list-style-type: none"> • Fire Fighting training for designated site staff; • Sources of fire risk and hazards; • How to comply with any requirements of local authority fire departments and standards; • How to minimise the risk of accidental fires; and • How to control accidental fires. 	Health and Safety Officer.	Availability and Awareness of the Fire Prevention and Fire Emergency Method	Ongoing
The “fire team” must attend a comprehensive fire-fighting training program. They must also have access to and manage the fire extinguishers and fire fighting vehicles available on site.	Project manager, Environmental Officer & Health and Safety Officer as well as the Fire Team	Fire Management in case of occurrence	Daily
The WEF must be part of or form a Fire Protection Association (FPA). (https://www.fpasa.co.za/).	Project manager, Environmental Officer	Membership of an FPA.	Ongoing
Routine checking of all the connections and WEF site.	Electrician	Presence of any loose wiring, malfunctioning parts	Ongoing, with a check of all connections yearly

Fire			
Impact Management Actions	Implementation	Monitoring	
	Responsible Party	Aspect	Frequency
Mobile electrostatic equipment must be used to ensure the system is grounded correctly.	Technician	Presence of an electrostatic reading	Monthly
Check for animals and nests in the WEF site.	Environmental Officer	Presence of animals and nests	Bi-weekly
A lightning rod must be installed as per national guidelines.	Contractor	Lightning strike events	Once, during the construction phase
All joints must be checked on a monthly basis for the presence of any loose cables of the aboveground powerlines.	Electrician	Presence of any loose wiring, malfunctioning parts	Monthly
Routine checking of all the powerline connections.	Electrician	Presence of any loose wiring, malfunctioning parts	Ongoing, with a check of all connections yearly

5 References

- Brown, A.A. & Davis, K.P. (1973). Forest fire control and use: Second edition. New York, NY: McGraw-Hill. 686 pp.
- Bothma, J.P. & du Toit, J.G. (2010). Game Ranch Management: Fifth edition. Pretoria: Van Schaik.
- Fire Information for Resource Management System (FIRMS). (2021). MODIS Collection 6 NRT Hotspot / Active Fire Detections MCD14DL. Available at <https://earthdata.nasa.gov/firms>. doi:10.5067/FIRMS/MODIS/MCD14DL.NRT.006 (Accessed April 2023)
- Forsyth, G.G., Kruger, F. & Le Maitre, D. (2010). National veldfire risk assessment: analysis of exposure of social, economic and environmental assets to veldfire hazards in South Africa. Stellenbosch, CSIR Natural Resources and the Environment. CSIR Report No: CSIR/NRE/ECO/ER/2010/0023/C.
- Krynauw, D.J. (2013). Plant studies III notes, Module 3: Management of fire in natural vegetation and wildlife areas in southern Africa. Pretoria: Tshwane University of Technology.
- Luke, R.H. & McArthur, A.G. (1978). Bushfires in Australia. Australian Government Publishing Services, Canberra.
- Morrow, H. (2001) Environmental and human health impact assessment of battery systems, in: Used battery collection and recycling, Editors: Pistoia, G., Wiaux, J-P., Wolsky, S.P., Industrial Chemistry Library Vol. 10, Elsevier Science, Amsterdam, p. 1-34
- Mucina, L. & Rutherford, M.C. (Eds.). (2006). The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria South African.
- Raimonde, D. (2009). Red list of South African Plants. SANBI, Pretoria.
- SANBI (South African National Biodiversity Institute). (2010). National veldfire risk assessment. <http://bgis.sanbi.org/>
- SANBI. (2018). Terrestrial ecosystem threat status and protection level layer [Vector] 2018. Available from the Biodiversity GIS website: <http://bgis.sanbi.org/SpatialDataset/Detail/2675>.
- Sepanski, A., Reil., F, Vaaben, W., Janknecht, E., Hupach, U., Bogdanski, N. & van Heeckeren, B. (2018). Assessing Fire Risks in Photovoltaic Systems and Developing Safety Concepts for Risk Minimization. TÜV Rheinland Energie und Umwelt GmbH Fraunhofer-Institut für Solare Energiesysteme (ISE).
- Tainton, N.M. (1999). Veld Management in South Africa. Pietermaritzburg: University of Natal Press.

6 Appendices

Appendix A Specialist declarations

DECLARATION

I, Sarah Newman, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Sarah Newman

Environmental Consultant

The Biodiversity Company

April 2023

DECLARATION

I, Andrew Husted, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Andrew Husted

Ecologist

The Biodiversity Company

February 2023

Appendix B Specialists CVs

Sarah Newman

M.Sc Entomology

Cell: +27 73 391 6933

Email: sarah@thebiodiversitycompany.com

Identity Number: 9312170034086

Date of birth: 17 December 1993



Profile Summary

Work experience in South Africa, Lesotho and Costa Rica.

Extensive experience working in the Sani Pass region of southern Africa investigating the patterns and drivers of ant diversity across an elevation gradient.

Experience with sea turtle monitoring and conservation in Costa Rica.

Areas of Interest

Entomology, Zoology, Biodiversity, Conservation and Community Ecology.

Key Experience

- Terrestrial Ecological Assessments
- Monitoring programmes
- Field work and research
- Taxonomic classification of insects

Country Experience

- South Africa
- Lesotho
- Costa Rica

Nationality

South African

Languages

- English – Proficient
- Afrikaans – Conversational
- Spanish – Basic

Qualifications

- MSc Entomology (*Distinction*), University of Pretoria
- BSc (Hons) Zoology, University of Pretoria
- BSc Zoology, University of Pretoria
- Cand Sci Nat (158474)

CURRICULUM VITAE: Sarah Newman

info@thebiodiversitycompany.com

CURRICULUM VITAE: Sarah Newman

OVERVIEW

An overview of the specialist technical expertise include the following:

- Terrestrial Ecological Assessments
- Faunal surveys which include mammals, birds, amphibians and reptiles
- Management plan compilation (Fire Management Plan)

EMPLOYMENT EXPERIENCE

Environmental Consultant at The Biodiversity Company (November 2022 - Present)

Terrestrial biodiversity surveys and assessments.

Research Technician (Contract) for the University of Pretoria (February 2022 – July 2022)

Taxonomic identification of invertebrates.

Sea Turtle Research Assistant for Ecology Project International at Pacuare Reserve, Costa Rica (February 2021 – November 2021)

Conducted sea turtle monitoring, conservation activities and data management, along with overseeing jaguar camera trapping surveys and performing teaching activities with visiting student groups and tourists.

Compliance and Regulatory Officer for Cell Path Services (Pty) Ltd (June 2019 – November 2020)

Ensured the company adhered to all regulatory requirements outlined by the relevant regulatory bodies.

ACADEMIC QUALIFICATIONS

University of Pretoria, Pretoria (2018): Master of Science (MSc) in Entomology with *Distinction*

Title: Taxonomic and Functional Diversity of Ants Across Environmental Gradients

University of Pretoria, Pretoria (2016): Bachelor of Science Honours (BSc (Hons)) in Zoology

Title: Rolling versus tunnelling: An evolutionary history of dung relocation and burial behaviour in African dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae)

University of Pretoria, Pretoria (2015): Bachelor of Science (BSc) in Zoology

CURRICULUM VITAE: Sarah Newman

info@thebiodiversitycompany.com

APPENDIX 7: STORMWATER MANAGEMENT PLAN

STORMWATER AND EROSION MANAGEMENT PLAN

1. PURPOSE

By taking greater cognisance of natural hydrological patterns and processes it is possible to develop storm water management systems in a manner that reduces potentially negative impacts and mimics nature. The main risks associated with inappropriate storm water management are increased erosion risk and risks associated with flooding. Therefore, this Storm water Management Plan and the Erosion Management Plan are closely linked to one another and should be managed together.

This Storm water Management Plan addresses the management of storm water runoff from the development site and significant impacts relating to resultant impacts such as soil erosion and downstream sedimentation. The main factors influencing the planning of storm water management measures and infrastructure are:

- » Topography and slope gradients;
- » Placing of infrastructure and infrastructure design;
- » Annual average rainfall; and
- » Rainfall intensities.

The objective of the plan is therefore to provide measures to address runoff from disturbed portions of the site, such that they:

- » Do not result in concentrated flows into natural watercourses i.e. provision should be made for temporary or permanent measures that allow for attenuation, control of velocities and capturing of sediment upstream of natural watercourses.
- » Do not result in any necessity for concrete or other lining of natural watercourses to protect them from concentrated flows off the development if not necessary.
- » Do not divert flows out of their natural flow pathways, thus depriving downstream watercourses of water.

This Storm water Management Plan must be updated and refined once the construction/ civil engineering plans have been finalised following detailed design.

2. RELEVANT ASPECTS OF THE SITE

The study site is located primarily (>95% of project site) within one Quaternary Drainage Region/Catchment (QDR) namely C11H QDR (Blesbokspruit River). Small portions of the project site extend into QDRs C11G and C11J, however almost all of the proposed infrastructure is restricted to the C11H QDR, with only one turbine falling within the C11J QDR. All of the above mentioned QDRs are located within the Upper Vaal Water Management Area. These QDRs are drained by numerous wetlands and watercourses with the larger drainage features being perennial, lower and upper foothill freshwater resource features. The smaller tributaries are typically non-perennial/seasonal, transitional and headwater freshwater resource features. The larger perennial freshwater resource features tend to drain in a south-western direction, whilst the smaller tributaries tend to drain perpendicular to the larger features (north-western, south-eastern).

The main drainage features within the region are the Blesbokspruit- Kwaggaslaagte- and Osspruit River. Both the Kwaggaslaagte- and Osspruit Rivers drain in south-western directions to feed into the Blesbokspruit River,

which is regarded as an important upper tributary of the Vaal River (CSIR, 2018) (Van Deventer, et al., 2018) ((DWAF), 2006).

The Blesbokspruit River, itself is located approximately 7km west of the project site, with two smaller tributaries draining some of the central portions of the project site. On the other hand, both the Kwaggaslaagte- and Osspruit Rivers, flow through the project site (Kwaggaslaagte River flows across the north-western portion of the project site, whilst the Osspruit River flows across the southern portion). These freshwater resource features themselves drain fairly small portions of the project site, with the majority of the project site being drained by small, short tributaries of these rivers. As mentioned, most of the larger freshwater resource features are lower and upper foothill features, with the lower foothill features characterised by floodplains confined on one side (V2), whilst the upper foothill features are characterised by confined valley flood plains and wetlands (V4) (Rowntree & Wadeson, 1999). The smaller tributary freshwater resource features are typically characterised by confined valley floodplains (V4) and v-shaped valleys (V6).

The proposed WEF project is located within the Highveld ecoregion (11.05 level 2 ecoregion) (Kleynhans, et al., 2005). Numerous prominent and important rivers have their sources within this region namely the; Vet, Modder, Riet, Vaal, Olifants, Steelpoort, Maric, Crocodiver (west), Crocodile (east) and the Great Usutu. The project site falls within the Vaal River catchment. The characteristics of the ecoregion are:

- » Topography can be described as plains with a moderate to low relief, as well as various grassland vegetation types (with moist types present towards the east and drier types towards the west and south);
- » Rainfall varies from low to moderately high, with an increase from west to east. Coefficient of variation of annual precipitation are moderately high in the west, decreasing to low in the east;
- » Drainage density is mostly low, but medium in some areas;
- » Stream frequency varies between low to medium
- » Median annual simulated runoff is moderately low to moderate, and
- » Mean annual temperature is hot in the west and moderate in the east.

The proposed development area is situated within the Highveld Geomorphic Province, and the North-western Highveld Sub-province (Partridge, et al., 2010) and is drained by the north-bank Vaal River tributaries. The Blesbokspruit River flow in a valley with a broad and wide cross-sectional profile and flat to medium slope so that the sediment storage surrogate descriptors for this river and its tributaries are predominantly BF (broad valley widths and flat slopes) and WM (wide valley width and medium slopes). The potential for sediment storage within these surrogate descriptors is regarded as high. Furthermore, the Blesbokspruit River and its tributaries are mainly characterised as having concave longitudinal profiles and linear BFCs (Best Fit Curves).

In terms of wetland features, characterising the project site, numerous wetland features have been identified within NBA's 2018 National Wetland MAP 5 (157 wetland features have been mapped) (refer to Table 3 below). Furthermore, four hydrogeomorphic units have been identified within the project site namely, channelled valley-bottom wetlands, floodplain wetlands, seepage wetlands and depression wetlands. Wetlands within the project site were predominantly seepages (67% of all wetlands) and combined, covered the second largest area within the project site (648.9 ha) (Table 3 and Figure 4). Second to the seepages were the channelled valley-bottom wetlands with 39 units identified within the project site (25%). However, even though these wetlands were fewer, they collectively covered a significantly larger area (1886.3 ha). Even though only three floodplain units were identified within the project site, these three units collectively covered just a few hectares less than the seeps (612.8 ha). Nine depression wetlands were identified within the project site and only covered a combined area of 4 ha.

3. STORMWATER MANAGEMENT PRINCIPLES

In the design phase, various storm water management principles should be considered including:

- » Prevent concentration of storm water flow at any point where the ground is susceptible to erosion.
- » Reduce storm water flows as far as possible by the effective use of attenuating devices (such as swales, berms, and silt fences). As construction progresses, the storm water control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.
- » Silt traps must be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- » Construction of gabions and other stabilisation features on steep slopes may be undertaken to prevent erosion, if deemed necessary.
- » Minimise the area of exposure of bare soils to minimise the erosive forces of wind, water and all forms of traffic.
- » Ensure that development does not increase the rate of storm water flow above that which the natural ground can safely accommodate at any point in the sub-catchments.
- » Ensure that all storm water control works are constructed in a safe and aesthetic manner in keeping with the overall development.
- » Plan and construct storm water management systems to remove contaminants before they pollute surface waters or groundwater resources.
- » Contain soil erosion, whether induced by wind or water forces, by constructing protective works to trap sediment at appropriate locations. This applies particularly during construction.
- » Avoid situations where natural or artificial slopes may become saturated and unstable, both during and after the construction process.
- » Design and construct roads to avoid concentration of flow along and off the road. Where flow concentration is unavoidable, measures to incorporate the road into the pre-development storm water flow should not exceed the capacity of the culvert. To assist with the storm water run-off, gravel roads should typically be graded and shaped with a 2-3% cross fall back into the slope, allowing storm water to be channelled in a controlled manner towards the, natural drainage lines and to assist with any sheet flow on the site.
- » Design culvert inlet structures to ensure that the capacity of the culvert does not exceed the pre-development storm water flow at that point. Provide detention storage on the road and/or upstream of the storm water culvert.
- » Design outlet culvert structures to dissipate flow energy. Any unlined downstream channel must be adequately protected against soil erosion.
- » Where the construction of a building causes a change in the vegetative cover of the site that might result in soil erosion, the risk of soil erosion by storm water must be minimised by the provision of appropriate artificial soil stabilisation mechanisms or re-vegetation of the area. Any inlet to a piped system should be fitted with a screen or grating to prevent debris and refuse from entering the storm water system.
- » Preferably all drainage channels on site and contained within the larger area of the property (i.e. including buffer zone) should remain in the natural state so that the existing hydrology is not disturbed.

3.1. Engineering Specifications

Detailed engineering specifications for a Storm water Management Plan describing and illustrating the proposed storm water control measures must be prepared by the Civil Engineers during the detailed design phase and should be based on the underlying principles of this Storm water Management Plan. This should include erosion control measures. Requirements for project design include:

- » Erosion control measures to be implemented before and during the construction period, including the final storm water control measures (post construction) must be indicated within the Final/Updated Storm water Management Plan.
- » All temporary and permanent water management structures or stabilisation methods must be indicated within the Final/Updated Storm water Management Plan.
- » The drainage system for the site should be designed to specifications that can adequately deal with a 1:50 year intensity rainfall event or more to ensure sufficient capacity for carrying storm water around and away from infrastructure.
- » Procedures for storm water flow through a project site need to take into consideration both normal operating practice and special circumstances. Special circumstances in this case typically include severe rainfall events.
- » An on-site Engineer or Environmental Officer is to be responsible for ensuring implementation of the erosion control measures on site during the construction period.
- » The EPC Contractor holds ultimate responsibility for remedial action in the event that the approved storm water plan is not correctly or appropriately implemented and damage to the environment is caused.

During the construction phase, the contractor must prepare a Storm water Control Method Statement to ensure that all construction methods adopted on site do not cause, or precipitate soil erosion and shall take adequate steps to ensure that the requirements of the Storm water Management Plan are met before, during and after construction. The designated responsible person on site, must be indicated in the Storm water Control Method Statement and shall ensure that no construction work takes place before the relevant storm water control measures are in place.

An operation phase Storm water Management Plan should be designed and implemented if not already addressed by the mitigations implemented as part of construction, with a view to preventing the passage of concentrated flows off hardened surfaces and onto natural areas.

4. EROSION MANAGEMENT PRINCIPLES

The goals of erosion control during and after construction at the site should be to:

- » Protect the land surface from erosion;
- » Intercept and safely direct run-off water from undisturbed upslope areas through the site without allowing it to cause erosion within the site or become contaminated with sediment; and
- » Progressively revegetate or stabilise disturbed areas.

These goals can be achieved by applying the management practices outlined in the following sections.

4.1. On-Site Erosion Management

Soil erosion is a frequent risk associated with developments such as the wind energy facility on account of the vegetation clearing and disturbance associated with the construction phase of the development and

may continue occurring throughout the operation phase. Service roads and installed infrastructure will generate increased direct runoff during intense rainfall events and may exacerbate the loss of topsoil and the effects of erosion. These eroded materials may enter the nearby watercourses and may potentially impact these systems through siltation and change in chemistry and turbidity of the water. General factors to consider regarding erosion risk at the site includes the following:

- » Due to the sandy nature of soils in the study area, soil loss will be greater during dry periods as it is more prone to wind erosion. Therefore, precautions to prevent erosion should be present throughout the year.
- » Reduction of a stable vegetation cover and associated below-ground biomass that currently increases soil surface porosity, water infiltration rates and thus improves the soil moisture availability. Without the vegetation, the soil will be prone to extensive surface capping, leading to accelerated erosion and further loss of organic material and soil seed reserves from the local environment.
- » Soil loss is related to the length of time that soils are exposed prior to rehabilitation or stabilisation. Therefore, the gap between construction activities and rehabilitation should be minimised. Phased construction and progressive rehabilitation, where practically possible, are therefore important elements of the erosion control strategy.
- » The extent of disturbance will influence the risk and consequences of erosion. Therefore, site clearing should be restricted to areas required for construction purposes only. As far as possible, large areas should not be cleared all at once, especially in areas where the risk of erosion is higher.
- » Roads should be planned and constructed in a manner which minimises their erosion potential. Roads should therefore follow the natural contour as far as possible. Roads parallel to the slope direction should be avoided as far as possible.
- » Where necessary, new roads constructed should include water diversion structures with energy dissipation features present to slow and disperse the water into the receiving area.
- » Roads used for project-related activities and other disturbed areas should be regularly monitored for erosion. Any erosion problems recorded should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.
- » Runoff may have to be specifically channelled or storm water adequately controlled to prevent localised rill and gully erosion.
- » Compacted areas should have adequate drainage systems to avoid pooling and surface flow. Heavy machinery should not compact those areas which are not intended to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. Where compaction does occur, the areas should be ripped.
- » All bare areas should be revegetated with appropriate locally occurring species, to bind the soil and limit erosion potential.
- » Silt fences should be used where there is a danger of topsoil or material stockpiles eroding and entering streams and other sensitive areas.
- » Gabions and other stabilisation features must be used on steep slopes and other areas vulnerable to erosion to minimise erosion risk as far as possible.
- » Activity at the site after large rainfall events when the soils are wet and erosion risk is increased should be reduced. No driving off of hardened roads should occur at any time, and particularly immediately following large rainfall events.
- » Topsoil should be removed and stored in a designated area separately from subsoil and away from construction activities (as per the recommendations in the EMPr). Topsoil should be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the natural vegetation in cleared areas.
- » Regular monitoring of the site for erosion problems during construction (on-going) and operation (at least twice annually) is recommended, particularly after large summer thunderstorms have been

experienced. The ECO will determine the frequency of monitoring based on the severity of the impacts in the erosion prone areas.

4.1.1 Erosion control mechanisms

The contractor may use the following mechanisms (whichever proves more appropriate/ effective) to combat erosion when necessary:

- » Reno mattresses;
- » Slope attenuation;
- » Hessian material;
- » Shade catch nets;
- » Gabion baskets;
- » Silt fences;
- » Storm water channels and catch pits;
- » Soil bindings;
- » Geofabrics;
- » Hydro-seeding and/or re-vegetating;
- » Mulching over cleared areas;
- » Boulders and size varied rocks; and
- » Tilling.

4.2. Engineering Specifications

A detailed engineering specifications Storm water Management Plan describing and illustrating the proposed stormwater control measures must be prepared by the Civil Engineers during the detailed design phase and should be based on the underlying principles of the Storm water Management Plan and this should include erosion control measures. Requirements for project design include:

- » Erosion control measures to be implemented before and during the construction period, including the final storm water control measures (post construction).
- » All temporary and permanent water management structures or stabilisation methods must be indicated within the Storm water Management Plan.
- » An on-site Engineer or Environmental Officer (EO)/ SHE Representative to be responsible for ensuring implementation of the erosion control measures on site during the construction period. The ECO should monitor the effectiveness of these measures on the interval agreed upon with the Site Manager and EO.
- » The EPC Contractor holds ultimate responsibility for remedial action in the event that the approved Storm water Management Plan is not correctly or appropriately implemented and damage to the environment is caused.

4.3 Monitoring

The site must be monitored continuously during construction and operation in order to determine any indications of erosion. If any erosion features are recorded as a result of the activities on-site the Environmental Officer (EO)/ SHE Representative (during construction) or Environmental Manager (during operation) must:

- » Assess the significance of the situation.
- » Take photographs of the soil degradation.
- » Determine the cause of the soil erosion.
- » Inform the contractor/operator that rehabilitation must take place and that the contractor/operator is to implement a rehabilitation method statement and management plan to be approved by the Site/Environmental Manager in conjunction with the ECO.
- » Monitor that the contractor/operator is taking action to stop the erosion and assist them where needed.
- » Report and monitor the progress of rehabilitation weekly and record all the findings in a site register (during construction).
- » All actions with regards to the incidents must be reported on a monthly compliance report which should be kept on file for if/when the Competent Authority requests to see it (during construction) and kept on file for consideration during the annual audits (during construction and operation).

The Contractor (in consultation with an appropriate specialist, e.g. an engineer) must:

- » Select a system/mechanism to treat the erosion.
- » Design and implement the appropriate system/mechanism.
- » Monitor the area to ensure that the system functions like it should. If the system fails, the method must be adapted or adjusted to ensure the accelerated erosion is controlled.
- » Continue monitoring until the area has been stabilised.

5. CONCLUSION

The Erosion Management Plan is a document to assist the Proponent/ EPC Contractor with guidelines on how to manage erosion during all phases of the project. The implementation of management measures is not only good practice to ensure minimisation of degradation, but also necessary to ensure compliance with legislative requirements. This document forms part of the EMPr, and is required to be considered and adhered to during the design, construction, operation and decommissioning phases of the project (if and where applicable). During the construction phase, the contractor must prepare an Erosion Control Method Statement to ensure that all construction methods adopted on site do not cause, or precipitate soil erosion and shall take adequate steps to ensure that the requirements of this plan are met before, during and after construction. The designated responsible person on site, must be indicated in the Method Statement and shall ensure that relevant erosion control measures are in place throughout the construction phase.

An operation phase Erosion Management Plan should be designed and implemented if not already addressed by the mitigations implemented as part of construction, with a view to preventing the passage of concentrated flows off hardened surfaces and onto natural areas.

APPENDIX 8: BIODIVERSITY MANAGEMENT PLAN BATS



**UMMBILA EMOYENI ONE WIND ENERGY FACILITY
MPUMALANGA, SOUTH AFRICA
BIODIVERSITY MANAGEMENT PLAN
BATS**

April 2023

**Produced for
Umbila Emoyeni (Pty) Ltd**

**Produced by
Camissa Sustainability Consulting**

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Annexure 1: Results of Step 2 - Determine Species Sensitivity

Annexure 2: Results of Step 3 - Determine Overall Risk and Priority Species

1 INTRODUCTION

Umbila Emoyeni (Pty) Ltd has received an environmental authorisation for the construction and operation of the Umbila Emoyeni One wind farm in the Mpumalanga province, South Africa. The wind farm will consist of 25 Gold Wind turbines (Figure 1) which will have a hub height of 130 m and rotor diameter of 183.4 m. The minimum and maximum blade sweep height is 38.3 m and 221.7 m respectively.

As part of the EIA requirements, a Biodiversity Management Plan (BMP) has been developed to manage impacts of the project on bats during operation of the facility. This document describes how this will be achieved, and accordingly, the objectives of this BMP are to:

1. Define and identify priority bat species.
2. Present an adaptive management framework that will enable the project to manage impacts with respect to priority bat species.
3. Provide biologically meaningful fatality thresholds for priority species.
4. Describe how impacts to bats will be monitored during operation of the wind farm
5. Outline a mitigation strategy if thresholds are exceeded based on the results of operational monitoring.

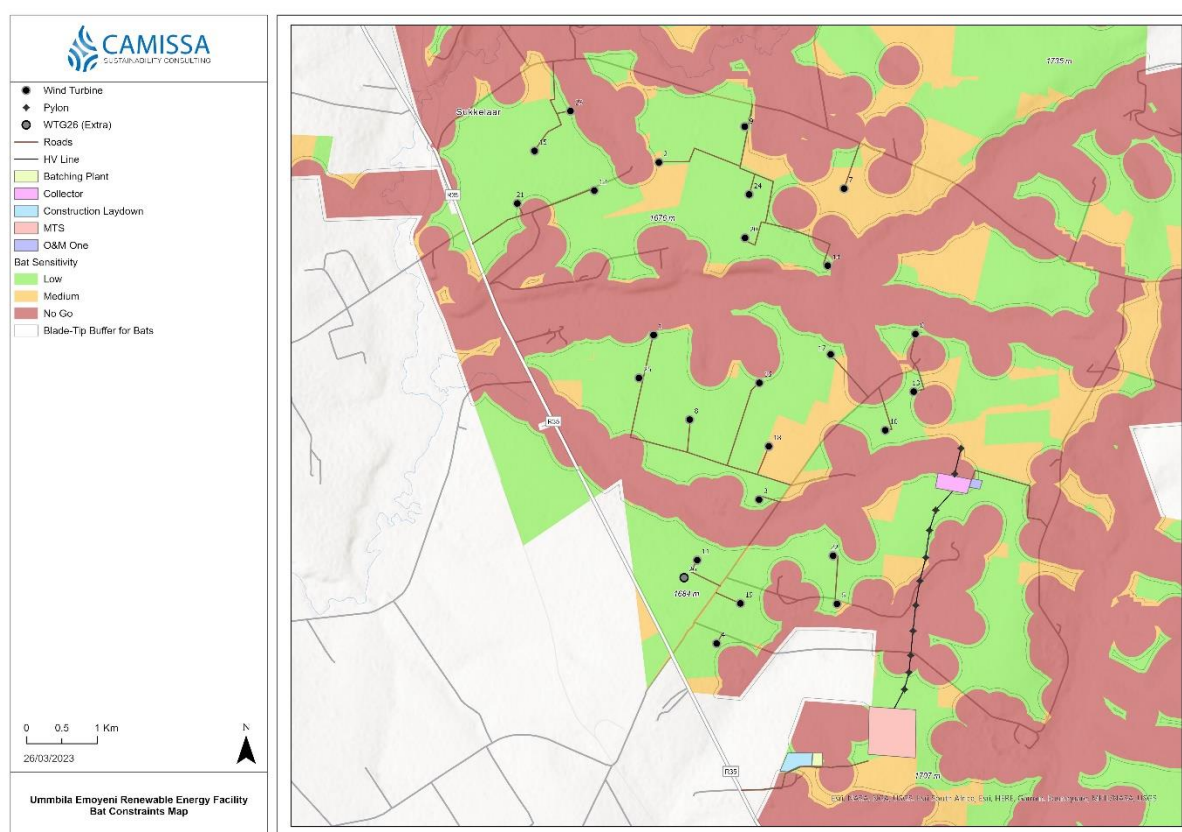


Figure 1: Layout of the Umbila Emoyeni One Wind Farm, Mpumalanga Province, South Africa showing bat constraints including areas that are No Go for turbine placement.

2 PRIORITY SPECIES

A systematic method was used to identify priority bat species considered to be at highest risk from Umbila Emoyeni One infrastructure. In the context of this BMP, risk is primarily focused on collisions with wind turbines since this represents the major direct impact to bats because collisions can result in mortality. Non-collision risks such as habitat loss and displacement are considered to be indirect impacts and were assessed as having low impact in the EIA and thus

do not form part of this BMP. Priority species were determined by using the following step-by-step screening process:

Step 1: Develop a list of species potentially at risk from the effects of Umbila Emoyeni One and identify a Unit of Analysis for each.

Step 2: Determine the sensitivity of each species defined as a combination of their *vulnerability* and the *relative importance* of the study area to each species

Step 3: Determine the overall risk of Umbila Emoyeni One to each species through a combination of their sensitivity and the likelihood that each species will be affected. If any priority species were identified at this step, a fatality threshold will be developed, representing the limits of acceptable change so as to avoid impacts to their long-term population viability.

In addition to the above process, the determination of priority species was also guided by best practice standards in South Africa as recommended in MacEwan et al. (2018). This document provides a list of specific frugivorous, conservation important and rare/range-restricted species which this BMP includes as priority species.

2.1 Step 1: Species list and Unit of Analysis

Baseline surveys were undertaken at the project which identified bat species populations present. This list was cross-referenced against the African Chiroptera Report (2020) and Monadjem et al. (2020) to determine if any additional species not recorded during the baseline surveys might be present. For each bat species, the Unit of Analysis (UoA) was assigned as their South African Population since this is the most relevant population scale. This step produced a list of 24 bat species that may be at risk of project impacts.

2.2 Step 2: Determine Species Sensitivity

Species differ in their sensitivity to wind energy impacts based on their vulnerability and the relative importance to them of the study area which is to be impacted.

2.2.1 Vulnerability

Vulnerability was determined based on an aggregate of the National Red List threat category (Child et al. 2016), population trend (IUCN 2021) and risk to wind energy (Table 3). Each of these three metrics was assigned points which were summed to produce an overall vulnerability score. This vulnerability score was then ranked into one of four vulnerability classes (Table 4). For example, a LC species (0 points), with unknown population trend (1 point) and high collision risk (2 points) would score 3 points (0 + 1 + 2 points), and be classed as medium vulnerability.

Table 3: Ecology and Life-History Based Collision Risk Determination for Bats

Foraging Strategy	Description	Collision Risk
I	Insectivorous bats that forage in the highly cluttered airspace within vegetation	Low
II	Insectivorous bats that forage in partially cluttered spaces such as clearings, streams, or other tunnels within vegetation or above vegetation (edge and gap foragers)	Medium
III	Insectivorous bats that forage in airspaces found in large clearings or high above vegetation (open-space foragers)	High
IV	Fruit bats	High

Table 4: Vulnerability Scoring for Bats

Red List Threat Status ¹ (A)	IUCN Population Trend (B)	Collision Risk (C)	Points	Sum of Points (A+B+C)	Vulnerability
LC on RSA Red List	Stable or Increasing	Low	0	0	Negligible
DD or NT on RSA Red List	Unknown	Medium	1	1	Low
VU on RSA Red List	Decreasing	High	2	2 and 3	Medium
CR or EN on RSA Red List	-	-	3	≥ 4	High

2.2.2 Relative Importance

Relative importance is an estimate of the proportion of each species’ population likely to use the wind farm area relative to the UoA. For bats, population data are lacking and instead, relative importance was determined as the ratio of the species extent of occurrence (EOO) within the wind farm relative to the EOO of that species in South Africa. Species EOO was determined from range maps obtained from the IUCN Red List (IUCN 2021) and the study area was defined as a minimum convex polygon around the wind turbines at the project (Figures 1) plus a 10 km buffer. Relative importance was then assigned to one of four classes (Table 5).

Table 5: Relative Importance Scoring for Bats

Relative Importance	Species EOO (km ²) within study area / EOO (km ²) in South Africa × 100
Negligible	≤ 0.5
Low	> 0.5 and ≤ 1
Medium	> 1 and ≤ 10
High	> 10

2.2.3 Sensitivity rating

Upon completion of the above process, sensitivity was determined using a matrix which combined the vulnerability and relative importance rankings (Table 6). Bat species that were scored as having negligible sensitivity were scoped out of the priority species identification process after this step, and not considered further. However, this BMP includes an adaptive management framework that will allow for risks to all bat species to be iteratively assessed based on the results of fatality monitoring program, including those scoped out at this stage. Species with low sensitivity and higher continued onto Step 3. Of the original 24 bat species assessed, 19 species were retained for Step 3 (see Annexure 1 for scoring).

Table 6: Bat Species Sensitivity Matrix

Sensitivity (e.g., Negligible Relative Importance + Low Vulnerability = Negligible Sensitivity)				
Vulnerability	Relative Importance			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible	Low	Low
Low	Negligible	Low	Low	Medium
Medium	Low	Low	Medium	High
High	Low	Medium	High	High

¹ Conservation Status: LC = Least Concern, DD = Data Deficient, NT = Near Threatened, VU = Vulnerable

2.3 Step 3: Determine Overall Risk and Priority Species

2.3.1 Likelihood of effect

Following the identification of bat species sensitive to Umbila Emoyeni One impacts, the extent of this risk was assessed by combining sensitivity with the likelihood of the effect occurring to each species.

Likelihood of Effect (LoE) was determined as a combination of two factors: 1) the magnitude of median bat activity recorded at 60 m and 120 m for each species during the baseline monitoring based on reference values in MacEwan et al. (2020b) and 2) published fatality records for bats in South Africa based on Aronson (2022), providing a reasonable indication of which species might appear as collision victims at Umbila Emoyeni One.

Each of these metrics was assigned points which were summed to produce an overall LoE score. This LoE score was then ranked into one of four classes (Table 7).

Table 7: Likelihood of Effect (LoE) Scoring

Baseline Bat Activity Levels (A)	% of Carcasses per species in Aronson (2022) (B)	Points	Sum of Points (A+B)	Likelihood of Effect
Not Recorded	No Fatalities Reported	0	0	Negligible
Low median activity	≤ 10 % carcasses Reported	1	1	Low
Medium median activity	> 10 % ≤ 20 % carcasses Reported	2	2 and 3	Medium
High median activity	> 20 % carcasses Reported	3	≥ 4	High

2.3.2 Overall risk rating

The overall risk to bats of the project was determined using a matrix which combined sensitivity and the likelihood of effect (Table 8). Using this matrix, species that emerged with high or medium overall risk scores were classified as priority species, while those with negligible and low overall risk scores classified as non-priority species (see Annexure 2 for scoring).

Table 8: Overall Project Risk Matrix

Overall Risk				
Sensitivity	Likelihood of effect			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible	Low	Low
Low	Negligible	Low	Low	Medium
Medium	Low	Low	Medium	High
High	Low	Medium	High	High

One bat species, Egyptian free-tailed bat (*Tadarida aegyptiaca*), emerged as having a medium overall risk and hence is classified as a priority species at Umbila Emoyeni One. In addition to this species, based on MacEwan et al. (2018), the following species are also considered priority species for the project:

- Percival's Short-eared Trident bat (*Cloetis percivali*)
- Wahlberg's Epauletted fruit bat (*Epomophorus wahlbergi*)
- African Straw-coloured fruit bat (*Eidolon helvum*)
- Egyptian Rousette (*Rousettus aegyptiacus*)
- Blasius's Horseshoe bat (*Rhinolophus blasii*)

3 ADAPTIVE MANAGEMENT FRAMEWORK

The intention of this BMP is to provide an adaptive management framework that will enable Umbila Emoyeni to manage impacts to priority bat species. The adaptive management framework consists of several components which guide on-site management responses to meet this objective.

The first component is the post-construction fatality monitoring program (PCFM) which will provide a quantitative measure of fatality for bat species. The second component is the development and use of quantitative fatality thresholds for priority species. The final component entails the evaluation of the fatality thresholds against estimated fatality and an adaptive management response mechanism that provides an escalating scale of mitigation if thresholds are exceeded, including a process to review fatality thresholds and any mitigation implemented.

3.1 Post-Construction Fatality Monitoring (PCFM)

Fatality monitoring at operational wind farms is a fundamental component of a BMP because it forms the basis for understanding how wind energy impacts biodiversity. The fundamental objectives of a PCFM include the following:

- To collect sufficient, robust, unbiased data which can be used to estimate fatality and assess the impact of a wind farm on particular species of interest.
- To determine if operational changes or other mitigation measures at a wind farm are required based on fatality estimates and to test the efficacy of such management responses.

PCFM will be initiated once the wind farm becomes operational. A detailed PCFM must be designed and implemented by a competent bat ecologist based on South African best practise (Aronson et al. 2020). An initial design has been provided here (Table 9) based on the minimum requirements for monitoring which will be implemented during the first year of the wind farms operation and which may be adjusted based on the Adaptive Management Process outlined in Section 3.3. PCFMs are typically iterative and might change as understanding of collision risk develops during the operational lifespan of a wind farm. Umbila Emoyeni (Pty) Ltd must ensure that size of the carcass search team is sufficient to execute the desired search effort.

Table 9: Initial PCFM Design Parameters for Bats at Umbila Emoyeni One Wind Farm

Parameter	Details
Search Period	Two years (24 months)*
Search Interval	Twice a week**
Transect Spacing	6 m
Sampling Fraction	100 % (All 25 turbines searched)
Search Plot Shape and Size	Square, 120 m x 120 m

*Monitoring must be repeated for an additional year in year 5 of operation, and then every 5 years for the duration of the operation of the wind farm.

**The search interval must be updated after the first year of monitoring to reflect carcass persistence rates measured during scavenger bias trials to reflect site specific persistence rates.

The core output of the PCFM will be an unbiased estimate of bat fatality generated using GenEst (Simonis et al. 2018) for a particular time period. These fatality estimates can be used to evaluate the impact of the wind farm on bats by comparing the estimates to pre-established fatality thresholds. All bat carcasses collected must be stored and maintained for record keeping. Carcasses must be identified to species, and the age and sex of carcasses determined.

3.2 Fatality Thresholds

Management interventions for bats at operating wind farms in South Africa are benchmarked against fatality thresholds. These thresholds attempt to manage impacts to bats by considering potential population level effects, with the threshold values set below the rate at which populations may decline due to anthropogenic pressures (MacEwan et al. 2018). These thresholds represent the estimated number of carcasses that would need to be found during carcass

searching above which the project may have an impact on the long-term viability of the population of a given species relative to the Unit of Analysis. Exceeding these thresholds would trigger an adaptive management response to avoid such population level impacts.

Six species emerged as priority through the screening process and therefore a threshold was set to guide management actions for these species. Should other species emerge as priority based on findings of the PCFM, thresholds may also be set for these. For all species except Egyptian free-tailed bat, the fatality threshold was set to 1 bat per annum (Table 10). This is because these 5 species are frugivorous, conservation important and/or rare/range-restricted (MacEwan et al. 2018).

For Egyptian free-tailed bat, the threshold setting process was based on the following formula:

$$\text{Bat fatality threshold} = (a \times b) c$$

Where,

- **a: the area of influence of the Umbila Emoyeni One wind turbines**

Based on MacEwan et al. (2018), this area was calculated as a minimum convex polygon around all 25 wind turbines. To account for the rotor swept area, a buffer of 91 m (the turbine blade length) was added to this polygon.

- **b: an estimate of the bat occupancy rate per hectare for different ecoregions in South Africa**

Based on MacEwan et al. (2018), this specific value varies by terrestrial ecoregion since bat occupancy per hectare varies with environmental conditions. The project is situated in the Highveld Grasslands ecoregion (Dinerstein et al. 2019) however reference values are not available for this ecoregion in MacEwan et al. (2018). Instead, reference values for the Drakensberg Grasslands, Woodlands and Forest ecoregion were used instead. While bat activity levels differ between these two ecoregions this difference is small (MacEwan et al. 2020a).

- **c: an estimate of the annual % reduction in the Egyptian free-tailed bat population, that if exceeded could result in adverse impacts on the long-term viability of its population.**

Based on MacEwan et al. (2018), it was assumed that a 2 % annual reduction in the number of individuals would lead to declines in the population.

Based on the input parameters, an estimated threshold of 48 Egyptian free-tailed bats was obtained:

$$\text{Bat fatality threshold} = (a \times b) c$$

$$\text{Bat fatality threshold} = (2,316.42 \times 1.02) 0.02$$

$$\text{Bat fatality threshold} = 48 \text{ individuals per annum}$$

This fatality threshold is the unbiased, corrected fatality estimates generated by GenEst. Should this be exceeded, an adaptive management response is triggered as described in Section 3.3.

Table 10: Umbila Emoyeni One Wind Farm Fatality Thresholds

Common Name	Species Name	Threshold (bats/year)
Percival's Short-eared Trident bat	<i>Cloeotis percivali</i>	1
Wahlberg's Epauletted fruit bat	<i>Epomophorus wahlbergi</i>	1
African Straw-coloured fruit bat	<i>Eidolon helvum</i>	1
Egyptian Rousette	<i>Rousettus aegyptiacus</i>	1
Blasius's Horseshoe bat	<i>Rhinolophus blasii</i>	1
Egyptian free-tailed bat	<i>Tadarida aegyptiaca</i>	48

3.3 Adaptive Management Process

The adaptive management process (Figure 2) is a mechanism that allows the project to monitor impacts to priority species, to ensure that appropriate mitigation is applied, and to track adherence to the fatality thresholds. The process follows a set of actions described below:

1. A PCFM is initiated and produces a fatality estimate for each priority species.
2. The fatality estimate is compared to the fatality threshold every 6 months.
 - a. If the fatality threshold has not been exceeded, fatality monitoring continues based on best practise, until the next periodic review. Depending on project findings, adjustments to the PCFM and thresholds may be required to continue to optimize the program.
 - b. If the fatality thresholds have been exceeded, an investigation must be initiated to determine the primary reasons why a threshold was exceeded. Any mitigation measures that have already been implemented should be reviewed to determine why thresholds were exceeded and adjusted accordingly. Fatality monitoring continues again until the next periodic review (i.e. following an additional 6 months) of the fatality thresholds relative to the fatality estimate.

The mitigation response can take several forms depending on the scale of impacts. Several mitigation options are available (e.g. curtailment and acoustic deterrents) and in addition to these, the decision to not implement mitigation following a periodic review can also be taken. Because of the number of assumptions associated with fatality thresholds, exceeding the fatality threshold would not automatically require mitigation to be initiated. Instead, the project findings (i.e., fatality estimates, scale of impacts etc.) should be reviewed through discussions with the projects appointed bat ecologist/consultant, and the wind farm operator. These discussions should focus on interpreting the fatality estimates relative to threshold values and knowledge (or uncertainty) of species ecology and local population status. The aim of these reviews would be to determine the appropriate mitigation response for each species in question and the scale of action required.

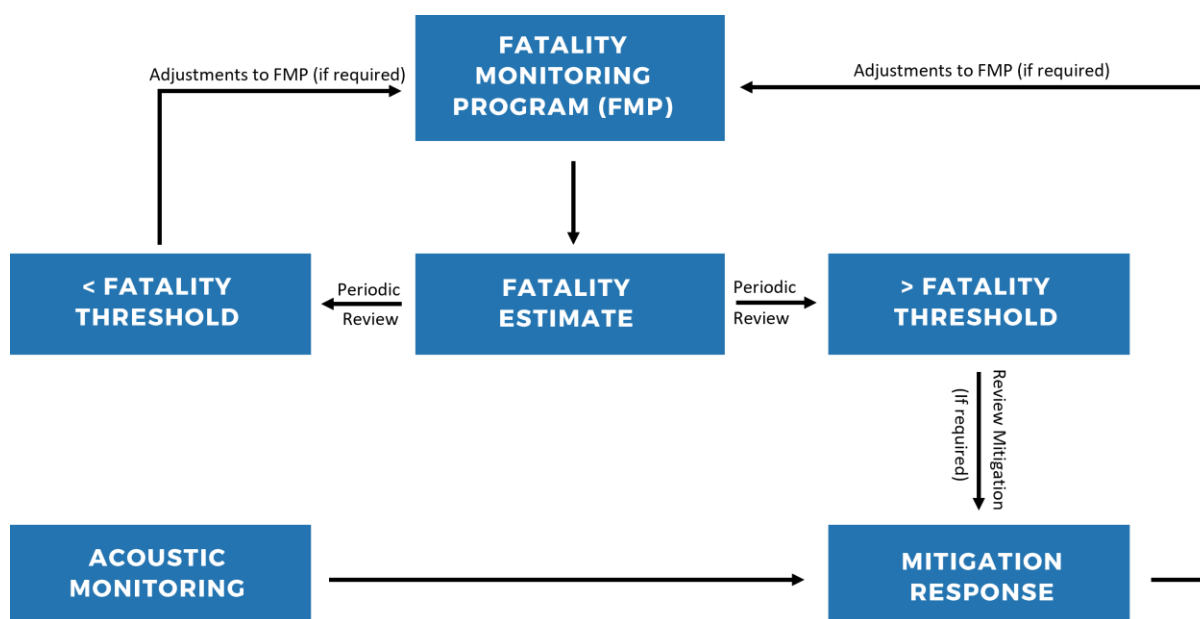


Figure 2: Summary of the Adaptive Management Process

3.3.1 Mitigation Options

This BMP provides a general discussion on the mitigation options that may be used, as and when appropriate for bats. Future iterations of this BMP must be updated to include any specific

mitigation protocols that will be implemented. The PCFM may need to be adjusted to allow the efficacy of any mitigation measures applied to be tested.

Options to mitigate impacts to bats at operational wind farms include curtailing (i.e., stopping and/or reducing) turbine operation and acoustic deterrents (i.e. broadcasting ultrasound to deter bats from entering specific airspace).

Curtailment is achieved in two primary ways. The first is blade feathering which is simple to implement and does not require increasing the cut-in speed of turbines and should therefore be used before more stringent curtailment. Blade feathering entails adjusting the angle of the rotor blades parallel to the wind, or turning the nacelle out of the wind, to slow or stop blade rotation. The second mechanism involves increasing turbine cut-in speed to a particular wind speed (e.g., 4 m/s, 5 m/s etc.) to avoid turbine blades spinning at lower wind speeds. Both mechanisms have been shown to reduce impacts to bats in North America (Arnett 2011, Good et al. 2012) and Europe (Behr et al. 2017).

Curtailment is typically implemented for bats during periods of elevated bat activity linked to meteorological conditions that are conducive for bat activity. As per Aronson et al. (2020) bat acoustic activity monitoring must take place in parallel with the PCFM to collect the data needed to develop and refine the curtailment algorithm.

Bat activity can be modelled as a function of a range of meteorological conditions such as temperature and wind speed. These models can then be used to guide when curtailment should be initiated. Data from the pre-construction monitoring surveys have been analysed to develop an initial curtailment algorithm that can be implemented in the event that fatality thresholds are exceeded as part of the adaptive management process (Table 11). This initial curtailment algorithm must be updated based on acoustic and meteorological data collected during the PCFM and tested on site in relation to bat fatality. It is recommended that an energy yield assessment be undertaken for this level of curtailment to assess its impact on operations.

Table 11: Umbila Emoyeni One Initial Curtailment Parameters

Parameter	September - November (Spring)	December - February (Summer)	March - May (Autumn)
Time Period	18h00 - 23h00	18h00 - 00h00	18h00 - 23h00
Temperature (°C)	Above 17.5	Above 17.5	Above 16
Wind Speed (m/s)	< 7 m/s	< 6 m/s	< 5 m/s

An alternative to curtailment is to use acoustic deterrents which can also reduce impacts to some bat species (Romano et al. 2019, Weaver et al. 2020). These devices are attached to wind turbines and broadcast ultrasound at specific frequencies which interferes with bats ability to perceive echoes from their echolocation calls. Acoustic deterrents therefore do not require interruptions to turbine operation and hence may be favourable to curtailment.

4 SUMMARY

This BMP provides a framework for managing impacts to bats at the Umbila Emoyeni One wind farm. Given the complex nature of wind energy and wildlife interactions, this document identified six priority bat species that will form the basis for initial management responses (Table 10). Additional species may be identified during the PCFM process. The adaptive management process for Umbila Emoyeni One wind farm includes the following:

1. Post-Construction Fatality Monitoring (an initial design provided in Table 9) which will generate a fatality estimate for each priority species.
2. These fatality estimates must be compared to fatality thresholds for each priority species (Table 10) every 6 months.
3. If the fatality thresholds have been exceeded, a review must be initiated to determine the primary reasons why a threshold was exceeded. Pending this review, mitigation options to manage impacts include implementing blade feathering, curtailment (an initial design is provided in Table 11) or acoustic deterrents.

4. PCFM continues (either adjusted or unadjusted) and the review process continues until it can be reasonably demonstrated that the fatality estimates for the wind farm are consistently below fatality threshold levels.

Management of wind energy impacts to wildlife will likely be needed for the duration of the wind farms operation with continuous monitoring and evaluation of impacts needed depending on project specific impacts. As a minimum, monitoring and evaluation will be needed in the first two years of operation, in year five, and then every five years (Aronson et al. 2020). Umbila Emoyeni One (Pty) Ltd will therefore need to engage with a wildlife ecologist with expertise in bats to assist in the management of impacts to bats at Umbila Emoyeni One wind farm.

5 REFERENCES

- ACR. 2020. African Chiroptera Report 2020. V. Van Cakenberghe and E.C.J. Seamark (Eds). AfricanBats NPC, Pretoria. i-xv + 8542 pp.
- Arnett, E. B. 2011. Altering turbine speed reduces bat mortality at wind-energy facilities. *Frontiers in Ecology and the Environment* **9**:209-214.
- Aronson, J. 2022. Current state of knowledge of wind energy impacts to bats in South Africa. *Acta Chiropterologica* **24**(1).
- Aronson, J., E. Richardson, K. MacEwan, D. Jacobs, W. Marais, P. Taylor, S. Sowler, H. C., and L. Richards. 2020. South African Good Practice Guidelines for Operational Monitoring for Bats at Wind Energy Facilities - ed 2. South African Bat Assessment Association.
- Behr, O., R. Brinkmann, K. Hochradel, J. Mages, F. Korner-Nievergelt, I. Niermann, M. Reich, R. Simon, N. Weber, and M. Nagy. 2017. Mitigating Bat Mortality with Turbine-Specific Curtailment Algorithms: A Model Based Approach. Pages 135-160 *Wind Energy and Wildlife Interactions*. Springer.
- Child, M. F., L. Roxburgh, E. Do Linh San, D. Raimondo, and H. T. Davies-Mostert, editors. 2016. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
- Dinerstein, E., C. Vynne, E. Sala, A. R. Joshi, S. Fernando, T. E. Lovejoy, J. Mayorga, D. Olson, G. P. Asner, J. E. M. Baillie, N. D. Burgess, K. Burkart, R. F. Noss, Y. P. Zhang, A. Baccini, T. Birch, N. Hahn, L. N. Joppa, and E. Wikramanayake. 2019. A Global Deal For Nature: Guiding principles, milestones, and targets. *Science Advances* **5**:eaaw2869.
- Good, R. E., W. Erickson, A. Merrill, S. Simon, K. Murray, and K. Bay. 2012. Bat monitoring studies at the Fowler Ridge Wind Energy Facility, Benton County, Indiana. Prepared for Fowler Ridge Wind Farm by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming.
- IUCN. 2021. The IUCN Red List of Threatened Species. Version 2021-1. <https://www.iucnredlist.org>. Downloaded on 11 Aug 2021.
- MacEwan, K., J. Aronson, E. Richardson, P. Taylor, B. Coverdale, D. Jacobs, L. Leeuwner, W. Marais, and L. Richards. 2018. South African Bat Fatality Threshold Guidelines - ed 2. South African Bat Assessment Association.
- MacEwan, K., T. W. Morgan, C. A. Lötter, and A. T. Tredennick. 2020a. Bat Activity Across South Africa: Implications for Wind Energy Development. *African Journal of Wildlife Research* **50**.
- MacEwan, K., S. Sowler, J. Aronson, and C. A. Lötter. 2020b. South African Best Practice Guidelines for Pre-construction Monitoring of Bats at Wind Energy Facilities - ed 5. South African Bat Assessment Association.
- Monadjem, A., P. J. Taylor, F. P. D. Cotterill, and M. C. Schoeman. 2020. Bats of Southern and Central Africa: A Biogeographic and Taxonomic Synthesis. 2nd edition.
- Romano, W. B., J. R. Skalski, R. L. Townsend, K. W. Kinzie, K. D. Coppinger, and M. F. Miller. 2019. Evaluation of an acoustic deterrent to reduce bat mortalities at an Illinois wind farm. *Wildlife Society Bulletin* **43**:608-618.
- Simonis, J., M. Huso, D. Dalthorp, J. Mintz, L. Madsen, P. Rabie, and J. Studyvin. 2018. GenEst user guide—Software for a generalized estimator of mortality: U.S. Geological Survey Techniques and Methods, book 7, chap. C19, 72 p., <https://doi.org/10.3133/tm7C19>.
- Weaver, S. P., C. D. Hein, T. R. Simpson, J. W. Evans, and I. Castro-Arellano. 2020. Ultrasonic acoustic deterrents significantly reduce bat fatalities at wind turbines. *Global Ecology and Conservation*:e01099.

Annexure 1: Results of Step 2 - Determine Species Sensitivity

Binomial	Common name	Threat status	Population trend	Foraging Strategy	Red List Threat Score	IUCN Trend Score	Wind Energy Risk Score	Vulnerability Score	Vulnerability	Study Area EOO	RSA EOO	EOO Score	Relative Importance	Sensitivity
<i>Taphozous mauritanus</i>	Mauritian tomb bat	LC	unknown	3	0	1	2	3	Medium	519.0	305826.7	0.2	Negligible	Low
<i>Hipposideros caffer</i>	Sundevall's Leaf-nosed bat	LC	declining	1	0	2	0	2	Medium	519.0	244600.7	0.2	Negligible	Low
<i>Clootis percivali</i>	Percival's Short-eared Trident bat	EN	unknown	1	3	1	0	4	High	519.0	199930.0	0.3	Negligible	Low
<i>Miniopterus natalensis</i>	Natal Long-fingered bat	LC	unknown	2	0	1	1	2	Medium	519.0	496702.0	0.1	Negligible	Low
<i>Chaerephon pumilus</i>	Little Free-tailed bat	LC	unknown	3	0	1	2	3	Medium	519.0	105038.6	0.5	Negligible	Low
<i>Mops midas</i>	Midas Free-tailed bat	LC	declining	3	0	2	2	4	High	519.0	15141.8	3.4	Medium	High
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed bat	LC	unknown	3	0	1	2	3	Medium	519.0	1193357.5	0.0	Negligible	Low
<i>Nycteris thebaica</i>	Egyptian Slit-faced bat	LC	unknown	1	0	1	0	1	Low	519.0	856680.1	0.1	Negligible	Negligible
<i>Epomophorus wahlbergi</i>	Wahlberg's Epauletted fruit bat	LC	stable	4	0	0	2	2	Low	519.0	280957.6	0.2	Negligible	Negligible
<i>Eidolon helvum</i>	African Straw-coloured fruit bat	LC	declining	4	0	2	2	4	High	519.0	668016.0	0.1	Negligible	Low
<i>Rousettus aegyptiacus</i>	Egyptian Rousette	LC	stable	4	0	0	2	2	Medium	519.0	379575.4	0.1	Negligible	Low
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe bat	LC	unknown	1	0	1	0	1	Low	519.0	729899.8	0.1	Negligible	Negligible
<i>Rhinolophus simulator</i>	Bushveld Horseshoe bat	LC	declining	1	0	2	0	2	Medium	519.0	223252.0	0.2	Negligible	Low
<i>Rhinolophus blasii</i>	Blasius's Horseshoe bat	NT	declining	1	1	2	0	3	Medium	519.0	34661.3	1.5	Medium	Medium
<i>Rhinolophus darlingi</i>	Darling's Horseshoe bat	LC	unknown	1	0	1	0	1	Low	519.0	654218.9	0.1	Negligible	Negligible
<i>Laephotis capensis</i>	Cape Serotine	LC	stable	2	0	0	1	1	Low	519.0	1140060.6	0.0	Negligible	Negligible
<i>Myotis tricolor</i>	Temminck's Myotis	LC	unknown	2	0	1	1	2	Medium	519.0	362242.1	0.1	Negligible	Low
<i>Myotis welwitschii</i>	Welwitsch's Myotis	LC	unknown	2	0	1	1	2	Medium	519.0	337995.6	0.2	Negligible	Low
<i>Scotophilus dinganii</i>	Yellow-bellied house bat	LC	unknown	2	0	1	1	2	Medium	519.0	582661.3	0.1	Negligible	Low
<i>Scotophilus viridis</i>	Green House bat	LC	unknown	2	0	1	1	2	Medium	519.0	38404.9	1.4	Medium	Medium
<i>Pipistrellus hesperidus</i>	Dusky Pipistrelle	LC	unknown	2	0	1	1	2	Medium	519.0	98877.5	0.5	Negligible	Low
<i>Pipistrellus rusticus</i>	Rusty Pipistrelle	LC	unknown	2	0	1	1	2	Medium	519.0	142229.8	0.4	Negligible	Low
<i>Eptesicus hottentotus</i>	Long-tailed Serotine	LC	unknown	2	0	1	1	2	Medium	519.0	964421.0	0.1	Negligible	Low
<i>Laephotis botswanae</i>	Botswana Long-eared bat	LC	unknown	2	0	1	1	2	Medium	519.0	49285.3	1.1	Medium	Medium

Annexure 2: Results of Step 3 - Determine Overall Risk and Priority Species

Family	Binomial	Common name	Database	Unit of Analysis	Sensitivity	Likelihood of Effect	Overall Risk	Priority Species
EMBALLONURIDAE	<i>Taphozous mauritanus</i>	Mauritian tomb bat	ACR	RSA pop ⁿ	Low	Low	Low	No
HIPPOSIDERIDAE	<i>Hipposideros caffer</i>	Sundevall's Leaf-nosed bat	ACR	RSA pop ⁿ	Low	Negligible	Negligible	No
HIPPOSIDERIDAE	<i>Cloetotis percivali</i>	Percival's Short-eared Trident bat	ACR	RSA pop ⁿ	Low	Negligible	Negligible	Yes
MINIOPTERIDAE	<i>Miniopterus natalensis</i>	Natal Long-fingered bat	ESIA/Baseline	RSA pop ⁿ	Low	Medium	Low	No
MOLOSSIDAE	<i>Chaerephon pumilus</i>	Little Free-tailed bat	ESIA/Baseline	RSA pop ⁿ	Low	Medium	Low	No
MOLOSSIDAE	<i>Mops midas</i>	Midas Free-tailed bat	ACR	RSA pop ⁿ	High	Negligible	Low	No
MOLOSSIDAE	<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed bat	ESIA/Baseline	RSA pop ⁿ	Low	High	Medium	Yes
NYCTERIDAE	<i>Nycteris thebaica</i>	Egyptian Slit-faced bat	ACR	RSA pop ⁿ	Negligible	Low	Negligible	No
PTEROPODIDAE	<i>Epomophorus wahlbergi</i>	Wahlberg's Epauletted fruit bat	ACR	RSA pop ⁿ	Negligible	Low	Negligible	Yes
PTEROPODIDAE	<i>Eidolon helvum</i>	African Straw-coloured fruit bat	ACR	RSA pop ⁿ	Low	Negligible	Negligible	Yes
PTEROPODIDAE	<i>Rousettus aegyptiacus</i>	Egyptian Rousette	ACR	RSA pop ⁿ	Low	Low	Low	Yes
RHINOLOPHIDAE	<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe bat	ACR	RSA pop ⁿ	Negligible	Negligible	Negligible	No
RHINOLOPHIDAE	<i>Rhinolophus simulador</i>	Bushveld Horseshoe bat	ACR	RSA pop ⁿ	Low	Negligible	Negligible	No
RHINOLOPHIDAE	<i>Rhinolophus blasii</i>	Blasius's Horseshoe bat	ACR	RSA pop ⁿ	Medium	Negligible	Low	Yes
RHINOLOPHIDAE	<i>Rhinolophus darlingi</i>	Darling's Horseshoe bat	ACR	RSA pop ⁿ	Negligible	Negligible	Negligible	No
VESPERTILIONIDAE	<i>Laephotis capensis</i>	Cape Serotine	ESIA/Baseline	RSA pop ⁿ	Negligible	High	Low	No
VESPERTILIONIDAE	<i>Myotis tricolor</i>	Temminck's Myotis	ACR	RSA pop ⁿ	Low	Low	Low	No
VESPERTILIONIDAE	<i>Myotis welwitschii</i>	Welwitsch's Myotis	ACR	RSA pop ⁿ	Low	Negligible	Negligible	No
VESPERTILIONIDAE	<i>Scotophilus dinganii</i>	Yellow-bellied house bat	ESIA/Baseline	RSA pop ⁿ	Low	Low	Low	No
VESPERTILIONIDAE	<i>Scotophilus viridis</i>	Green House bat	ACR	RSA pop ⁿ	Medium	Negligible	Low	No
VESPERTILIONIDAE	<i>Pipistrellus hesperidus</i>	Dusky Pipistrelle	ACR	RSA pop ⁿ	Low	Negligible	Negligible	No
VESPERTILIONIDAE	<i>Pipistrellus rusticus</i>	Rusty Pipistrelle	ACR	RSA pop ⁿ	Low	Negligible	Negligible	No
VESPERTILIONIDAE	<i>Eptesicus hottentotus</i>	Long-tailed Serotine	ESIA/Baseline	RSA pop ⁿ	Low	Low	Low	No
VESPERTILIONIDAE	<i>Laephotis botswanae</i>	Botswana Long-eared bat	ACR	RSA pop ⁿ	Medium	Negligible	Low	No