# UMMBILA EMOYENI WIND ENERGY FACILITY – PHASE ONE, MPUMALANGA PROVINCE

Final Environmental Management Programme for 1 x 33kV/132kV onsite collector substation (IPP Portion) associated with the Ummbila Emoyeni Phase One Wind Energy Facility

June 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 | 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.<br><br>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.<br><br>Where an impact management outcome is not relevant, the words "not applicable" can be inserted in the template under the "responsible persons" column.<br><br>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.<br><br>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 |

| Part | Section | Heading | Content |
|---|---|---|---|
| | | | also be made available on such publicly accessible website. |
| | 2 | Site specific information | Contains preliminary infrastructure layout and a declaration that the applicant/holder of the EA will comply with the pre-approved generic EMPr template contained in Part B: Section 1, and understands that the impact management outcomes and impact management actions are legally binding. The preliminary infrastructure layout must be finalized to inform the final EMPr that is to be submitted with the basic assessment report (BAR) or environmental impact assessment report (EIAR), ensuring that all impact management outcomes and impact management actions have been either pre-approved or approved in terms of Part C.<br><br>This section must be submitted to the CA together with the final BAR or EIAR. The information submitted to the CA will be considered to be incomplete should a signed copy of Part B: section 2 not be submitted. Once approved, this Section forms part of the EMPr for the development and is legally binding. |
| C | | Site specific sensitivities/ attributes | If any specific environmental sensitivities/ attributes are present on the site which require site specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr, to manage impacts, these specific impact management outcomes and impact management actions must be included in this section. These specific environmental attributes must be referenced spatially and impact management outcomes and impact management actions must be provided. These specific impact management outcomes and impact management actions must be presented in the format of the pre-approved EMPr template (Part B: section 1)<br><br>This section will not be required should the site contain no specific environmental sensitivities or attributes. However, if Part C is applicable to the site, it is required to be submitted together with the BAR or EIAR, for consideration of, and |

| Part | Section | Heading | Content |
|---|---|---|---|
| | | | decision on, the application for EA. The information in this section must be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. Once approved, Part C forms part of the EMPr for the site and is legally binding.<br><br>This section applies only to additional impact management outcomes and impact management actions that are necessary for the avoidance, management and mitigation of impacts and risks associated with the specific development or expansion and which are not already included in Part B: section 1. |
| Appendix 1 | | | Contains the method statements to be prepared prior to commencement of the activity. The method statements are not required to be submitted to the competent authority. |

6. Completion of part B: section 1: the pre-approved generic EMPr template

The template is to be completed prior to commencement of the activity, by providing the following information for each environmental impact management action:

- For implementation
  - a 'responsible person',
  - a method for implementation,
  - a timeframe for implementation
- For monitoring
  - a responsible person
  - frequency
  - evidence of compliance.

The completed template must be signed and dated by the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must be signed and dated on each page by the holder of the EA. This template once signed and dated is legally binding. The holder of the EA will remain responsible for its implementation.

7. Amendments of the impact management outcomes and impact management actions

Once the activity has commenced, a holder of an EA may make amendments to the impact management outcomes and impact management actions in the following manner:

- Amendment of the impact management outcomes: in line with the process contemplated in Regulation 37 of the EIA Regulations; and
- Amendment of the impact management actions: in line with the process contemplated in Regulation 36 of the EIA Regulations.

8. Documents to be submitted as part of part B: section 2 site specific information and declaration

Part B: Section 2 has three distinct sub-sections. The first and third sub-sections are in a template format. Sub-section two requires a map to be produced.

Sub-section 1 contains the project name, the applicant's name and contact details, the site information, which includes coordinates of the property or farm in which the proposed substation infrastructure is proposed as well as the 21-digit Surveyor General code of each cadastral land parcel and, where available, the farm name.

Sub-section 2 is to be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. This sub-section must include a map of the site sensitivity overlaid with the preliminary infrastructure layout using the national web based environmental screening tool, when available for compulsory use at: https://screening.environment.gov.za/screeningtool. The sensitivity map shall identify the nature of each sensitive feature e.g. threatened plant species, archaeological site, etc. Sensitivity maps shall identify features both within the planned working area and any known sensitive features and within 50 m from the development footprint.

Sub-section 3 is the declaration that the applicant (s)/proponent (s) or holder of the EA in the case of a change of ownership must complete which confirms that the applicant/EA holder will comply with the pre-approved 'generic EMPr' template in Section 1 and understands that the impact management outcomes and impact management actions are legally binding.

(a) Amendments to Part B: Section 2 – site specific information and declaration

Should the EA be transferred, Part B: Section 2 must be completed by the new applicant/proponent and submitted with the application for an amendment of the EA in terms of regulations 29 or 31 of the EIA Regulations, whichever applies. The information submitted as part of such an application for an amendment to an EA will be considered to be incomplete should a signed copy of Part B: Section 2 not be submitted. Once approved, Part B: Section 2 forms part of the EMPr for the development and the EMPr becomes legally binding to the new EA holder.

PART A – GENERAL INFORMATION

1. DEFINITIONS

In this EMPr any word or expression to which a meaning has been assigned in the NEMA or EIA Regulations has that meaning, and unless the context requires otherwise –

**"c**learing" 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;

**"c**ontractor**"** - 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;

**"m**ethod 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.

**"s**lope**"** means the inclination of a surface expressed as one unit of rise or fall for so many horizontal units;

"**s**olid 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);

"**s**poil" 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;

"**t**opsoil" 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;

"**w**orks" means the works to be executed in terms of the Contract

## 2. ACRONYMS and ABBREVIATIONS

| | |
|---|---|
| CA | Competent Authority |
| cEO | Contractors Environmental Officer |
| dEO | Developer Environmental Officer |
| DPM | Developer Project Manager |
| DSS | Developer Site Supervisor |
| EAR | Environmental Audit Report |
| ECA | Environmental Conservation Act No. 73 of 1989 |
| ECO | Environmental Control Officer |
| EA | Environmental Authorisation |
| EIA | Environmental Impact Assessment |
| ERAP | Emergency Response Action Plan |
| EMPr | Environmental Management Programme Report |
| EAP | Environmental Assessment Practitioner |
| FPA | Fire Protection Agency |
| HCS | Hazardous chemical Substance |
| NEMA | National Environmental Management Act, 1998 (Act No. 107 of 1998) |
| NEMBA | National Environmental Management: Biodiversity Act ,2004 (Act No. 10 of 2004) |
| NEMWA | National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) |
| MSDS | Material Safety Data Sheet |
| **RI&AP's** | Registered Interested and affected parties |

## 3. ROLES AND RESPONSIBILITIES FOR ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) IMPLEMENTATION

The effective implementation of this generic EMPr is dependent on established and clear roles, responsibilities and reporting lines within an institutional framework. This section of the EMPr gives guidance to the various environmental roles and reporting lines, however, project specific requirements will ultimately determine the need for the appointment of specific person(s) to undertake specific roles and or responsibilities. As such, it must be noted that in the event that no specific person, for example, an environmental control officer (ECO) is appointed, the holder of the EA remains responsible for ensuring that the duties indicated in this document for action by the ECO are undertaken.

Table 1: *Guide to roles and responsibilities for implementation of an EMPr*

| Responsible Person(s) | Role and Responsibilities |
|---|---|
| Developer's Project Manager (DPM) | <u>Role</u><br>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.<br><br><u>Responsibilities</u><br>- Be fully conversant with the conditions of the EA;<br>- Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s);<br>- Issuing of site instructions to the Contractor for corrective actions required;<br>- 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<br>- Ensure that periodic environmental performance audits are undertaken on the project implementation. |

| Responsible Person(s) | Role and Responsibilities |
|---|---|
| Developer Site Supervisor (DSS) | <u>Role</u><br>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.<br><br><u>Responsibilities</u><br>- Ensure that all contractors identify a contractor's Environmental Officer (cEO);<br>- Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO;<br>- Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO;<br>- Issuing of site instructions to the Contractor for corrective actions required;<br>- Will issue all non-compliances to contractors; and<br>- Ratify the Monthly Environmental Report. |
| Environmental Control Officer (ECO) | <u>Role</u><br>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.<br><br>The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the |

| Responsible Person(s) | Role and Responsibilities |
|---|---|
| | Performance Specification) must be endorsed by the Project Manager. The ECO must also, as specified by the EA, report to the relevant CA as and when required.<br><br><u>Responsibilities</u><br>The responsibilities of the ECO will include the following:<br>- Be aware of the findings and conclusions of all EA related to the development;<br>- Be familiar with the recommendations and mitigation measures of this EMPr;<br>- Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them;<br>- 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;<br>- Educate the construction team about the management measures contained in the EMPr and environmental licenses;<br>- Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective;<br>- Monitoring the performance of the Contractors and ensuring compliance with the EMPr and associated Method Statements;<br>- 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;<br>- Liaison between the DPM, Contractors, authorities and other lead stakeholders on all environmental concerns;<br>- Compile a regular environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr;<br>- Validating the regular site inspection reports, which are to be prepared by the contractor Environmental Officer (cEO);<br>- Checking the cEO's record of environmental incidents (spills, impacts, legal transgressions etc.) as well as corrective and preventive actions taken;<br>- Checking the cEO's public complaints register in which all complaints are recorded, as well as action taken; |

| Responsible Person(s) | Role and Responsibilities |
| --- | --- |
| | - Assisting in the resolution of conflicts;<br>- Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor;<br>- 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;<br>- Maintenance, update and review of the EMPr;<br>- Communication of all modifications to the EMPr to the relevant stakeholders. |
| developer Environmental Officer (dEO) | <u>Role</u><br>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.<br><br><u>Responsibilities</u><br>- Be fully conversant with the EMPr;<br>- Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures;<br>- Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) ;<br>- Confine the development site to the demarcated area;<br>- Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO);<br>- Assist the contractors in addressing environmental challenges on site;<br>- Assist in incident management:<br>- Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared;<br>- Assist the contractor in investigating environmental incidents and compile investigation reports;<br>- Follow-up on pre-warnings, defects, non-conformance reports; |

| Responsible Person(s) | Role and Responsibilities |
|---|---|
| | - Measure and communicate environmental performance to the Contractor;<br>- Conduct environmental awareness training on site together with ECO and cEO;<br>- Ensure that the necessary legal permits and / or licenses are in place and up to date;<br>- Acting as Developer's Environmental Representative on site and work together with the ECO and contractor; |
| Contractor | <u>Role</u><br>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.<br><br><u>Responsibilities</u><br>- project delivery and quality control for the development services as per appointment;<br>- 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;<br>- 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;<br>- attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones;<br>- ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO. |

| Responsible Person(s) | Role and Responsibilities |
|---|---|
| contractor Environmental Officer (cEO) | <u>Role</u><br>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:<br><br><u>Responsibilities</u><br>- Be on site throughout the duration of the project and be dedicated to the project;<br>- Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site;<br>- Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and Method Statements;<br>- Attend the Environmental Site Meeting;<br>- Undertaking corrective actions where non-compliances are registered within the stipulated timeframes;<br>- Report back formally on the completion of corrective actions;<br>- Assist the ECO in maintaining all the site documentation;<br>- Prepare the site inspection reports and corrective action reports for submission to the ECO;<br>- Assist the ECO with the preparing of the monthly report; and<br>- Where more than one Contractor is undertaking work on site, each company appointed as a Contractor will appoint a cEO representing that company. |

## 4. ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE

To ensure accountable and demonstrated implementation of the EMPr, a number of reporting systems, documentation controls and compliance mechanisms must be in place for all substation infrastructure projects as a minimum requirement.

### 4.1 Document control/Filing system

The holder of the EA is solely responsible for the upkeep and management of the EMPr file. As a minimum, all documentation detailed below will be stored in the EMPr file. A hard copy of all documentation shall be filed, while an electronic copy may be kept where relevant. A duplicate file will be maintained in the office of the DSS (where applicable). This duplicate file must remain current and up-to-date. The filing system must be updated and relevant documents added as required. The EMPr file must be made available at all times on request by the CA or other relevant authorities. The EMPr file will form part of any environmental audits undertaken as prescribed in the EIA Regulations.

### 4.2 Documentation to be available

At the outset of the project the following preliminary list of documents shall be placed in the filing system and be accessible at all times:

- Full copy of the signed EA from the CA in terms of NEMA, granting approval for the development or expansion;
- Copy of the generic and site specific EMPr as well as any amendments thereof;
- Copy of declaration of implementing generic EMPr and subsequent approval of site specific EMPr and amendments thereof;
- All method statements;
- Completed environmental checklists;
- Minutes and attendance register of environmental site meetings;
- An up-to-date environmental incident log;
- A copy of all instructions or directives issued;
- A copy of all corrective actions signed off. The corrective actions must be filed in such a way that a clear reference is made to the non-compliance record;
- Complaints register.

### 4.3 Weekly Environmental Checklist

The ECOs are required to complete a Weekly Environmental Checklist, the format of which is to be agreed prior to commencement of the activity. The ECOs are required to sign and date the checklist, retain a copy in the EMPr file and submit a copy of the completed checklist to the DSS on a weekly basis.

The checklists will form the basis for the Monthly Environmental Reports. Copies of all completed checklists will be attached as Annexures to the Environmental Audit Report as required in terms of the EIA Regulations.

## 4.4 Environmental site meetings

Minutes of the environmental site meetings shall be kept. The minutes must include an attendance register and will be attached to the Monthly Report that is distributed to attendees. Each set of minutes must clearly record "Matters for Attention" that will be reviewed at the next meeting.

## 4.5 Required Method Statements

The method statement will be done in such detail that the ECOs are enabled to assess whether the contractor's proposal is in accordance with the EMPr.

The method statement must cover applicable details with regard to:

- development procedures;
- materials and equipment to be used;
- getting the equipment to and from site;
- how the equipment/ material will be moved while on site;
- how and where material will be stored;
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- timing and location of activities;
- compliance/ non-compliance with the EMPr; and
- any other information deemed necessary by the ECOs.

Unless indicated otherwise by the Project Manager, the Contractor shall provide the following method statements to the Project Manager no less than 14 days prior to the commencement date of the activity:

- Site establishment – Camps, Lay-down or storage areas, satellite camps, infrastructure;
- Batch plants;
- Workshop or plant servicing;
- Handling, transport and storage of Hazardous Chemical Substance's;
- Vegetation management – Protected, clearing, aliens, felling;
- Access management – Roads, gates, crossings etc.;
- Fire plan;
- Waste management – transport, storage, segregation, classification, disposal (all waste streams);
- Social interaction – complaints management, compensation claims, access to properties etc.;
- Water – use (source, abstraction and disposal), access and all related information, crossings and mitigation;
- Emergency preparedness – Spills, training, other environmental emergencies;
- Dust and noise management methodologies;
- Fauna interaction and risk management – only if the risk was identified – wildlife interaction especially on game farms; and
- Heritage and palaeontology management.

The ECOs shall monitor and ensure that the contractors perform in accordance with these method statements. Completed and agreed method statements between the holder of the EA and the contractor shall be captured in Appendix 1.

4.6 Environmental Incident Log (Diary)

The ECOs are required to maintain an up-to-date and current Environmental Incident Log (environmental diary). The Environmental Incident Log is a means to record all environmental incidents and/or all non-compliance notice would not be issued. An environmental incident is defined as:

- Any deviation from the listed impact management actions (listed in this EMPr) that may be addressed immediately by the ECOs. (For example a contractor's staff member littering or a drip tray that has not been emptied);
- Any environmental impact resulting from an action or activity by a contractor in contravention of the environmental stipulations and guidelines listed in the EMPr which as a single event would have a minor impact but which if cumulative and continuous would have a significant effect (for example no toilet paper available in the ablutions for an afternoon); and
- General environmental information such as road kills or injured wildlife.

The ECOs are to record all environmental incidents in the Environmental Incident Log. All incidents regardless of severity must be reported to the Developer. The Log is to be kept in the EMPr file and at a minimum the following will be recorded for each environmental incident:

- The date and time of the incident;
- Description of the incident;
- The name of the Contractor responsible;
- The incident must be listed as significant or minor;
- If the incident is listed as significant, a non-compliance notice must be issued, and recorded in the log;
- Remedial or corrective action taken to mitigate the incident; and
- Record of repeat minor offences by the same contractor or staff member.

The Environmental Incident Log will be captured in the EAR.

4.7 Non-compliance

A non-compliance notice will be issued to the responsible contractor by the ECOs via the DSS or Project Manager. The non-compliance notice will be issued in writing; a copy filed in the EMPr file and will at a minimum include the following:

- Time and date of the non-compliance;
- Name of the contractor responsible;
- Nature and description of the non-compliance;
- Recommended / required corrective action; and
- Date by which the corrective action to be completed.
- The contractors shall act immediately when a notice of non-compliance is received and correct whatever is the cause for the issuing of the notice. Complaints received regarding activities on the development site pertaining to the environment shall be

recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant CA for them to deal with the transgression, as it deems fit. The contractor is deemed not to have complied with the EMPr if, inter alia, There is a deviation from the environmental conditions, impact management outcomes and impact management actions activities, as approved in generic and site specific EMPr as relevant as set out in the EMPr, which deviation has, or may cause, an environmental impact.

4.8 Corrective action records

For each non-compliance notice issued, a documented corrective action must be recorded. On receiving a non-compliance notice from the DSS, the contractor's cEO will ensure that the corrective actions required take place within the stipulated timeframe. On completion of the corrective action the cEO is to issue a Corrective Action Report in writing to the ECOs. If satisfied that the corrective action has been completed, the ECOs are to sign-off on the Corrective Action Report, and attach the report to the non-compliance notice in the EMPr file. A corrective action is considered complete once the report has signed off by the ECOs.

4.9 Photographic record

A digital photographic record will be kept. The photographic record will be used to show before, during and post rehabilitation evidence of the project as well used in cases of damages claims if they arise. Each image must be dated and a brief description note attached.

The Contractor shall:

1. Allow the ECOs access to take photographs of all areas, activities and actions.

The ECOs shall keep an electronic database of photographic records which will include:

1. Pictures of all areas designated as work areas, camp areas, development sites and storage areas taken before these areas are set up;
2. All bunding and fencing;
3. Road conditions and road verges;
4. Condition of all farm fences;
5. Topsoil storage areas;
6. All areas to be cordoned off during construction;
7. Waste management sites;
8. Ablution facilities (inside and out);
9. Any non-conformances deemed to be "significant";
10. All completed corrective actions for non-compliances;
11. All required signage;
12. Photographic recordings of incidents;
13. All areas before, during and post rehabilitation; and
14. Include relevant photographs in the Final Environmental Audit Report.

## 4.10 Complaints register

The ECOs shall keep a current and up-to-date complaints register. The complaints register is to be a record of all complaints received from communities, stakeholders and individuals. The Complaints Record shall:

1. Record the name and contact details of the complainant;
2. Record the time and date of the complaint;
3. Contain a detailed description of the complaint;
4. Where relevant and appropriate, contain photographic evidence of the complaint or damage (ECOs to take relevant photographs); and
5. Contain a copy of the ECOs written response to each complaint received and keep a record of any further correspondence with the complainant. The ECO's written response will include a description of any corrective action to be taken and must be signed by the Contractor, ECO and affected party. Where a damage claim is issued by the complainant, the ECOs shall respond as described in (section 4.11) below.

## 4.11 Claims for damages

In the event that a Claim for Damages is submitted by a community, landowner or individual, the ECOs shall:

1. Record the full detail of the complaint as described in (section 4.10) above;
2. The DPM will evaluate the claim and associated damage and submit the evaluation to the Senior Site Representative for approval;
3. Following consideration by the DPM, the claim is to be resolved and settled immediately, or the reason for not accepting the claim communicated in writing to the claimant. Should the claimant not accept this, the ECO shall, in writing report the incident to the Developer's negotiator and legal department; and
4. A formal record of the response by the ECOs to the claimant as well as the rectification of the method of making payments not amount will be recorded in the EMPr file.

## 4.12 Interactions with affected parties

Open, transparent and good relations with affected landowners, communities and regional staff are an essential aspect to the successful management and mitigation of environmental impacts.

The ECOs shall:

1. Ensure that all queries, complaints and claims are dealt within an agreed timeframe;
2. Ensure that any or all agreements are documented, signed by all parties and a record of the agreement kept in the EMPr file;
3. Ensure that a complaints telephone numbers are made available to all landowners and affected parties; and
4. Ensure that contact with affected parties is courteous at all times;

### 4.13 Environmental audits

Internal environmental audits of the activity and implementation of the EMPr must be undertaken. The findings and outcomes included in the EMPr file and submitted to the CA at intervals as indicated in the EA.

The ECOs must prepare a monthly EAR. The report will be tabled as the key point on the agenda of the Environmental Site Meeting. The Report is submitted for acceptance at the meeting and the final report will be circulated to the Project Manager and filed in the EMPr file. At a frequency determined by the EA, the ECOs shall submit the monthly reports to the CA. At a minimum the monthly report is to cover the following:

- Weekly Environmental Checklists;
- Deviations and non-compliances with the checklists;
- Non-compliances issued;
- Completed and reported corrective actions;
- Environmental Monitoring;
- General environmental findings and actions; and
- Minutes of the Bi-monthly Environmental Site Meetings.

### 4.14 Final environmental audits

On final completion of the rehabilitation and/or requirements of the EA a final EAR is to be prepared and submitted to the CA. The EAR must comply with Appendix 7 of the EIA Regulations.

PART B: SECTION 1: Pre-approved generic EMPr template

## 5. IMPACT MANAGEMENT OUTCOMES AND IMPACT MANAGEMENT ACTIONS

This section provides a pre-approved generic EMPr template with aspects that are common to the development of substation infrastructure for the transmission and distribution of electricity. There is a list of aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity, and for each aspect a set of prescribed impact management outcomes and associated impact management actions have been identified. Holders of EAs are responsible to ensure the implementation of these outcomes and actions for all projects as a minimum requirement, in order to mitigate the impact of such aspects identified for the development or expansion of substation infrastructure for the transmission and distribution of electricity.

The template provided below is to be completed by providing the information under each heading for each environmental impact management action.

The completed template must be signed and dated on each page by both the contractor and the holder of the EA prior to commencement of the activity. The method statements prepared and agreed to by the holder of the EA must be appended to the template as Appendix 1. Each method statement must also be duly signed and dated on each page by the contactor and the holder of the EA. This template, once signed and dated, is legally binding. The holder of the EA will remain responsible for its implementation.

*5.1 Environmental awareness training*

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

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| – The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum:<br>a) Safety notifications; and<br>b) No littering. | Contractor | Develop and place appropriate posters at key locations | Pre-construction<br>Construction | ECO<br>dEO<br>cEO | Monthly | Photographic record |
| – Environmental awareness training must include as a minimum the following:<br>a) Description of significant environmental impacts, actual or potential, related to their work activities;<br>b) Mitigation measures to be implemented when carrying out specific activities;<br>c) Emergency preparedness and response procedures;<br>d) Emergency procedures;<br>e) Procedures to be followed when working near or within sensitive areas;<br>f) Wastewater management procedures;<br>g) Water usage and conservation;<br>h) Solid waste management procedures;<br>i) Sanitation procedures;<br>j) Fire prevention; and<br>k) Disease prevention. | cEO / dEO in consultation with the ECO | Develop environmental awareness training material which covers the minimum requirements | Pre-construction<br>Construction | ECO<br>dEO | Prior to the commence ment of the environmen tal awareness training | Environment al awareness training material requirements checklist |
| – A record of all environmental awareness training courses undertaken as part of the EMPr must be available; | ECO / cEO / dEO | Filing system including all proof of training (i.e. attendance register and training minutes / notes for the record) | During the construction phase | ECO<br>dEO | Monthly | Completed and up to date filing system with proof of training |
| – Educate workers on the dangers of open and/or unattended fires; | cEO / dEO in consultation with the ECO | Develop environmental awareness training | Pre-construction<br>Construction | ECO<br>dEO | Prior to the commence ment of the | Environment al awareness training |

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| | | 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 by readily available to all staff | During the construction phase | ECO dEO | Monthly | Environmental awareness training material requirements checklist and the training register which must indicate the language of the training |

## *5.2 Site Establishment development*

| Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area. |
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| Impact Management Actions | Implementation | | | Monitoring | | |
|---|---|---|---|---|---|---|
| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |
| – A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; | Contractor | Development of an appropriate method statement | Pre-construction | ECO<br>dEO | Once, prior to constructio n | Availability of the method statement which complies with the minimum requirements listed |
| – Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; | DPM | Place construction camps outside of sensitive areas identified in the Basic Assessment Report | Pre-construction<br>Construction | ECO<br>dEO | Once, prior to constructio n | Availability of a layout and sensitivity map indicating avoidance of sensitive areas |
| – Sites must be located where possible on previously disturbed areas; | DPM | Place site outside of sensitive areas and within previously disturbed areas | Pre-construction | ECO<br>dEO | Once, prior to constructio n | Availability of a layout and sensitivity map indicating |

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| | | 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<br>dEO | Once, prior to constructio n and once during the constructio n 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 wind energy facility | | | | | |

## *5.3 Access restricted areas*

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| 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 constructio n | Access restricted areas are identified and provided |

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| | | | | | | 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*

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| 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<br>Contractor | Develop access agreements with the affected landowners.<br>Ensure that agreements are approved and signed | Pre-construction | dEO<br>ECO | Once, prior to constructio n | 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 implementati on 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<br>Construction | ECO | Once, prior to constructio n | Access routes map readily available |

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| | | 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 re-habilitated to the pre-disturbance state | Construction and Rehabilitation | cEO ECO | Bi-weekly (every two weeks) | Photographic record of the closure of access roads and re-vegetation |
| – Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads; | Contractor (and Eskom maintenance staff where relevant to operation) | Existing access routes to be used must be specified and the development of new roads must be avoided as far as possible | Construction and operation | cEO Operation and maintenance team | Weekly | Implementation of the approved layout |
| – In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with section 4.9: photographic record; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor; | dEO / cEO | Record the conditions of private roads to be used (prior to use) as per the requirements of section 4.9 and agree on the required condition of the roads with the landowner, DPM and contractor | During the construction phase | ECO | Prior to the use of private roads | Photographic record and proof of the road conditions agreed upon with the relevant parties |

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| – 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 constructio n | Implementati on of the approved layout |
| – Access roads must only be developed on pre-planned and approved roads. | Contractor | Construction of access roads only on pre-planned and approved access roads | During the construction phase | ECO once during the design dEO | Once during the design and weekly during the constructio n of access roads | Implementati on of the approved layout |

### 5.5 *Fencing and Gate installation*

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| 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 | | |
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| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |

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| – Use existing gates provided to gain access to all parts of the area authorised for development, where possible; | Contractor | Identify and inform all relevant staff of the existing gates to be used | Pre-construction & Construction | dEO | Monthly | Existing gates are utilised on a frequent basis and only limited new access gates are developed |
| – Existing and new gates to be recorded and documented in accordance with section 4.9: photographic record; | ECO | Existing and new gates will be recorded and documented as per the requirements of section 4.9 | During the construction phase | ECO | Once, when the constructio n of all new gates have been completed | Photographic record of the existing and new gates as per the requirements of section4.9 |
| – All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; | Contractor | Ensure all relevant gates are fitted with locks and are always locked | Construction and Operation | ECO monthly, Operation and 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 constructio n and during the constructio n 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 | During the construction phase | cEO | Once, during the erection of | New gates installed as |

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| | | more than 100mm between the bottom of the gate and the ground | | | the gates during the construction phase | 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 |

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| – Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the land owner. | dEO/ cEO Contractor | Obtain written approval from the relevant landowner where temporary fencing is required to restrict livestock movement | During the construction phase | ECO | To be monitored as temporary fencing is required | Written approval to be provided by the dEO |
| – All fencing must be developed of high quality material bearing the SABS mark; | Contractor | Make use of high quality materials approved by SABS | During the construction phase | cEO | To be monitored as fencing is erected during the constructio n 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 constructio n 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 |

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|---|---|---|---|---|---|---|
| – 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<br>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<br>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*

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| 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 |

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|---|---|---|---|---|---|---|
| – 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 construction and operation | Use of high quality water meters |
| – The Contractor must ensure the following:<br>a. The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river;<br>b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and<br>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 | | | | | |
| – Ensure water conservation is being practiced by:<br>a. Minimising water use during cleaning of equipment;<br>b. Undertaking regular audits of water systems; and<br>c. Including a discussion on water usage and conservation during environmental awareness training.<br>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*

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| Impact management outcome: Impacts to the environment caused by storm water and wastewater discharges during construction are avoided. |

| Impact Management Actions | Implementation | | | Monitoring | | |
|---|---|---|---|---|---|---|
| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |
| – Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager; | Contractor | Implement measures for the control and management of runoff | During the construction phase | cEO | Weekly | No mismanage ment of runoff or contaminate d water due to the temporary concrete batching plant |
| – All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility; | Contractor and cEO | Obtain approved absorbent material and make use of licensed waste disposal facilities for disposal of oil | During the Construction Phase | ECO | Monthly | Availability of approved absorbent material at the construction site and proof of disposal of oil at licensed disposal facilities |
| – Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO; | DPM in consultation with the ECO | Consultation between the DPM and the ECO to determine if water can be discharged directly into water bodies (where present). The | During the construction phase | ECO | As and when the need arises to discharge natural stormwater runoff and clean water | Proof of consultation between the DPM and ECO and the outcomes thereof to be provided. Proof of |

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| | | necessary water quality testing must be undertaken prior to discharge | | | | water quality testing and the results thereof. |
| – Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO. | DPM in consultation with the ECO | Consultation between the DPM and the ECO to determine if water can be released following settling. | During the construction phase | ECO | As and when the need arises to discharge settled water | Proof of consultation between the DPM and ECO and the outcomes thereof to be provided. |

### 5.8 *Solid and hazardous waste management*

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| Impact management outcome: Wastes are appropriately stored, handled and safely disposed of at a recognised waste facility. |

| Impact Management Actions | Implementation | | | Monitoring | | |
|---|---|---|---|---|---|---|
| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |
| – All measures regarding waste management must be undertaken using an integrated waste management approach; | Contractor | Develop and implement a waste management plan | During the construction phase | ECO | Monthly | Implementation of the waste management plan and proof of |

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| | | | | | | waste management through proof of responsible disposal |
| – Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; | Contractor | Provision of appropriate waste collection bins strategically placed throughout the site | During the construction phase | cEO | Weekly | Appropriate waste collection bins are available throughout the site |
| – A suitably positioned and clearly demarcated waste collection site must be identified and provided; | DPM and Contractor | Identify an appropriate location for the waste collection site which must be clearly demarcated through signage and temporary fencing | Design and Construction Phase | ECO | Once, prior to the commencement of construction | A waste collection site is appropriately placed and demarcated |
| – The waste collection site must be maintained in a clean and orderly manner; | Contractor | Regular collection of waste and maintenance of the area must be undertaken as per the waste requirements for the project during construction | During the Construction Phase | cEO | Weekly | The waste collection site is maintained and clean |
| – Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal; | Contractor | Provide separate and marked bins for the different waste types | During the Construction Phase | cEO | Weekly | Separate waste bins are available on site and |

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| | | associated with the construction phase | | | | 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 | During the construction phase | ECO | Monthly | Disposal certificates of disposal at licensed facilities to be provided |

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

*5.9 Protection of watercourses and estuaries*

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| 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 |

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|---|---|---|---|---|---|---|
| – 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 – | | | | | |

| | | | | | | |
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| | 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 permenant crossings (access roads) are provided for access to the substations if no alternative crossing is available. | During the construction phase | cEO | Weekly | Ensure that permenant crossings are developed if there is no alternative. |
| – There must not be any impact on the long term morphological dynamics of watercourses or estuaries; | DPM, cEO | Develop a management plan or process for implementation should a spill take place within a watercourse and ensure continuous monitoring | During the construction and operation phase | ECO, dEO | For all phases of the project life cycle (i.e. constructio n, operation, decommissi oning) | No incidents reported of spillage of pollutants into watercourses |
| – Existing crossing points must be favored over the creation of new crossings (including temporary access) | DPM, cEO | Develop a management plan or process for implementation should a spill take place within a watercourse and ensure continuous monitoring | During the pre-construction and construction phase | ECO, dEO | During the constructio n phase of the project. | Existing crossing points utilised as opposed to new ones created and no incidents reported of spillage of pollutants into watercourses |

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| – When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken:<br>a) Water levels during the period of construction;<br>No altering of the bed, banks, course or characteristics of a watercourse<br>b) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained;<br>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<br>d) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows. | Contractor | Activities undertaken near watercourses must be in-line with and consider the specified environmental controls | During the construction phase | ECO | Monthly, and as and when required | No degradation of the watercourses and no incidents of destruction reported |

### 5.10 *Vegetation clearing*

Impact management outcome: Vegetation clearing is restricted to the authorised development footprint of the proposed infrastructure.

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |
| General: | | | | | | |

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

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| | | | | | protected species | |
| – The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals; | ECO | Ensure that the audit report indicates all species rescued and replanted and provides feedback in terms of compliance with the conditions of permits for replanting | During the Construction Phase and following the completion of the Construction Phase | ECO | Once off or as and when required | ECO confirmed rescued and replanted programme implemented correctly. |
| – Trees felled due to construction must be documented and form part of the Environmental Audit Report; | ECO | Ensure that the audit report documents the details of trees felled | During the Construction Phase and following the completion of the Construction Phase | ECO | Once, prior to the commence ment of the constructio n 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 |

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| | | | | | | are available as proof of responsible disposal |
| – Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained; | DPM qnd Contractor | A suitably qualified pest control operator must be appointed | Construction and Operation | ECO | As and when the use of herbicides is required | Only registered pest control operators must be appointed and proof of their registration must be provided |
| – A daily register must be kept of all relevant details of herbicide usage; | DPM qnd Contractor | A suitably qualified pest control operator must be appointed | Construction and Operation | ECO | As and when the use of herbicides is required | Only registered pest control operators must be appointed and proof of their registration must be provided |
| – No herbicides must be used in estuaries | 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 | During the construction phase | ECO | Once, during the undertaking of the demarcatio | Demarcation and fencing is undertaken in-line with the |

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| | | implement appropriate fencing where required as per section 5.3 | | | n of the areas and the erection of the fencing | requirements of section 5.3 |
| – Alien invasive vegetation must be removed and disposed of at a licensed waste management facility. | Contractor | Undertake removal of alien invasive vegetation in accordance with the relevant guideline and ensure the vegetation is disposed of at a licensed waste disposal facility | Construction and Operation | ECO Operation and maintenance team | Monthly, and as and when required | Proof must be provided that alien invasive vegetation has been cleared in accordance to the relevant guideline and that the vegetation was disposed of at a licensed waste disposal facility |

### *5.11 Protection of fauna*

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| Impact management outcome: Disturbance to fauna is minimised. |

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |

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| – No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present; | dEO / cEO Contractor | Develop a procedure for dealing with livestock within the affected properties | Pre-construction and during the construction phase | ECO | Once, prior to the commencement of construction and as and when required during the construction phase | Written consent provided by the landowner and proof of representation of the landowner during interference |
| – The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the development programme; | dEO / cEO in consultation with the Contractor | Ensure that the planning and development programme considers breeding sites for wild bird species | Pre-construction & Construction | ECO | Once, prior to the commencement of construction and as and when required | The planning and development programme includes the consideration of breeding sites for wild bird species |
| – Breeding sites must be kept intact and disturbance to breeding birds must be avoided. Special care must be taken where nestlings or fledglings are present; | dEO / cEO in consultation with the Contractor | Avoid breeding sites and ensure that special care is taken in the presence of nestlings and fledglings | During the Construction Phase Operation Phase | ECO monthly, cEO and Operation and maintenance team weekly | Weekly, and as an when required during the construction. Monthly, and as and when required 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 | During the Construction Phase Operation Phase | ECO Operation and | Monthly during construction and | Photographic record of compliance and |

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| | | specialist must be implemented | | maintenance team | monthly during operation | successful implementation of the recommended measures |
| – No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas; | dEO / cEO in consultation with the Contractor | All site staff must be informed of this requirement during the Environmental Awareness Training and the consequences of not adhering to the requirement. These areas must be demarcated as Access Restricted Areas | During the Construction Phase | ECO | Monthly, and as and when required | No instances of poaching is reported |
| – No deliberate or intentional killing of fauna is allowed; | dEO / cEO in consultation with the Contractor | All site staff must be informed of this requirement during the Environmental Awareness Training and the consequences of not adhering to 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 |

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| – In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages; and | dEO / cEO in consultation with the Contractor | Implement and maintain snake deterrents on pylons in areas where snakes are abundant | During the Construction Phase Operation Phase | ECO Operation and maintenance team | Once, during the construction of the pylons and as and when required. Monthly during operation | Photographic record of the implementation and maintenance of snake deterrents |
| – No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits. | DPM in consultation with the dEO | Undertake a permitting process to obtain the required permits | Pre-construction | ECO | Once, prior to the commencement of construction and as and when required | Permits for removal and/relocation must be kept on file and be readily available |

### *5.12 Protection of heritage resources*

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| Impact management outcome: Impact to heritage resources is minimised. |

| Impact Management Actions | Implementation | Monitoring |
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| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |
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| – 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<br><br>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 |
| – 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, palaeontolgoical 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 | | |
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| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |
| – Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.; | cEO in consultation with the Contractor | Develop an Emergency Preparedness, Response and Fire Management Plan specific to the project | Pre-construction Construction | cEO | Once, prior to the commencement of construction and weekly during the construction phase | Compliance with the Emergency Preparedness, Response and Fire Management Plan |
| – All unattended open excavations must be adequately fenced or demarcated; | Contractor | Ensure that all excavations undertaken is fenced and demarcated within a reasonable 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 | During the construction phase | ECO | Monthly, and as and | No incidents of unauthorised |

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| | | of towers and scaffolding must only be undertaken by authorised personnel as managed by the Contractor | | | when required | climbing is reported |
| – Ensure structures vulnerable to high winds are secured; | Contractor | Ensure that sufficient stabilisation measures are implemented to secure structures vulnerable to high winds | During the construction phase | cEO | Weekly, and as and when required | No incidents of unstable structures due to high winds is reported |
| – Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged. | cEO | Compile and regularly update as incidents and complaints are submitted from the public and indicate the actions taken to resolve the complaint | During the construction phase | ECO | Monthly, and as and when required | The incidents and complaints register is complete and provides all the required details |

### *5.14 Sanitation*

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

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | 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 environment al sensitivities |
| – The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances; | Contractor in consultation with the cEO | All site staff must be informed of this requirement during the Environmental Awareness Training and the consequences of not adhering to the requirement. | Pe-construction & Construction | ECO | Monthly, and as and when required | No evidence of non-compliance identified |
| – Where mobile chemical toilets are required, the following must be ensured:<br>a) Toilets are located no closer than 100 m to any watercourse or water body;<br>b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause;<br>c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr;<br>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; | Contractor in consultation with the cEO | The installation of the toilets by the Contractor must be as per the listed requirements | During the Construction Phase | cEO | Weekly | No evidence of non-compliance identified |

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| e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours;<br>f) Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards; | | | | | | |
| – A copy of the waste disposal certificates must be maintained. | Contractor | Certificates obtained from the licensed waste disposal facility with the emptying of the toilets must be kept on file | During the Construction Phase | ECO | Monthly, and as and when required | Certificates for waste disposal from the licensed waste disposal facility available on site |

### *5.15 Prevention of disease*

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| Impact Management outcome: All necessary precautions linked to the spread of disease are taken. |

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |

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| – 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 environment ally-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 commence ment of constructio n and monthly during constructio n | Environment al awareness training material requirements checklist |
| – The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area; | Contractor | Develop and place information posters on HIV/ AIDS | During the Construction Phase | cEO | Weekly | Photographic evidence of poster placement |
| – Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; | cEO / Contractor in consultation with the ECO | Information and education of sexually transmitted diseases must be covered in the Environmental Awareness Training. | Pre-construction & Construction | ECO | Monthly | Environment al awareness training material requirements checklist |
| – Free condoms must be made available to all staff on site at central points; | Contractor | Placement of free condoms in mobile toilets and at the construction camps | During the Construction Phase | ECO | Monthly | Proof of placement of free condoms by the |

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

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| | | fire and the procedure to be followed for informing the local authority | | | | 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*

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| Impact management outcome: Safe storage, handling, use and disposal of hazardous substances. |

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |

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| – 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 | During the Construction Phase | ECO | Monthly during the Construction Phase | Photographic proof that storage areas are bunded and proof |

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

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| | | | | | and when required | |
| – Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available; | cEO / Contractor | Develop environmental awareness training material which covers the relevant impacts and safety measures.<br><br>Provide appropriate training and personal protective equipment for the relevant personnel handling hazardous substances and materials | Pre-construction & Construction | ECO | Prior to the commencement of the environmental awareness training and monthly during the construction phase for personal protective equipment | Environmental awareness training material requirements checklist and all relevant personnel have undergone appropriate training and have access to personal protective equipment |
| – The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers; | Contractor | Appropriate storage facilities must be constructed or obtained for the storing of diesel, other liquid fuel, oil and hydraulic fluid | During the Construction Phase | ECO | Monthly, and as and when required | Storage tanks for the project are appropriate and no incidents are reported in this regard |
| – The tanks/ bowsers must be situated on a smooth impermeable surface (concrete) with a permanent bund. The impermeable lining must extend to the crest of the bund and the volume inside the bund must be 130% of the total capacity of all the storage tanks/ | Contractor | Appropriate storage facilities must be constructed or obtained for tanks | During the Construction Phase | ECO | Monthly, and as and when required | Storage areas for the tanks/ bowsers for the project are |

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| bowsers (110% statutory requirement plus an allowance for rainfall); | | as per the requirements listed | | | | appropriate and no incidents are reported in this regard |
| – The floor of the bund must be sloped, draining to an oil separator; | Contractor | Appropriate storage facilities must be constructed as per the requirements listed | During the Construction Phase | ECO | Once, during constructio n | Bunded storage areas are constructed according to the requirements |
| – Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained; | Contractor | Appropriately constructed refuelling facility must be developed as per the requirements. Drip trays must be provided for use | During the Construction Phase | ECO<br>cEO | Monthly<br>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<br>cEO | Monthly<br>Weekly | Drip trays or bunded areas are used for the storage of dirty drums |
| – No unauthorised access into the hazardous substances storage areas must be permitted; | Contractor | Ensure through the implementation of procedures that no unauthorised access is undertaken into the storage areas | During the Construction Phase | ECO | Monthly | Proof of the implementati on of the relevant procedure must be provided by the contractor |

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| – 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<br>cEO | Monthly<br>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 | During the Construction Phase | ECO | Monthly | Proof of appropriate number of |

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| | | number of spill kits in relevant areas | | | | 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.<br><br>Certificates of disposal at licensed waste disposal facilities must be provided |

### *5.18 Workshop, equipment maintenance and storage*

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| Impact management outcome: Soil, surface water and groundwater contamination is minimised. |

| Impact Management Actions | Implementation | Monitoring |
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| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |
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| – 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 |

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| – The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil / water separator where maintenance work on vehicles and equipment can be performed; | Contractor | Ensure that the workshop area is sufficiently bunded in accordance with the required specification | During the Construction Phase | ECO | Once, during the Constructio n Phase and as and when required | Workshop area is bunded in accordance with the required specification |
| – Water drainage from the workshop must be contained and managed in accordance Section 5.7: Storm and waste water management. | Contractor | Ensure that water drainage from workshop area is managed as per the requirements of section 5.7 | During the Construction Phase | ECO | Monthly | Workshop drainage is managed in accordance with the requirements |

### *5.19 Batching plants*

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| Impact management outcome: Minimise spillages and contamination of soil, surface water and groundwater. |

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | 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 | During the construction phase | cEO | Weekly | No mismanage ment of laden water due to the |

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| | | cement laden water | | | | 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 |

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| – Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licensed disposal facility; | Contractor | Make use of hardened concrete where possible or dispose of concrete in a suitable manner | During the Construction Phase | ECO | Monthly | Certificates of disposal of concrete at licensed waste disposal facility |
| – Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site; | Contractor | Bind empty cement bags and temporarily store it in an appropriate area on site | During the Construction Phase | ECO | Monthly | Proof of binding of empty cement bags and storage in an appropriate are on site to be provided by the Contractor |
| – Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to Section 5.20: Dust emissions) | Contractor | Ensure that sand and aggregates are kept damp or otherwise protected from dust generation | During the Construction Phase | ECO | Monthly | Proof of damping (or alternative dust suppression) of sand and aggregates must be provided by the Contractor |
| – Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility; | Contractor | Ensure that all excess sand, stone and cement is removed or reused | At the completion of the Construction Phase | ECO | Once, with the completion of constructio n | Certificates for the disposal of sand, stone and cement at licensed |

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| | | | | | | 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*

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| Impact management outcome: Dust prevention measures are applied to minimise the generation of dust. |

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | 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 | During the Construction Phase and Rehabilitation | cEO | Weekly | Plan for implementati on must be provided by the Contractor |

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| | | associated rehabilitation | | | | |
| – Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; | Contractor | Ensure that specific limitations are placed on the transport and handling of erodible materials during high wind conditions or when a visible dust plume is present | During the Construction Phase | cEO | Bi-weekly (every second week) | No complaints submitted in this regard |
| – During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; | ECO | ECO to provide adequate recommendations | During the Construction Phase | Not Applicable | | |
| – Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind; | Contractor | Place soil stockpiles in areas less affected by wind | During the Construction Phase | cEO and<br><br>ECO | Bi-weekly (every second week)<br><br>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 | Recommend ations made by the ECO have been implemented by the Contractor |

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| – Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas; | cEO / dEO / contractor | Inform all drivers of speed limits and place appropriate signage along the relevant roads | During the Construction Phase Operation Phase | ECO Operation and Maintenance team | Monthly | No complaints from community members are submitted |
| – Straw stabilisation must be applied at a rate of one bale/10 m² and harrowed into the top 100 mm of top material, for all completed earthworks; | Contractor | Ensure that straw stabilisation is undertaken as per the listed requirements | During the Construction Phase | ECO | Monthly | Photographic record of all straw stabilisation undertaken |
| – For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust. | Contractor | Appropriate dust suppressant measures are implemented | During the Construction Phase | cEO | Weekly | Photographic record of measures being implemented and the results thereof |

### *5.21 Blasting*

Impact management outcome: Impact to the environment is minimised through a safe blasting practice.

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | 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 | Pre-Construction Phase | ECO/EO | Once off, before blasting activities | ECO/EO to check all valid credentials and |

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| | | credentials and certifications | | | commence . | 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*

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| Impact Management outcome: Prevent unnecessary noise to the environment by ensuring that noise from development activity is mitigated. |

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | 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. |

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| – 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 transportatio n 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 commence ment of constructio n | No complaints registered in this regard. |

### *5.23 Fire prevention*

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| Impact management outcome: Prevention of uncontrollable fires. |

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |

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

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| | | emergency services at a visible and central location | | | | |
| – Two way swop of contact details between ECO and FPA. | ECO | Consultation between the ECO and FPA in order to exchange contact details | Pre-construction | Not Applicable | | |

### 5.24 Stockpiling and stockpile areas

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

| Impact Management Actions | Implementation | | | Monitoring | | |
|---|---|---|---|---|---|---|
| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |
| – All material that is excavated during the project development phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses, watercourses and water bodies; | Contractor | Identify and demarcate an appropriate location for the storage of excavated materials | Pre-construction & Construction | ECO | Monthly | Excavated material is not stored within sensitive environment al areas |
| – All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods; | Contractor | Implement appropriate and sufficient maintenance on stockpiled material regularly | During the Construction Phase | cEO<br><br>ECO | Bi-weekly (every second month)<br><br>Monthly | Stockpiled material is maintained sufficiently and is clear of weeds and |

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| | | | | | | 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<br><br>ECO | Bi-weekly (every second month)<br><br>Monthly | Topsoil stockpiles do not exceed 2m in height |
| – During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.); | Contractor | Appropriate material must be provided in order to cover stockpiles when required | During the Construction Phase | ECO | Monthly | Contractor to provide proof of availability of appropriate material to cover stockpiles when required |
| – Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material. | Contractor | Sandbags must be provided in order to prevent erosion of stockpiled materials | During the Construction Phase | ECO | Monthly | Contractor to provide proof of availability of sandbags to prevent erosion of stockpiled materials |

### *5.25 Civil works*

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

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

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| – 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 implement a 150mm topsoil layer on top following shaping and compaction to promote rehabilitation | Duration of the construction phase | ECO | Monthly | Spoil material used in landscaping is suitably covered with a later of topsoil at least 150mm deep |

### *5.26 Excavation of foundation, cable trenching and drainage systems*

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| 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 |

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

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

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

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

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

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

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| | | Section 5.8 of this report | | | | 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. |
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| 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 | Duration of the construction phase | ECO | Monthly | Evidence of leftover waste/unused materials on site following |

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|---|---|---|---|---|---|---|
| | | materials that may be left on site | | | | 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*

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| Impact management outcome: No environmental degradation occurs as a result of stringing. |

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | 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 | During the Construction Phase | ECO | Monthly | Undertake recycling or disposal of solid waste as per the |

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| | | requirements of section 6.8 | | | | 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)*

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

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | 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 | During the Construction Phase | ECO | Monthly | Undertake recycling or disposal of |

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| | | waste as per the requirements of section 5.8 | | | | solid waste as per the requirements of section 5.8 |

### *5.32 Socio-economic*

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| Impact management outcome: enhanced socio-economic development. |

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |
| – Develop and implement communication strategies to facilitate public participation; | dEO / cEO | Identify and implement appropriate strategies for communication with the communities through consideration of the community needs | Pre-construction & Construction | ECO | Once, prior to the commencement of construction and monthly during the construction | Communication is undertaken as per the identified strategies and no complaints are submitted regarding communication |
| – Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process; | Contractor | Development and implement a Grievance Mechanism which considers the community needs and provides | Pre-construction & Construction | ECO | Once, prior to the commencement of construction and monthly | Conflict resolution is undertaken in line with the requirements of the Grievance |

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| | | procedures for conflict resolution | | | during the construction phase | Mechanism. No complaints on conflict resolution is submitted by the community |
| – Sustain continuous communication and liaison with neighboring owners and residents | Contractor | Development and implement and Grievance Mechanism provides procedures for communication / liaison with neighbouring landowners and residents | Pre-construction & Construction | ECO | Once, prior to the commencement of construction and monthly during the construction phase | Communication / liaison with neighbouring landowners and residents are undertaken in line with the requirements of the Grievance Mechanism. No complaints on communication with neighbouring landowners and residents are submitted |
| – Create work and training opportunities for local stakeholders; and | Contractor | Develop and implement a "locals first" policy for the provision of | Pre-construction & Construction | ECO | Once, prior to the commencement of constructio | The "locals first" policy is considered in terms of the employment |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | employment opportunities | | | n and monthly during the constructio n phase | 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 wind energy facility | | | | | |

### 5.33 *Temporary closure of site*

| Impact management outcome: Minimise the risk of environmental impact during periods of site closure greater than five days. |
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| Impact Management Actions | Implementation | | | Monitoring | | |
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| | Responsible person | Method of implementation | Timeframe for implementation | Responsible person | Frequency | Evidence of compliance |
| – Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in sections 5.17: Hazardous substances and 5.18: Workshop, equipment maintenance and storage; | Contractor | Regular emptying of the bunds must be undertaken. This must be undertaken as per the requirements listed in sections 5.17 and 5.18 | During the Construction Phase | ECO | Prior to site closure for more than 05 days | Bunds are emptied as per the requirements listed under sections 5.17 and 5.18 |
| – Hazardous storage areas must be well ventilated; | Contractor | Install appropriate ventilation in all hazardous storage areas | During the construction phase | ECO | Prior to site closure for more than 05 days | Effective ventilation is installed in hazardous storage areas |

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| – 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 emergency personnel | Pre-construction & construction | ECO | Prior to site closure for more than 05 days | Proof of the workshop held must be kept on file by the contractor. |
| – Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; | Contractor | Regular checks of night hazards must be undertaken | During the Construction Phase | ECO | Prior to site closure for more than 05 days | Proof of checks of night hazards must be provided by |

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| | | | | | | 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 | During the Construction Phase | ECO | Prior to site closure for | Refuse bins are emptied and secured |

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| | | secured prior to site closure | | | more than 05 days | 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 | During the Construction Phase | ECO | Monthly | Drip trays are emptied and secured prior to site closure |

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| | | or pollution may result | | | | |
| – 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 | During the Construction Phase | ECO | Monthly | Visual inspection of disposal record documentati |

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| | | record in the site environmental file | | | | on and registration of the waste disposal site utilised. |

### 5.35 *Landscaping and rehabilitation*

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| Impact management outcome: Areas disturbed during the development phase are returned to a state that approximates the original condition. |

| Impact Management Actions | Implementation | | | Monitoring | | |
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| | 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.<br><br>Dispose of all spoil and waste at a licensed waste disposal facility | Pre-construction & Rehabilitation | cEO | Weekly | Rehabilitation of the disturbed areas is undertaken as per the rehabilitation plan. All certificates of waste disposal at licensed facilities are available. |

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| – 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 requirements listed under section 5.24 | Rehabilitation | cEO | Weekly | Stockpiled topsoil is used as per the requirements listed under section 5.24 |

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| – 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 rehabilitatio n to confirm correct timeframe | Rehabilitation is undertaken during the optimal time |
| – Where impacted through construction related activity, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; | Contractor | All disturbed slope areas must be stabilised | Rehabilitation | cEO | Weekly | Disturbed slopes are stabilised sufficiently |
| – Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly; | Contractor | Stabilise slopes as per the design specifications | Pre-construction & Rehabilitation | cEO | Weekly | Slopes are stabilised as per the design specifications |
| – Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil. | Contractor | Spoil used for landscaping must be applied as per | Rehabilitation | cEO | Weekly | Photographic record of spoil used for landscaping |

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| | | the listed requirements | | | | purposes as well as feedback from the contractor |
| – Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following:<br>a) Annual and perennial plants are chosen;<br>b) Pioneer species are included;<br>c) Species chosen must be indigenous to the area with the seeds used coming from the area;<br>d) Root systems must have a binding effect on the soil;<br>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: Ummbila 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: Ummbila Emoyeni Wind Energy Facility – Phase One, Mpumalanga Province

#### 7.1.4 Description of the project:

Ummbila Emoyeni (Pty) Ltd is proposing the development of a commercial wind energy facility and associated infrastructure on a site located ~6km south-east of Bethal and 1km east of Morgenzon, within the Mpumalanga Province. The Phase One project site is located in the Lekwa Local Municipality within the Gert Sibande District on the following properties:

| Parent Farm Number | Farm Portions |
|---|---|
| Farm 421 - Sukkelaar | 2, 7, 9, 10, 11, 12, 22 ,25 R/E, 34, 35, 36, 37, 38, 39, 40, 42 |
| Farm 422 – Klipfontein | 2 R/E, 3 R/E, 12, 13 R/E,16, 17, 18, 21, 22, 23 |
| Farm 458 – Goedgedacht | 4, 15, 16, 18, 19, 21, 22, 25, 27, 28, 33, 34, 35 |
| Farm 548 – Durabel | 0 |

The facility will have a contracted capacity of up to 155MW and will be known as the Ummbila Emoyeni Phase One Wind Energy Facility. A project site considered to be suitable for the development of a wind farm, with an extent of ~5 452ha, 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 development footprint[1] of Phase One will contain the following infrastructure to enable the wind farm to generate up to 155MW:

- » Up to 25 wind turbines with a maximum hub height of up to 130m. The tip height of the turbines will be up to 225m.
- » 33kV cabling to connect the wind turbines to the onsite collector substations, to be laid underground where practical.
- » 1 x 33kV/132kV onsite collector substation (IPP Portion), each being 5ha in extent.
- » Cabling between turbines, to be laid underground where practical.
- » Construction compounds including site office (approximately 6ha (150m x 200m)):
  - ∗ 1 x Batching plant of up to 4ha to 7ha.
  - ∗ 1 x O&M office of approximately 1.5ha adjacent to the collector SS.
  - ∗ 1 x construction compound / laydown area, including site office of 6-7ha (150m x 200m each).
- » Laydown and crane hardstand areas (approximately 75m x 120m).
- » Access roads of 12 -13m wide, with 12m at turning circles.

An Environmental Authorisation (EA) for the project was issued on 26 January 2023 (DFFE Ref: 14/12/16/3/3/2/2160). It is the intention of the applicant to develop the WEF in commercially viable phases. This Final EMPr has been compiled in terms of the requirements of Condition 13 of the EA amendment (DFFE Ref: 14/12/16/3/3/2/2160/AM1) 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 larger wind farm which the substations are associated with. The DFFE screening tool report for the project site is included in Appendix 3 of this EMPr.

[1]The development footprint is the result of detailed design by the developer which the consideration of sensitive environmental features which are required to be avoided by the wind farm infrastructure.

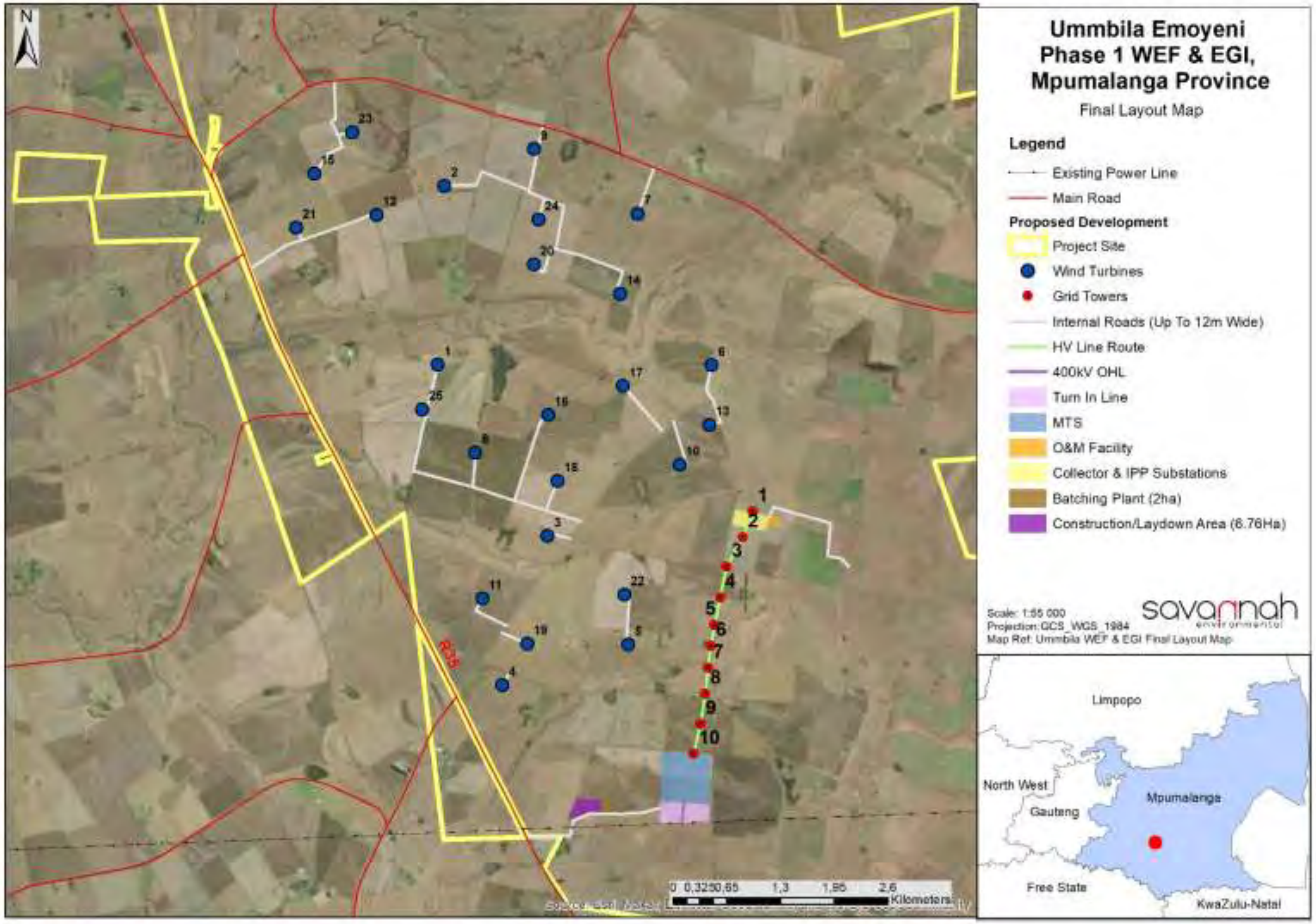


Figure 1: <u>Final layout</u> map of the Ummbila Emoyeni Phase One WEF & EGI, including all infrastructure

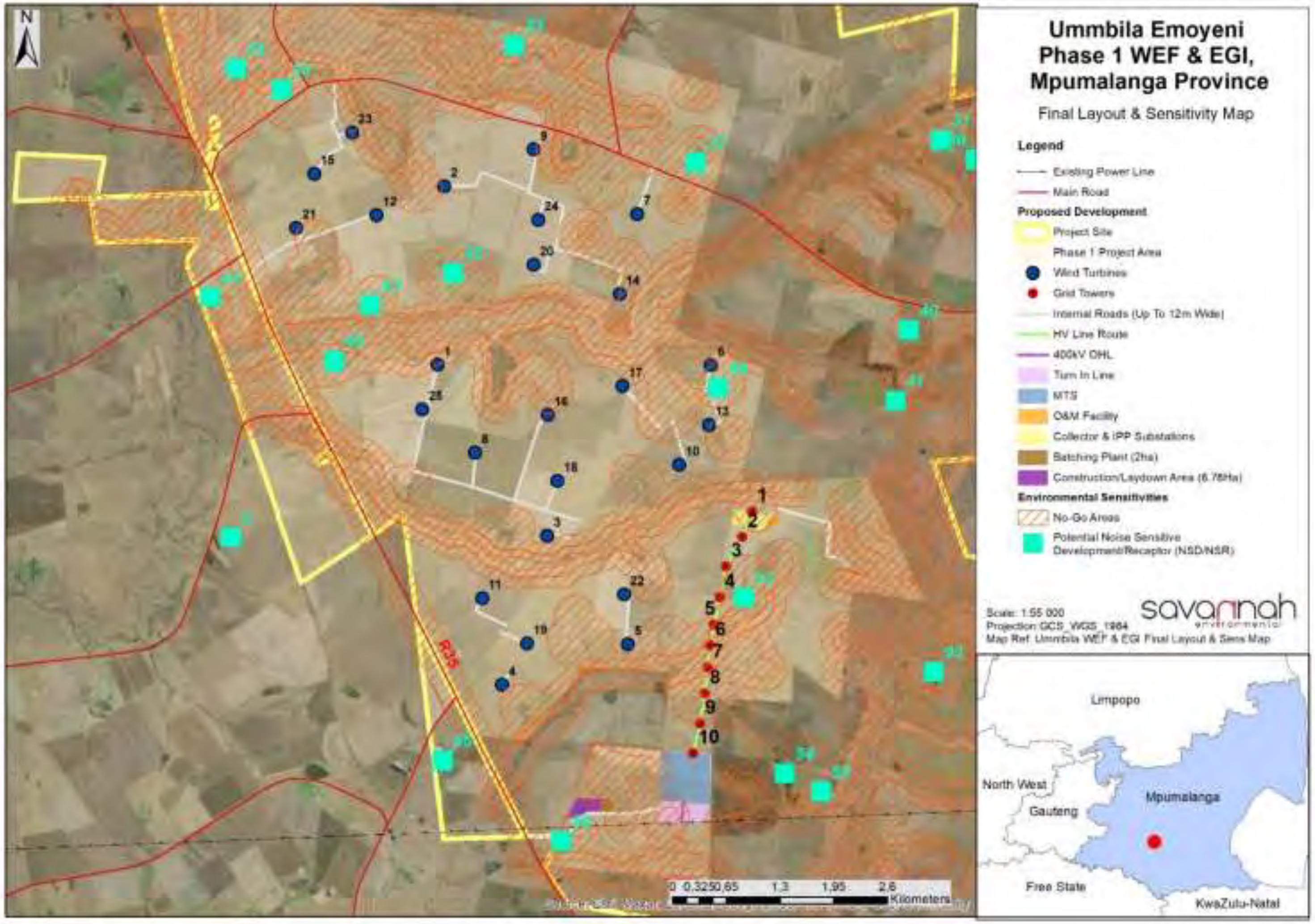


Figure 2: Environmental sensitivity & final layout map of the Ummbila Emoyeni Phase One WEF & EGI, including all infrastructure[2]

[2] The status of the NSD/NSRs is to be confirmed.

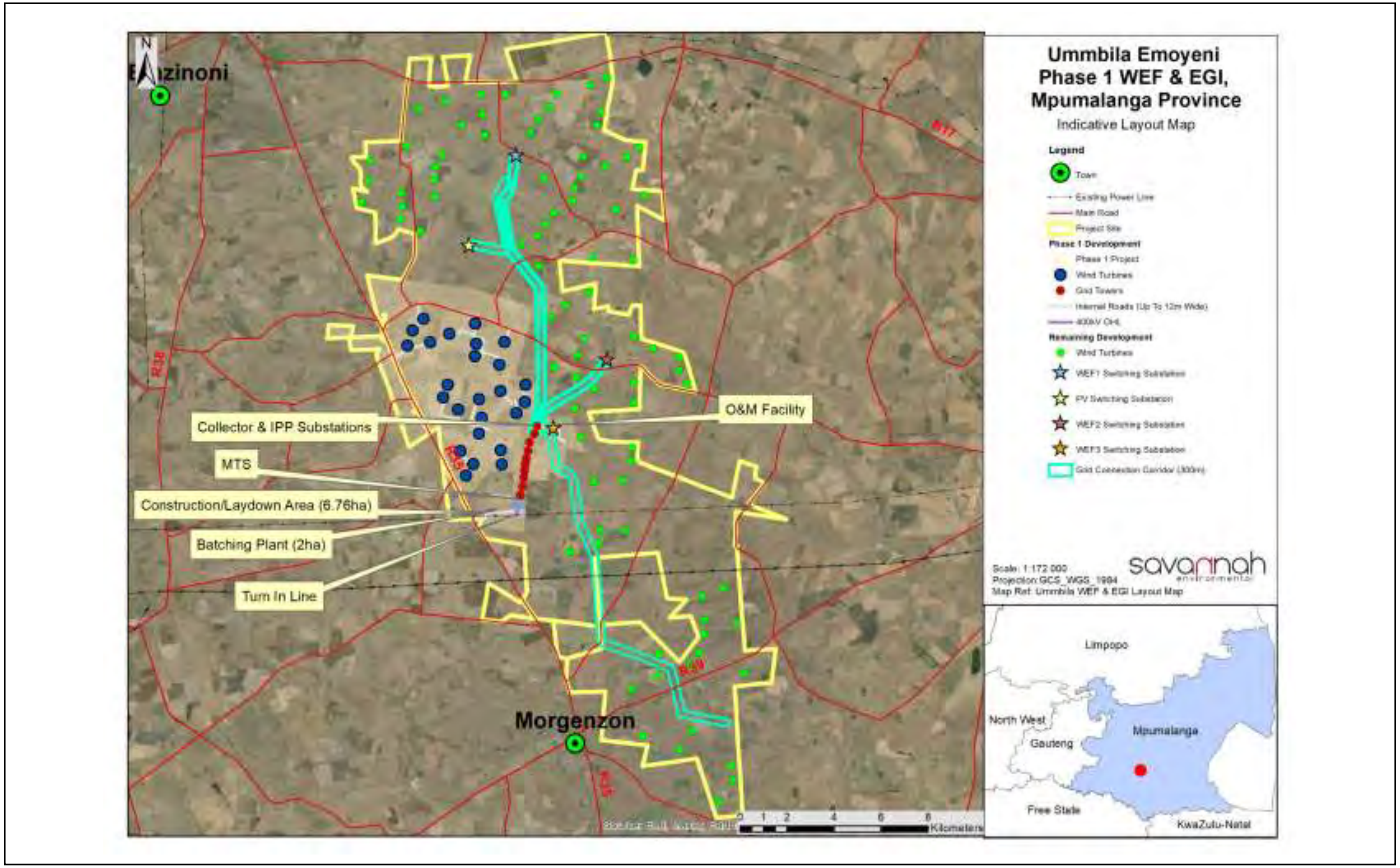


Figure 3: Indicative layout map of the Ummbila Emoyeni Phase One WEF & EGI Final layout in relation to the remainder of the project site.

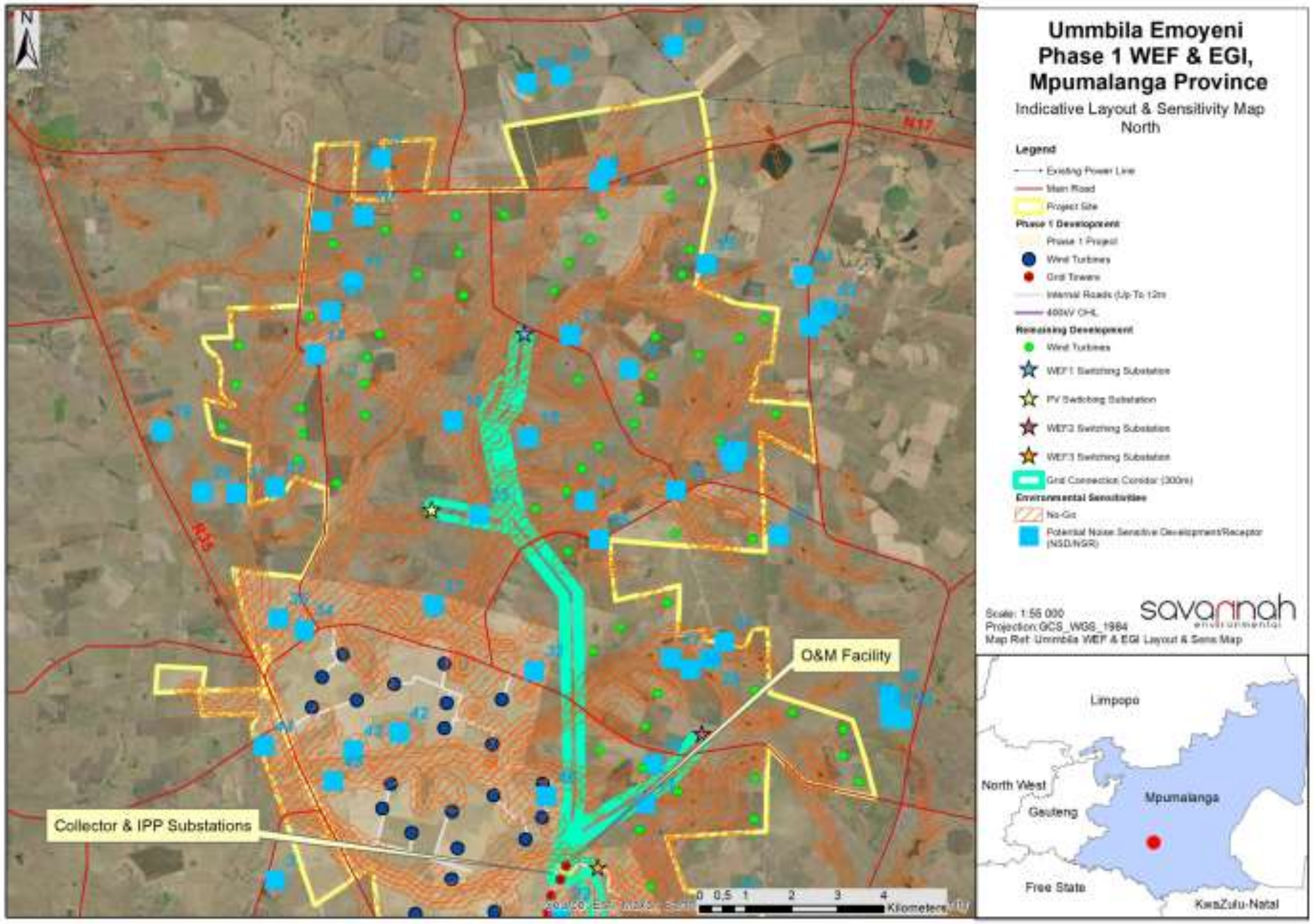


Figure 4: Northern indicative layout map of the Ummbila Emoyeni Phase One WEF & EGI Final layout in relation to the remainder of the project site, overlain with sensitivities identified in the EIA Phase[3].

[3] The status of the NSD/NSRs is to be confirmed.

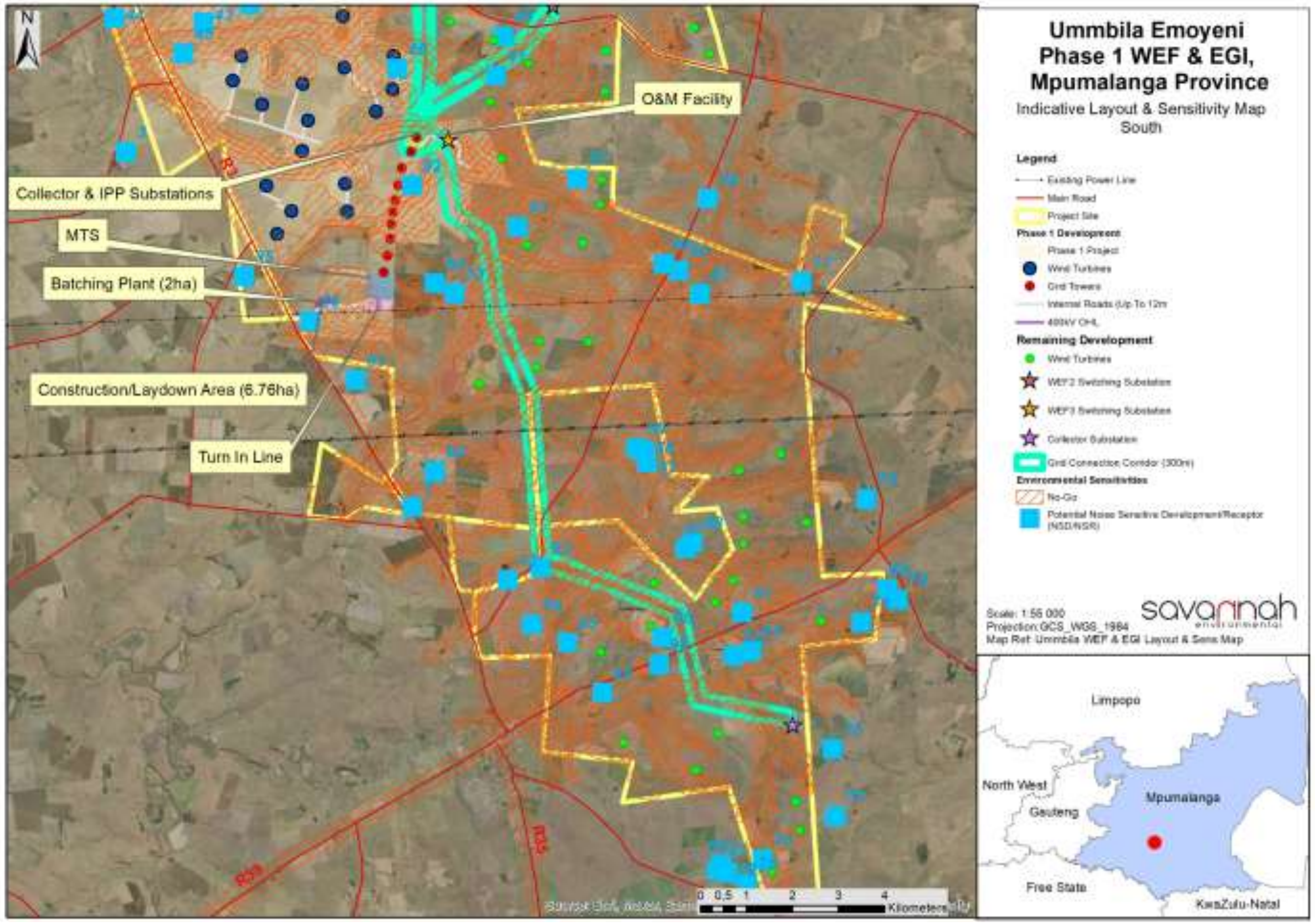


Figure 5: Southern indicative layout map of the Ummbila Emoyeni Phase One WEF & EGI Final layout in relation to the remainder of the project site, overlain with sensitivities identified in the EIA Phase[4].

[4] The status of the NSD/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: 27 June 2023

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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 | » Substations;<br>» Access roads; and<br>» Associated infrastructure. |
| Potential Impact | » Design fails to respond optimally to the identified environmental considerations. |
| Activities/risk sources | » Positioning of onsite substations.<br>» Positioning of laydown areas. |
| Mitigation: Target/Objective | » To ensure that the design responds to the identified environmental constraints and opportunities, including the constraints identified through the EIA process.<br>» 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<br>EPC Contractor | Pre-construction |
| Consider design level mitigation measures recommended by the specialists, as detailed within the EIA report and relevant appendices. | Developer<br>EPC Contractor | Design phase |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| 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<br>EPC Contractor | Design phase |
| 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.<br><br>» All small, endorheic seepages and depressions with a High Ecological Importance: 50m buffers from the outer edge of the freshwater resource features.<br>» All larger interconnected wetland features with Very Ecological Importance: 100m buffers from the outer edge of the freshwater resource features.<br>» 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):<br>* only activities relating to the route access and cabling:<br>* the use/upgrade of existing roads and watercourse crossings are the preferred options;<br>* 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.<br>* All underground cabling should be laid either within access roads or next to access roads (as close as possible). | Developer<br>EPC Contractor | Design phase |
| Drainage lines must be avoided for turbine placement and access roads, and a no-go buffer of 20 m must be applied around them. | Project manager, Environmental Officer | Life of operation |
| Infrastructure to avoid avifauna Very High Sensitivity areas, linear infrastructure (including roads) permitted. | Developer<br>EPC Contractor | Design phase |
| The footprint within avifauna Medium Sensitivity areas should be minimised and avoided wherever possible. | Developer<br>EPC Contractor | Design phase |
| The minimum footprint areas of infrastructure should be used wherever possible. | Developer<br>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<br>EPC Contractor | Design phase |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| 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<br>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<br>EPC Contractor | Design phase |
| The historic farm werf cluster as defined in the Heritage Impact Assessment must not be impacted by the development. | Developer<br>EPC Contractor | Design phase |
| A 500m no development buffer should be implemented on either side of the N17, R35 and R39. | Developer<br>EPC Contractor | Design phase |
| A 200m no development buffer should be implemented on either side of the secondary routes that run through the development area. | Developer<br>EPC Contractor | Design phase |
| A 500m no development buffer must be implemented around the identified farm werfs. | Developer<br>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<br>EPC Contractor | Design phase |
| <u>Should protected tree species occur in the project area, permits are required to have them removed in accordance with section (15) (1) of the National Forest Act, 1998, as amended.</u> | <u>Developer</u> | <u>Pre-construction</u> |

| | |
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| Performance Indicator | » Design meets the objectives and does not degrade the environment.<br>» Design and layouts respond to the mitigation measures and recommendations in the EIA report. |
| Monitoring | » 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

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|---|---|
| Project component/s | » Onsite substations |
| Potential Impact | » Disturbance of birds (e.g. destruction of habitat).<br>» Displacement of birds.<br>» Collision with project components.<br>» Traffic to and from site. |
| Activity/risk source | » Site preparation and earthworks.<br>» Foundations or plant equipment installation.<br>» Mobile construction equipment movement on site. |

| | |
|---|---|
| | » Substation construction facilities. |
| Mitigation: Target/Objective | » To minimise footprints of habitat destruction.<br>» 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<br>EO | Construction |
| The Environmental Officer must, during audits/site visits, make a concerted effort to look out for such breeding activities of SCCs (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. | Contractor | Construction |
| 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 |

| | |
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| Performance Indicator | » No disturbance outside of designated work areas.<br>» Minimised clearing of existing/natural vegetation and habitats for avifauna.<br>» Limited impacts on avifaunal species (i.e. noted/recorded fatalities), especially those of conservation concern. |
| Monitoring and Reporting | » Observation of vegetation clearing activities by the EO throughout construction phase.<br>» Supervision of all clearing and earthworks by the EO. |

<u>OBJECTIVE 3: Appropriate management of the construction site and construction workers</u>

| | |
|---|---|
| Project Component/s | » Onsite substations |
| Potential Impact | » Damage to indigenous natural vegetation and sensitive areas.<br>» Damage to and/or loss of topsoil (i.e. pollution, compaction etc.).<br>» Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities.<br>» Pollution/contamination of the environment. |
| Activities/Risk Sources | » Vegetation clearing and levelling of equipment storage area/s.<br>» Access to and from the equipment storage area/s.<br>» Ablution facilities.<br>» Contractors not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment. |
| Mitigation: Target/Objective | » Limit equipment storage within demarcated designated areas.<br>» Ensure adequate sanitation facilities and waste management practices.<br>» Ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment. |

| Mitigation: Action/Control | Responsibility | Timeframe |
|---|---|---|
| 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. | Contractors | Construction |
| 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. | Contractor | Construction |
| 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 | Contractor | Construction |

| Mitigation: Action/Control | Responsibility | Timeframe |
|---|---|---|
| equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area. | | |
| 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 |
| 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 |

| Mitigation: Action/Control | Responsibility | Timeframe |
|---|---|---|
| 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 |
| 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 |

| Mitigation: Action/Control | Responsibility | Timeframe |
|---|---|---|
| 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 | » Code of Conduct drafted by the Developer before commencement of the construction phase.<br>» Appropriate training of all staff is undertaken prior to them commencing work on the construction site.<br>» Ablution and waste removal facilities are in a good working order and do not pollute the environment due to mismanagement.<br>» All areas are rehabilitated promptly after construction in an area is complete.<br>» Excess vegetation clearing and levelling is not undertaken.<br>» No complaints regarding contractor behaviour or habits. |
| Monitoring | » Regular audits of the construction camps and areas of construction on site by the EO.<br>» Proof of disposal of sewage at an appropriate licensed wastewater treatment works.<br>» Proof of disposal of waste at an appropriate licensed waste disposal facility.<br>» An incident reporting system must be used to record non-conformances to the EMPr.<br>» Observation and supervision of Contractor practices throughout the construction phase by the EO.<br>» 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 | » Onsite substations |
| Potential Impact | » Vegetation clearance and associated impacts on faunal habitats.<br>» Traffic to and from site. |
| Activity/risk source | » Site preparation and earthworks.<br>» Foundations or plant equipment installation.<br>» Mobile construction equipment movement on site.<br>» Substation construction facilities. |

| Mitigation: Target/Objective | » To minimise footprints of habitat destruction.<br>» 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 and if encountered the ECO/ EO should be informed. | Developer<br>EPC Contractor | Duration of contract |
| 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 |
| The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments,<br>• Signs must be put up to enforce this | Project manager, Environmental Officer | Construction |
| The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna. | Project manager, Environmental Officer & Design Engineer | Construction Phase |
| 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. | Environmental Officer & Contractor, Engineer | Planning and Construction |

| Mitigation: Action/control | Responsibility | Timeframe |
|---|---|---|
| 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. | Project manager, Environmental Officer & Contractor | Construction |

| | |
|---|---|
| Performance Indicator | » No disturbance outside of designated work areas.<br>» Minimised clearing of existing/natural vegetation and habitats for fauna.<br>» Limited impacts on faunal species (i.e. noted/recorded fatalities), especially those of conservation concern. |
| Monitoring and Reporting | » Observation of vegetation clearing activities by the EO throughout construction phase.<br>» 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

1st Floor, Block 2, 5 Woodlands Drive Office Park
Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: joanne@savannahsa.com
Tel: +27 (11) 656 3237

# 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 Associated for Impact Assessment South Africa (IAIAsa): 5601
- Member of the South African Wind Energy Association (SAWEA)

## EMPLOYMENT

| Date | Company | Roles and Responsibilities |
|---|---|---|
| **January 2006 - Current:** | Savannah Environmental (Pty) Ltd | Director<br>Project manager<br>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 |
|---|---|---|
| Karoshoek CPV facility on site 2 as part of the larger Karoshoek Solar Valley Development East of Upington, Northern Cape | FG Emvelo | Project Manager & EAP |
| 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 Noupoort, Northern Cape | Fusion Energy | Project Manager & EAP |
| Amandel SEF near Thabazimbi, Limpopo | iNca Energy | Project Manager & EAP |
| Arola/Doornplaat SEF near Ventersdorp, North West | FRV & iNca Energy | Project Manager & EAP |
| Bloemfontein Airport PV Installation, Free State | The Power Company | Project Manager & EAP |
| Brakspruit SEF near Klerksorp, North West | FRV & iNca Energy | Project Manager & EAP |
| Carolus Poort SEF near Noupoort, Northern Cape | Fusion Energy | Project Manager & EAP |
| Damfontein SEF near Noupoort, Northern Cape | Fusion Energy | Project Manager & EAP |
| Everest SEF near Welkom, Free State | FRV & iNca Energy | Project Manager & EAP |
| Gillmer SEF near Noupoort, Northern Cape | Fusion Energy | Project Manager & EAP |
| Grootkop SEF near Allansridge, Free State | FRV & iNca Energy | Project Manager & EAP |
| Heuningspruit PV1 & PV 2 near Koppies, Free State | Cronimat | Project Manager & EAP |
| Kimberley Airport PV Installation, Northern Cape | The Power Company | Project Manager & EAP |
| Kolonnade Mall Rooftop PV Installation in Tshwane, Gauteng | Momentous Energy | Project Manager & EAP |
| Loskop SEF near Groblersdal, Limpopo | S&P Power Unit | Project Manager & EAP |
| Marble SEF near Marble Hall, Limpopo | S&P Power Unit | Project Manager & EAP |
| Morgenson PV1 SEF South-West of Windsorton, Northern Cape | Solar Reserve South Africa | Project Manager & EAP |
| OR Tambo Airport PV Installation, Gauteng | The Power Company | Project Manager & EAP |
| Oryx SEF near Virginia, Free State | FRV & iNca Energy | Project Manager & EAP |
| Rhino SEF near Vaalwater, Limpopo | S&P Power Unit | Project Manager & EAP |
| Rustmo2 PV Plant near Buffelspoort, North West | Momentous Energy | Project Manager & EAP |
| Spitskop SEF near Northam, Limpopo | FRV & iNca Energy | Project Manager & EAP |
| Steynsrus PV, Free State | Suncorp | Project Manager & EAP |
| Tabor SEF near Polokwane, Limpopo | FRV & iNca Energy | Project Manager & EAP |
| UpingtonAirport PV Installation, Northern Cape | The Power Company | Project Manager & EAP |
| Valeria SEF near Hartebeestpoort Dam, North West | Solar to Benefit Africa | Project Manager & EAP |
| Watershed SEF near Lichtenburg, North West | FRV & iNca Energy | Project Manager & EAP |
| Witkop SEF near Polokwane, Limpopo | FRV & iNca Energy | Project Manager & EAP |
| Woodmead Retail Park Rooftop PV Installation, Gauteng | Momentous Energy | Project Manager & EAP |

**Environmental Compliance, Auditing and ECO**

| Project Name & Location | Client Name | Role |
|---|---|---|
| ECO and bi-monthly auditing for the construction of the Adams Solar PV Project Two South of Hotazel, | 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 | Sublanary Trading | Project Manager |
| Quarterly compliance monitoring of compliance with all environmental licenses for the operation activities at the Kathu PV facility, Northern Cape | REISA | Project Manager |
| ECO for the construction of the Konkoonsies II PV SEF and associated infrastructure, Northern Cape | BioTherm Energy | Project Manager |
| ECO for the construction of the Aggeneys PV SEF and associated infrastructure, Northern Cape | BioTherm Energy | Project Manager |

**Compliance Advice and ESAP Reporting**

| Project Name & Location | Client Name | Role |
|---|---|---|
| Aggeneys Solar Farm, Northern Cape | BioTherm Energy | Environmental Advisor |
| Airies II PV Facility SW of Kenhardt, Northern Cape | BioTherm Energy | Environmental Advisor |
| Kalahari SEF Phase II in Kathu, Northern Cape | Engie | Environmental Advisor |
| Kathu PV Facility, Northern Cape | Building Energy | Environmental Advisor |
| Kenhardt PV Facility, Northern Cape | BioTherm Energy | Environmental Advisor |
| Kleinbegin PV SEF West of Groblershoop, Northern Cape | MedEnergy | Environmental Advisor |
| Konkoonises II SEF near Pofadder, Northern Cape | BioTherm Energy | Environmental Advisor |
| Konkoonsies Solar Farm, Northern Cape | BioTherm Energy | Environmental Advisor |
| Lephalale SEF, Limpopo | Exxaro | Environmental Advisor |
| Pixley ka Seme PV Park, South-East of De Aar, Northern Cape | African Clean Energy Developments (ACED) | Environmental Advisor |
| RustMo1 PV Plant near Buffelspoort, North West | Momentous Energy | Environmental Advisor |
| Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo | Building Energy | Environmental Advisor |
| Sirius PV Plants, Northern Cape | Aurora Power Solutions | Environmental Advisor |
| Upington Airport PV Power Project, Northern Cape | Sublunary Trading | Environmental Advisor |
| Upington SEF, Northern Cape | Abengoa Solar | Environmental Advisor |
| Ofir-ZX PV SEF near Keimoes, Northern Cape | Networx S28 Energy | Environmental Advisor |
| 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 Lephalale 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 Lephalale SEF, Limpopo | Exxaro Resources | Project Manager & EAP |
| Environmental Permitting for the Scuitdrift 1 SEF & Scuitdrift 2 SEF, Limpopo | Building Energy | Project Manager & EAP |
| Environmental Permitting for the Sirius PV Plant, Northern Cape | Aurora Power Solutions | Project Manager & EAP |
| Environmental Permitting for the Steynsrus PV1 & PV2 SEF's, Northern Cape | Cronimet Power Solutions | Project Manager & EAP |
| Environmental Permitting for the Heuningspruit PV SEF, Northern Cape | Cronimet Power Solutions | Project Manager & EAP |
| Permits for the Kleinbegin and UAP PV Plants, Northern Cape | MedEnergy Global | Project Manager & EAP |
| S53 Application for Arriesfontein Solar Park Phase 1 – 3 near Danielskuil, Northern Cape | Solar Reserve / SunCorp | Project Manager & EAP |
| S53 Application for Hertzogville PV1 & PV 2 SEFs, Free State | Solar Reserve / SunCorp | Project Manager & EAP |
| S53 Application for the Bloemfontein Airport PV Facility, Free State | Sublunary Trading | Project Manager & EAP |
| S53 Application for the Kimberley Airport PV Facility, Northern Cape | Sublunary Trading | Project Manager & EAP |
| S53 Application for the Project Blue SEF, Northern Cape | WWK Developments | Project Manager & EAP |
| S53 Application for the Upington Airport PV Facility, Free State | Sublunary Trading | Project Manager & EAP |
| WULA for the Kalahari SEF Phase II in Kathu, Northern Cape | Engie | Project Manager & EAP |

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

**Environmental Compliance, Auditing and ECO**

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

**Screening Studies**

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

**Compliance Advice and ESAP reporting**

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

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

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

**RENEWABLE POWER GENERATION PROJECTS: WIND ENERGY FACILITIES**

**Environmental Impact Assessments and Environmental Management Programmes**

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

## <u>CONVENTIONAL POWER GENERATION PROJECTS (COAL)</u>

**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 Lephalale, Limpopo | Exxaro Resources | Project Manager & EAP |

**Basic Assessments**

| Project Name & Location | Client Name | Role |
|---|---|---|
| Coal Stockyard on Medupi Ash Dump Site, Limpopo | Eskom Holdings | Project Manager & EAP |
| Biomass Co-Firing Demonstration Facility at Arnot Power Station East of Middleburg, Mpumlanaga | Eskom Holdings | Project Manager & EAP |

**Screening Studies**

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

**Environmental Compliance, Auditing and ECO**

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

**Compliance Advice**

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

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

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

## CONVENTIONAL POWER GENERATION PROJECTS (GAS)

**Environmental Impact Assessments and Environmental Management Programmes**

| Project Name & Location | Client Name | Role |
|---|---|---|
| Ankerlig OCGT to CCGT Conversion project &400 kV transmission power line between Ankerlig and the Omega Substation, Western Cape | Eskom Holdings SoC Limited | Project Manager & EAP |
| Gourikwa OCGT to CCGT Conversion project & 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 |
| Karoshoek Grid Integration project as part of the Karoshoek Solar Valley Development East of Upington, Northern Cape | FG Emvelo | Project Manager & EAP |
| Koeberg-Omega Transmission Power Lines,, Western Cape | Eskom Transmission | Project Manager & EAP |
| Koeberg-Stikland Transmission Power Lines, Western Cape | Eskom Transmission | Project Manager & EAP |
| Kyalami Strengthening Project, Gauteng | Eskom Transmission | Project Manager & EAP |
| Mokopane Integration Project, Limpopo | Eskom Transmission | Project Manager & EAP |
| Saldanha Bay Strengthening Project, Western Cape | Eskom Transmission | Project Manager & EAP |
| Steelpoort Integration Project, Limpopo | Eskom Transmission | Project Manager & EAP |
| Transmission Lines from the Koeberg-2 Nuclear Power Station site, Western Cape | Eskom Transmission | Project Manager & EAP |
| Tshwane Strengthening Project, Phase 1, Gauteng | Eskom Transmission | Project Manager & EAP |
| 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 |
| Karoshoek Grid Integration project as part of the Karoshoek 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, Westnern Cape | BioTherm Energy | Project Manager & EAP |
| Rheboksfontein WEF Powerline to the Aurora Substation, Western Cape | Moyeng Energy | Project Manager & EAP |
| Soetwater Switching Station near Sutherland, Northern Cape | African Clean Energy Developments (ACED) | Project Manager & EAP |
| Solis Power I Power Line & Switchyard Station near Upington, Northern Cape | Brightsource | Project Manager & EAP |
| Stormwater Canal System for the Ilanga CSP near Upington, Northern Cape | Karoshoek Solar One | Project Manager & EAP |
| Tsitsikamma Community WEF Powerline to the Diep River Substation, Eastern Cape | Eskom Holdings | Project Manager & EAP |
| 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 | Karoshoek Solar One | Project Manager |

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

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

**MINING SECTOR PROJECTS**

**Environmental Impact Assessments and Environmental Management Programmes**

| Project Name & Location | Client Name | Role |
|---|---|---|
| Elitheni Coal Mine near Indwe, Eastern Cape | Elitheni Coal | Project Manager & EAP |
| Groot Letaba River Development Project Borrow Pits | 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 | Seskoko Resources | Project Manager & EAP |
| Aluminium Plant WML & AEL, Gauteng | GfE-MIR Alloys & Minerals | Project Manager & EAP |

**Basic Assessments**

| Project Name & Location | Client Name | Role |
|---|---|---|
| Rare Earth Separation Plant in Vredendal, Western Cape | Rareco | Project Manager & EAP |
| Decommissioning and Demolition of Kilns 5 & 6 at the Slurry Plant, Kwa-Zulu Natal | PPC | Project Manager & EAP |

**Environmental Compliance, Auditing and ECO**

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

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

| Project Name & Location | Client Name | Role |
|---|---|---|
| Waste Licence Application for the Rare Earth Separation Plant in Vredendal, Western Cape | Rareco | Project Manager & EAP |

| | | |
|---|---|---|
| WULA for the Expansion of the Landfill site at Exxaro's Namakwa Sands Mineral Separation Plant, Western Cape | Exxaro Resources | Project Manager & EAP |
| S24G & WML for an Aluminium Plant, Gauteng | GfE-MIR Alloys & Minerals | Project Manager & EAP |

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

**Environmental Impact Assessments and Environmental Management Programmes**

| Project Name & Location | Client Name | Role |
|---|---|---|
| Bridge across the Ngotwane River, on the border of South Africa and Botswana | Eskom Holdings | Project Manager & EAP |
| Chemical Storage Tanks, Metallurgical Plant Upgrade & Backfill Plant upgrade at South Deep Gold Mine, near Westornaria, Gauteng | Goldfields | Project Manager & EAP |
| Expansion of the existing Welgedacht Water Care Works, Gauteng | ERWAT | Project Manager & EAP |
| Golden Valley WEF Access Road near Cookhouse, Eastern Cape | BioTherm Energy | Project Manager & EAP |
| Great Fish River Wind Farm Access Roads and Watercourse Crossings near Cookhouse, Eastern Cape | African Clean Energy Developments (ACED) | Project Manager & EAP |
| Ilanga CSP Facility Watercourse Crossings near Upington, Northern Cape | Karoshoek Solar one | Project Manager & EAP |
| Modification of the existing Hartebeestfontein Water Care Works, Gautng | ERWAT | Project Manager & EAP |
| N10 Road Realignment for the Ilanga CSP Facility, East of Upington, Northern Cape | SANRAL | Project Manager & EAP |
| Nxuba (Bedford) Wind Farm Watercourse Crossings near Cookhouse, Eastern Cape | African Clean Energy Developments (ACED) | Project Manager & EAP |
| Pollution Control Dams at the Medupi Power Station Ash Dump & Coal Stockyard, Limpopo | Eskom | Project Manager & EAP |
| Qoboshane borrow pits (EMPr only), Eastern Cape | Emalahleni Local Municipality | Project Manager & EAP |
| Tsitsikamma Community WEF Watercourse Crossings, Eastern Cape | Cennergi | Project Manager & EAP |
| Clayville Central Steam Plant, Gauteng | Bellmall Energy | Project Manager & EAP |
| Msenge Emoyeni Wind Farm Watercourse Crossings and Roads, Eastern Cape | Windlab | Project Manager & EAP |

**Basic Assessments**

| Project Name & Location | Client Name | Role |
|---|---|---|
| Harmony Gold WWTW at Doornkop Mine, Gauteng | Harmony Doornkop Plant | Project Manager & EAP |
| Ofir-ZX Watercourse Crossing for the Solar PV Facility, near Keimoes, Northern Cape | Networx S28 Energy | Project Manager & EAP |
| Qoboshane bridge & access roads, Eastern Cape | Emalahleni Local Municipality | Project Manager & EAP |
| Relocation of the Assay Laboratory near Carletonville, Gauteng | Sibanye Gold | Project Manager & EAP |
| Richards Bay Harbour Staging Area, KwaZulu-Natal | Eskom Holdings | Project Manager & EAP |
| S-Kol Watercourse Crossing for the Solar PV Facility, East of Keimoes, Northern Cape | Networx S28 Energy | Project Manager & EAP |
| Sonnenberg Watercourse Crossing for the Solar PV Facility, West Keimoes, Northern Cape | Networx S28 Energy | Project Manager & EAP |

| 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<br>Auditor |
| ECO for the Rehabilitation of the Blaaupan & Storm Water Channel, Gauteng | Airports Company of South Africa (ACSA) | Project Manager |
| Due Diligence reporting for the Better Fuel Pyrolysis Facility, Gauteng | Better Fuels | Project Manager |
| ECO for the Construction of the Water Pipeline from Kendal Power Station to Kendal Pump Station, Mpumalanga | Transnet | Project Manager |
| ECO for the Replacement of Low-Level Bridge, Demolition and Removal of Artificial Pong, and Reinforcement the Banks of the Crocodile River at the Construction at Walter Sisulu National Botanical Gardens, Gauteng Province | South African National Biodiversity Institute (SANBI) | Project Manager |
| External Compliance Audit of the Air Emission Licence (AEL) for a depot in Bloemfontein, Free State Province and in Tzaneen, Mpumalanga Province | PetroSA | Project Manager |

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

| Project Name & Location | Client Name | Role |
|---|---|---|
| WULA for the Izubulo Private Nature Reserve, Limpopo | Kjell Bismeyer, Jann Bader, Laurence Saad | Project Manager & EAP |
| WULA for the Masodini Private Game Lode, Limpopo | Masodini Private Game Lodge | Environmental Advisor |
| WULA for the Ezulwini Private Nature Reserve, Limpopo | Ezulwini Investments | Project Manager & EAP |
| WULA for the Masodini Private Game Lode, Limpopo | Masodini Private Game Lodge | Project Manager & EAP |
| WULA for the N10 Realignment at the Ilanga SEF, Northern Cape | Karoshoek Solar One | Project Manager & EAP |
| WULA for the Kruisvallei Hydroelectric Power Generation Scheme, Free State | Building Energy | Project Manager & EAP |

| Project Name & Location | Client Name | Role |
|---|---|---|
| S24G and WULA for the Ilegal construction of structures within a watercourse on EFF 24 Ruimsig Agricultural Holdings, Gauteng | Sorror Language Services | Project Manager & EAP |

**HOUSING AND URBAN PROJECTS**

**Basic Assessments**

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

**Compliance Advice and reporting**

| Project Name & Location | Client Name | Role |
|---|---|---|
| Kampi ya Thude at the Olifants West Game Reserve, Limpopo | Nick Elliot | Environmental Advisor |
| External Compliance Audit of WUL for the Johannesburg Country Club, Gauteng | Johannesburg Country Club | Project Manager |

**Environmental Compliance, Auditing and ECO**

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

**ENVIRONMENTAL MANAGEMENT TOOLS**

| Project Name & Location | Client Name | Role |
|---|---|---|
| Development of the 3rd Edition Environmental Implementation Plan (EIP) | Gauteng Department of Agriculture and Rural Development (GDARD) | Project Manager & EAP |
| Development of Provincial Guidelines on 4x4 routes, Western Cape | Western Cape Department of Environmental Affairs and Development Planning | EAP |
| Compilation of Construction and Operation EMP for the Braamhoek Transmission Integration Project, Kwazulu-Natal | Eskom Holdings | Project Manager & EAP |
| Compilation of EMP for the Wholesale Trade of Petroleum Products, Gauteng | Munaca Technologies | Project Manager & EAP |
| Operational Environmental Management Programme (OEMP) for Medupi Power Station, Limpopo | Eskom Holdings | Project Manager & EAP |
| Operational Environmental Management Programme (OEMP) for the Dube TradePort Site Wide Precinct | Dube TradePort Corporation | Project Manager & EAP |
| Operational Environmental Management Programme (OEMP) for the Kusile Power Station, Mpumalanga | Eskom Holdings | Project Manager & EAP |
| Review of Basic Assessment Process for the Wittekleibosch Wind Monitoring Mast, Eastern Cape | Exxaro Resources | Project Manager & EAP |
| Revision of the EMPr for the Sirius Solar PV | Aurora Power Solutions | Project Manager & EAP |

| 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 |

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Johannesburg, South Africa

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Tel: +27 (11) 656 3237

# CURRICULUM VITAE OF CHANTELLE 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 | *Junior Environmental Consultant*<br>Tasks include:<br>*Environmental Assessment Practitioner (EAP); Specialising in project-related GIS mapping.*<br>*Performing Basic Assessment Reports and Environmental Impact Assessments,*<br>*Assisting on administrative public participation documents.* |
| **September 2021 – November 2021** | Prescali Environmental (Pty) | *Environmental Intern*<br>Tasks included:<br>Liaising with senior management on environmental concerns,<br>Preparing Water Use Licence (WUL) audits,<br>Taking minutes during meetings,<br>Public Participation tasks. |

## 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* |
| *Ummbila 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*** |
|---|---|---|
| *Ummbila 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*** |
|---|---|---|
| *Ummbila 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*** |
|---|---|---|
| *Witberg WEF Access Road, Western Cape* | *Red Rocket South Africa (Pty) Ltd* | *Junior EAP and GIS Specialist* |

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Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: nicolene@savannahsa.com
Tel: +27 (11) 656 3237

# 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 | Public Participation and Social Consultant<br><br><u>*Tasks include:*</u><br><br>*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.*<br><br>*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.* |

| Date | Company | Roles and Responsibilities |
|---|---|---|
| **2016 – October 2018** | Imaginative Africa (Pty) Ltd<br><br>*(Director of Imaginative Africa)* | Independent Consultant<br><br>*Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements:*<br><br>*<u>Tasks include:</u>*<br><br>*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.*<br><br>*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*<br><br>*<u>Clients</u>:*<br><br>*SiVEST Environmental*<br>*Savannah Environmental*<br>*Baagi Environmental*<br>*Royal Haskoning DHV (previously SSI)* |
| **2013 - 2016** | Zitholele Consulting<br><br>*Contact person: Dr Mathys Vosloo*<br><br>*Contact number: 011 207 2060* | Senior Public Participation Practitioner and Project Manager<br><br><u>Tasks included:</u><br><br>*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<br><br>*(company owned by Nicolene Venter)* | Independent Consultant<br><br>Consulting to various Environmental Assessment Practitioners for Public Participation and Stakeholder Engagements<br><br><u>Tasks included:</u><br><br>*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.*<br><br>*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*<br><br>*<u>Clients</u>:*<br>*Bohlweki Environmental*<br>*Bembani Sustainability (Pty) Ltd*<br>*Naledzi Environmental* |
| **2007 – 2011** | SiVEST SA (Pty) Ltd<br><br>*Contact person: Andrea Gibb*<br><br>*Contact number: 011 798 0600* | Unit Manager: Public Participation Practitioner<br><br>*<u>Tasks included:</u>*<br><br>*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<br><br>*(company owned by Nicolene Venter)* | Independent Consultant<br><br>Public Participation and Stakeholder Engagement Practitioner<br><br>*<u>Tasks included:</u>*<br><br>*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.*<br><br>*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.*<br><br>*<u>Clients</u>:*<br><br>*Manyaka-Greyling-Meiring (previously Greyling Liaison and currently Golder Associates)* |
| **1997 - 2004** | Imaginative Africa (Pty) Ltd<br><br>*(company owned by Nicolene Venter)* | Independent Consultant: Public Participation Practitioner.<br><br>*<u>Tasks included:</u>*<br><br>*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.*<br><br>*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.*<br><br>*<u>Clients</u>:*<br><br>*Greyling Liaison (currently Golder Associates); Bembani Sustainability (Pty) Ltd; Lidwala Environmental; Naledzi Environmental* |

| **PROJECT EXPERIENCE** |
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**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<br>EAP: Savannah Environmental* | *Project Manage the Public Participation Process<br>Facilitate all meetings<br>Consultation with Government Officials, Key Stakeholders, Landowners & Community Leaders* |
| *Allepad PVs 4 PVs) & Power Lines (grid connection), Upington, Northern Cape Province* | *IL Energy<br>EAP: Savannah Environmental* | |
| *Hyperion Solar PV Developments (4 PVs) and Associated Infrastructures, Kathu, Northern Cape Province* | *Building Energy<br>EAP: Savannah Environmental* | |
| *Aggeneys Solar PV Developments (2 PVs) and Associated Infrastructures, Aggeneys, Northern Cape Province* | *Atlantic Energy Partners and ABO Wind<br>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* | |
| *Geelstert 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* | *BioTherm Energy<br>EAP: SiVEST* | *Public Participation, Landowner and Community Consultation* |
| *Sendawo PVs, including Substations & Power Lines, Vryburg, North West Province* | | |
| *Helena Solar 1, 2 and 3 PVs, Copperton, Northern Cape Province* | | |
| *Farm Spes Bona 23552 Solar PV Plants, Bloemfontein, Free State Province* | *Surya Power<br>EAP: SiVEST* | *Public Participation, Landowner and Community Consultation* |
| *De Aar Solar Energy Facility, De Aar, Northern Cape Province* | *South Africa Mainstream Renewable Power Developments<br>EAP: SiVEST* | *Public Participation, Landowner and Community Consultation* |
| *Droogfontein Solar Energy Facility, Kimberley, Northern Cape Province* | | |
| *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*<br>*EAP: SiVEST* | *Public Participation, Landowner and Community Consultation* |
| *19MW Solar Power Plant on Farm 198 (Slypklip), Danielskuil, Northern Cape Province* | *Solar Reserve South Africa*<br>*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*<br>*Facilitate all meetings*<br>*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, McTaggarts PV1, McTaggarts PV2, McTaggarts 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*<br>*EAP: SiVEST* | *Public Participation* |
| *Eureka Wind Farm, Copperton, Northern Cape Province* | | |
| *Loeriesfontein Wind Farm, Loeriesfontein, Northern Cape Province* | *South Africa Mainstream Renewable Power Developments*<br>*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*<br>*EAP: Savannah Environmental* | *Project Manage the Public Participation Process*<br>*Facilitate all meetings*<br>*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*<br>*EAP: Bohlweki Environmental* | *Project Manage the Public Participation Process*<br>*Facilitate all meetings*<br>*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*<br>*Facilitate all meetings*<br>*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*<br>*Facilitate all meetings*<br>*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*<br>*EAP: Baagi Environmental* | |
| *Thyspunt Transmission Lines Integration Project, Eastern Cape Province* | *Eskom Holdings*<br>*EAP: SiVEST* | *Public Participation, Landowner and Community Consultation* |
| *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*<br>*EAP: Bembani Environmental* | |
| *Melkhout-Kudu-Grassridge 132kV Power Line Project (project not submitted to DEA), Eastern Cape Province* | *Eskom Holdings*<br>*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*<br>*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<br>EAP: Baagi Environmental | Public Meetings |
| Mooidraai-Smitkloof 132kV Power Line and Substation, Northern Cape Province | Eskom Holdings<br>EAP: SSI | Focus Group Meetings |
| Aggeneis-Oranjemond 400kV Eskom Transmission Power Line, Northern Cape Province | Eskom Holdings<br>EAP: Savannah Environmental | Focus Group Meetings & Public Meetings |
| Ariadne-Eros 400kV/132kV Multi-Circuit Transmission Power Line (Public Meetings) | Eskom Holdings<br>EAP: ACER Africa | Public Meetings |
| Majuba-Venus 765kV Transmission Power Lines, Mpumlanaga Province | | |
| Thabametsi IPP Power Station, Limpopo Province | Thabametsi Power Company<br>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<br>EAP: SiVEST* | *Social Assessment* |

## ASH DISPOSAL FACILITIES

### *Environmental Impact Assessments and Environmental Management Programmes*

<table>
<tr><th>Project Name & Location</th><th>Client Name</th><th>Role</th></tr>
<tr><td>Medupi Flue Gas Desulphurisation Project (up to completion of Scoping Phase), Limpopo Province</td><td rowspan="4">Eskom Holdings SOC Ltd<br>EAP: Zitholele Consulting</td><td rowspan="7">Public Participation, Landowner and Community Consultation</td></tr>
<tr><td>Kendal 30-year Ash Disposal Facility, Mpumalanga Province</td></tr>
<tr><td>Kusile 60-year Ash Disposal Facility, Mpumalanga Province</td></tr>
<tr><td>Camden Power Station Ash Disposal Facility, Mpumalanga Province</td></tr>
<tr><td>Tutuka Fabric Filter Retrofit and Dust Handling Plant Projects, Mpumalanga Province</td><td rowspan="3">Eskom Holdings SOC Ltd<br>EAP: Lidwala Environmental</td></tr>
<tr><td>Eskom’s Majuba and Tutuka Ash Dump Expansion, Mpumalanga Province</td></tr>
<tr><td>Hendrina Ash Dam Expansion, Mpumalanga Province</td></tr>
</table>

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

### *Basic Assessments*

<table>
<tr><th>Project Name & Location</th><th>Client Name</th><th>Role</th></tr>
<tr><td>Expansion of LOX and Diesel Storage at the Air Products Facility in Coega, Eastern Cape</td><td>Air Products South Africa (Pty) Ltd</td><td rowspan="2">Project Manage the Public Participation Process<br>Facilitate all meetings<br>Consultation with Government Officials, Key Stakeholders & Landowners</td></tr>
<tr><td>Transnet’s New Multi-Products Pipeline traversing Kwa-Zulu Natal, Free State and Gauteng Provinces</td><td>Transnet<br>EAP: Bohlweki Environmental</td></tr>
<tr><td>Realignment of the Bulshoek Dam Weir near Klawer and the Doring River Weir near Clanwilliam, Western Cape Province</td><td>Dept of Water and Sanitation<br>EAP: Zitholele</td><td>Public Participation</td></tr>
</table>

## 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 Golder Associates* | *Secretarial Services* |
| *Orange River Bulk Water Supply System* | | *Secretarial Services* |
| *Levuvu-Letaba Resources Quality Objectives* | | *Secretarial Services* |
| *SmancorCR Chemical Plant (Public Meeting), Gauteng Province* | *Samancor Chrome (Pty) Ltd EAP: Environment al Science Associates* | *Public Meeting* |
| *SANRAL N4 Toll Highway Project (2nd 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:*<br>*I&AP Notification process* |
| *Mulilo 10MW PV Facility, De Aar, Northern Cape* | *Mulilo (Pty) Ltd* | |
| *Karoshoek CSP 1 Facility/ Solar One, Upington, Northern Cape* | *Karoshoek 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:** Ummbila Emoyeni

**Project title:** Solar & Wind

**Date screening report generated:** 10/03/2022 13:41:31

**Applicant:** Emoyeni Renewable Energy Farm (Pty) Ltd

**Compiler:** Savannah Environmental

**Compiler signature:** ..........................................................................................................

**Application Category:** Utilities Infrastructure|Electricity|Generation|Renewable|Wind

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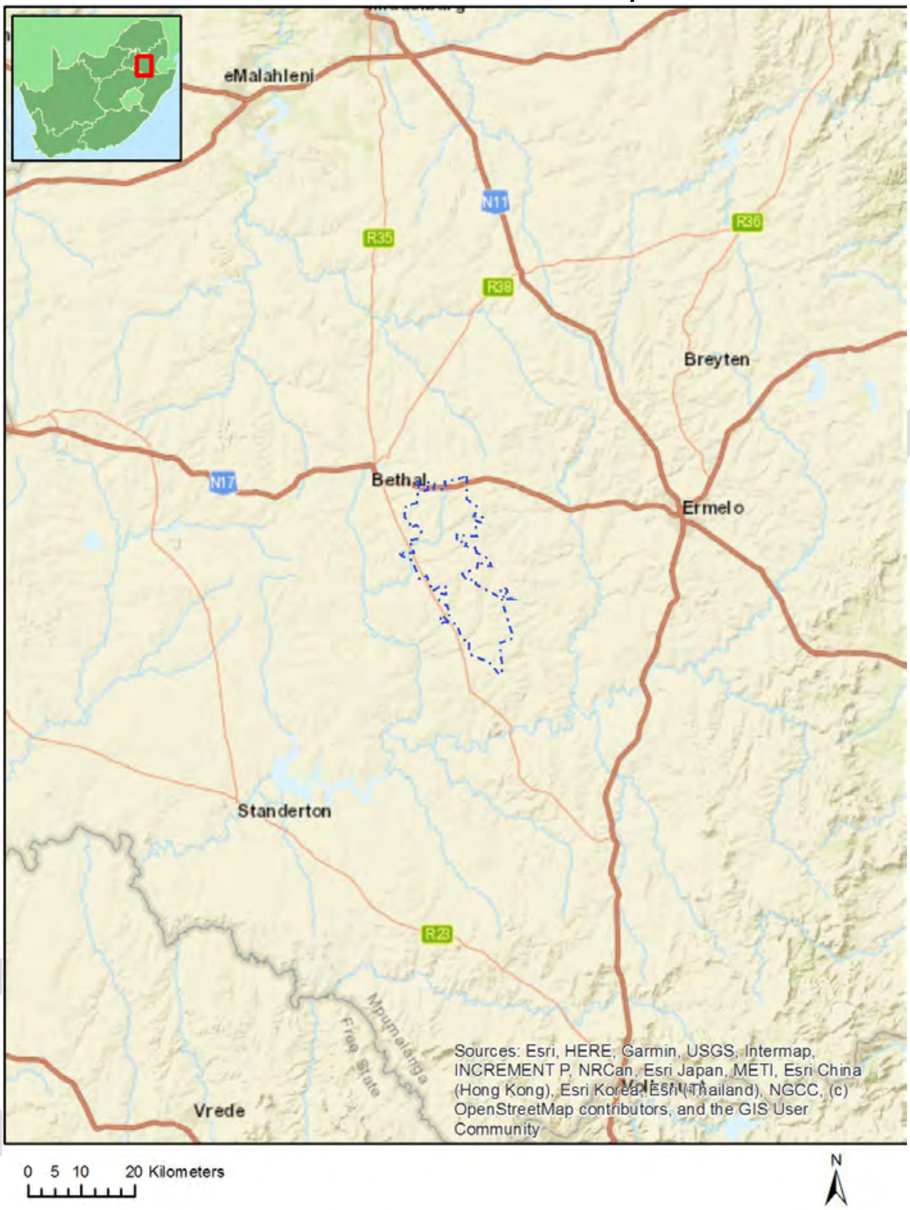
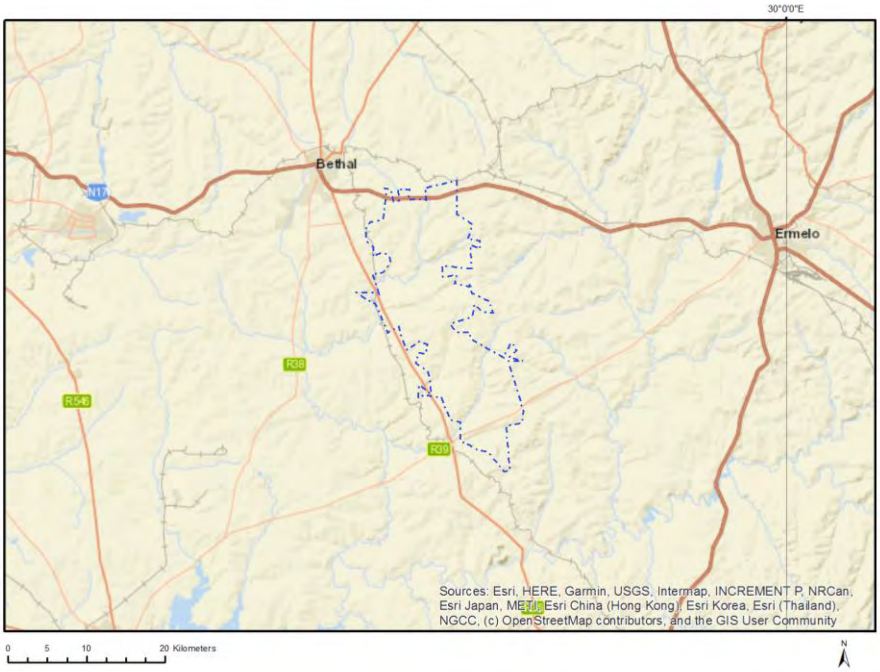
# Proposed Project Location

## Orientation map 1: General location

**General Orientation: Ummbila Emoyeni**



## 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 | BRAKFONTEIN | 452 | 0 | 26°40'23S | 29°42'48.62E | Farm |
| 2 | BRAKFONTEIN SETTLEMENT | 268 | 0 | 26°30'13.97S | 29°39'1.92E | Farm |
| 3 | DURABEL | 548 | 0 | 26°34'17.12S | 29°33'50.27E | Farm |
| 4 | RIETFONTEIN | 420 | 0 | 26°31'55.89S | 29°31'35.24E | Farm |
| 5 | TWEEFONTEIN | 467 | 0 | 26°44'28.81S | 29°39'15.89E | Farm |
| 6 | KLIPFONTEIN | 422 | 0 | 26°35'50.07S | 29°36'4.08E | Farm |
| 7 | NAUDESFONTEIN | 261 | 0 | 26°28'28.25S | 29°31'41.69E | Farm |
| 8 | GELUKSPLAATS | 264 | 0 | 26°29'51.68S | 29°35'42.7E | Farm |
| 9 | SUKKELAAR | 421 | 0 | 26°34'47.76S | 29°31'25.64E | Farm |
| 10 | EBENHEAZER | 455 | 0 | 26°38'56.57S | 29°39'17.4E | Farm |
| 11 | KLIPKRAAL | 469 | 0 | 26°42'18.67S | 29°42'52.44E | Farm |
| 12 | BEKKERSPRUIT | 423 | 0 | 26°32'58.95S | 29°36'18.51E | Farm |
| 13 | ROODEKRANS | 457 | 0 | 26°41'27.59S | 29°35'40.12E | Farm |
| 14 | SPRINGBOKFONTEIN | 425 | 0 | 26°34'4.51S | 29°40'25.01E | Farm |
| 15 | OSHOEK | 454 | 0 | 26°36'52.84S | 29°40'32.54E | Farm |
| 16 | VAALBANK | 456 | 0 | 26°41'19.21S | 29°39'17.6E | Farm |
| 17 | GOEDEGEDACHT | 458 | 0 | 26°38'30.67S | 29°35'37.06E | Farm |
| 18 | ZEVENFONTEIN | 468 | 0 | 26°43'25.32S | 29°43'1.75E | Farm |
| 19 | GELUKSPLAATS | 264 | 4 | 26°28'23.7S | 29°37'4.57E | Farm Portion |
| 20 | GELUKSPLAATS | 264 | 7 | 26°28'21.04S | 29°34'38.11E | Farm Portion |
| 21 | NAUDESFONTEIN | 261 | 7 | 26°28'42.44S | 29°31'44.38E | Farm Portion |
| 22 | NAUDESFONTEIN | 261 | 70 | 26°28'57.93S | 29°33'14.4E | Farm Portion |
| 23 | GELUKSPLAATS | 264 | 12 | 26°29'29.66S | 29°34'46.92E | Farm Portion |
| 24 | GELUKSPLAATS | 264 | 11 | 26°31'22.36S | 29°34'28.68E | Farm Portion |
| 25 | NAUDESFONTEIN | 261 | 24 | 26°29'52.28S | 29°32'6.39E | Farm Portion |
| 26 | GELUKSPLAATS | 264 | 6 | 26°31'35.1S | 29°36'36.13E | Farm Portion |

| | | | | | | |
|---|---|---|---|---|---|---|
| 27 | GELUKSPLAATS | 264 | 3 | 26°28'28.37S | 29°35'49.83E | Farm Portion |
| 28 | GELUKSPLAATS | 264 | 15 | 26°28'55.57S | 29°35'34.86E | Farm Portion |
| 29 | BRAKFONTEIN SETTLEMENT | 268 | 10 | 26°31'20.55S | 29°38'0.6E | Farm Portion |
| 30 | NAUDESFONTEIN | 261 | 15 | 26°29'5.71S | 29°32'44.01E | Farm Portion |
| 31 | NAUDESFONTEIN | 261 | 1 | 26°28'44.5S | 29°33'15.16E | Farm Portion |
| 32 | NAUDESFONTEIN | 261 | 25 | 26°29'57.67S | 29°31'35E | Farm Portion |
| 33 | NAUDESFONTEIN | 261 | 71 | 26°28'57.38S | 29°33'44.29E | Farm Portion |
| 34 | GELUKSPLAATS | 264 | 0 | 26°30'22.25S | 29°34'23.29E | Farm Portion |
| 35 | GELUKSPLAATS | 264 | 2 | 26°28'42.51S | 29°34'35.29E | Farm Portion |
| 36 | GELUKSPLAATS | 264 | 9 | 26°31'0.2S | 29°36'40.36E | Farm Portion |
| 37 | GELUKSPLAATS | 264 | 13 | 26°28'56.37S | 29°34'23.3E | Farm Portion |
| 38 | BRAKFONTEIN SETTLEMENT | 268 | 7 | 26°30'38.07S | 29°38'14.25E | Farm Portion |
| 39 | NAUDESFONTEIN | 261 | 14 | 26°30'1.21S | 29°33'1.95E | Farm Portion |
| 40 | GELUKSPLAATS | 264 | 10 | 26°31'33.85S | 29°35'40.69E | Farm Portion |
| 41 | GELUKSPLAATS | 264 | 17 | 26°28'52.28S | 29°36'19.91E | Farm Portion |
| 42 | BRAKFONTEIN SETTLEMENT | 268 | 11 | 26°31'21.86S | 29°37'29.81E | Farm Portion |
| 43 | NAUDESFONTEIN | 261 | 21 | 26°29'7.08S | 29°33'32.19E | Farm Portion |
| 44 | GELUKSPLAATS | 264 | 5 | 26°29'32.36S | 29°36'32.77E | Farm Portion |
| 45 | RIETFONTEIN | 420 | 9 | 26°32'30.21S | 29°33'11.21E | Farm Portion |
| 46 | RIETFONTEIN | 420 | 11 | 26°30'39.26S | 29°33'5.51E | Farm Portion |
| 47 | NAUDESFONTEIN | 261 | 34 | 26°27'34.71S | 29°33'11.93E | Farm Portion |
| 48 | NAUDESFONTEIN | 261 | 69 | 26°28'56.54S | 29°32'41.71E | Farm Portion |
| 49 | GELUKSPLAATS | 264 | 18 | 26°28'38.74S | 29°37'3.19E | Farm Portion |
| 50 | BRAKFONTEIN SETTLEMENT | 268 | 12 | 26°31'41.12S | 29°38'40.65E | Farm Portion |
| 51 | SUKKELAAR | 421 | 24 | 26°35'0.53S | 29°30'44.54E | Farm Portion |
| 52 | RIETFONTEIN | 420 | 13 | 26°30'41.78S | 29°30'32.56E | Farm Portion |
| 53 | RIETFONTEIN | 420 | 10 | 26°31'34.16S | 29°32'58.91E | Farm Portion |
| 54 | SUKKELAAR | 421 | 38 | 26°36'4.66S | 29°33'15.25E | Farm Portion |
| 55 | SUKKELAAR | 421 | 45 | 26°34'31.73S | 29°31'56.39E | Farm Portion |
| 56 | RIETFONTEIN | 420 | 23 | 26°31'13.99S | 29°31'10.84E | Farm Portion |
| 57 | RIETFONTEIN | 420 | 32 | 26°31'59.22S | 29°33'5.2E | Farm Portion |
| 58 | RIETFONTEIN | 420 | 22 | 26°30'51.05S | 29°31'18.5E | Farm Portion |
| 59 | SUKKELAAR | 421 | 22 | 26°34'42.86S | 29°30'46.33E | Farm Portion |
| 60 | SUKKELAAR | 421 | 25 | 26°34'58.91S | 29°31'29.77E | Farm Portion |
| 61 | SUKKELAAR | 421 | 7 | 26°35'26.99S | 29°33'4.21E | Farm Portion |
| 62 | SUKKELAAR | 421 | 12 | 26°36'40.98S | 29°32'58.69E | Farm Portion |
| 63 | SUKKELAAR | 421 | 56 | 26°34'48.8S | 29°31'56.81E | Farm Portion |
| 64 | KLIPFONTEIN | 422 | 20 | 26°35'16.03S | 29°36'35.27E | Farm Portion |
| 65 | BRAKFONTEIN SETTLEMENT | 268 | 5 | 26°29'52.86S | 29°37'53.54E | Farm Portion |
| 66 | BRAKFONTEIN SETTLEMENT | 268 | 6 | 26°30'32.09S | 29°37'40.2E | Farm Portion |
| 67 | SUKKELAAR | 421 | 39 | 26°33'46.73S | 29°32'5.32E | Farm Portion |
| 68 | SUKKELAAR | 421 | 40 | 26°33'54.76S | 29°33'3.46E | Farm Portion |
| 69 | SUKKELAAR | 421 | 52 | 26°36'31.52S | 29°32'46.78E | Farm Portion |
| 70 | SUKKELAAR | 421 | 10 | 26°36'7.66S | 29°32'14.66E | Farm Portion |
| 71 | NAUDESFONTEIN | 261 | 5 | 26°27'34.97S | 29°31'40.97E | Farm Portion |
| 72 | GELUKSPLAATS | 264 | 8 | 26°30'34.81S | 29°35'48.76E | Farm Portion |
| 73 | GELUKSPLAATS | 264 | 14 | 26°28'56.09S | 29°35'13.34E | Farm Portion |
| 74 | GELUKSPLAATS | 264 | 16 | 26°28'54.67S | 29°35'43.65E | Farm Portion |
| 75 | RIETFONTEIN | 420 | 19 | 26°31'7.09S | 29°33'23.96E | Farm Portion |
| 76 | RIETFONTEIN | 420 | 0 | 26°32'20.55S | 29°29'37.04E | Farm Portion |
| 77 | SUKKELAAR | 421 | 12 | 26°36'58.65S | 29°32'43.4E | Farm Portion |
| 78 | SUKKELAAR | 421 | 37 | 26°36'43.21S | 29°33'9.93E | Farm Portion |
| 79 | SUKKELAAR | 421 | 50 | 26°36'45.86S | 29°32'55.66E | Farm Portion |
| 80 | SUKKELAAR | 421 | 42 | 26°35'5.49S | 29°32'2E | Farm Portion |

| | | | | | | |
|---|---|---|---|---|---|---|
| 81 | SUKKELAAR | 421 | 55 | 26°35'4.05S | 29°32'3.58E | Farm Portion |
| 82 | KLIPFONTEIN | 422 | 18 | 26°35'22.84S | 29°33'49.72E | Farm Portion |
| 83 | KLIPFONTEIN | 422 | 4 | 26°36'23.05S | 29°37'45.67E | Farm Portion |
| 84 | KLIPFONTEIN | 422 | 6 | 26°35'18.42S | 29°37'31.15E | Farm Portion |
| 85 | KLIPFONTEIN | 422 | 0 | 26°37'11.82S | 29°37'30.27E | Farm Portion |
| 86 | BEKKERSPRUIT | 423 | 2 | 26°32'24.08S | 29°38'2.2E | Farm Portion |
| 87 | BEKKERSPRUIT | 423 | 6 | 26°33'20.57S | 29°35'51.56E | Farm Portion |
| 88 | BEKKERSPRUIT | 423 | 8 | 26°33'30.96S | 29°37'36.68E | Farm Portion |
| 89 | RIETFONTEIN | 420 | 12 | 26°30'46.46S | 29°32'3.3E | Farm Portion |
| 90 | RIETFONTEIN | 420 | 8 | 26°33'17.93S | 29°33'19.13E | Farm Portion |
| 91 | SUKKELAAR | 421 | 6 | 26°35'24.4S | 29°31'5.57E | Farm Portion |
| 92 | SUKKELAAR | 421 | 11 | 26°36'26.75S | 29°32'24.67E | Farm Portion |
| 93 | SUKKELAAR | 421 | 9 | 26°35'28.8S | 29°32'26.43E | Farm Portion |
| 94 | KLIPFONTEIN | 422 | 8 | 26°35'39.4S | 29°36'34.75E | Farm Portion |
| 95 | KLIPFONTEIN | 422 | 17 | 26°34'38.67S | 29°35'13.88E | Farm Portion |
| 96 | BEKKERSPRUIT | 423 | 10 | 26°34'24.98S | 29°37'43.46E | Farm Portion |
| 97 | BEKKERSPRUIT | 423 | 16 | 26°33'18.26S | 29°38'3.73E | Farm Portion |
| 98 | RIETFONTEIN | 420 | 15 | 26°32'17.47S | 29°31'57.86E | Farm Portion |
| 99 | SUKKELAAR | 421 | 23 | 26°34'43.01S | 29°31'27.69E | Farm Portion |
| 100 | SUKKELAAR | 421 | 43 | 26°34'51.88S | 29°31'53.66E | Farm Portion |
| 101 | SUKKELAAR | 421 | 34 | 26°34'49.67S | 29°33'25.94E | Farm Portion |
| 102 | SUKKELAAR | 421 | 35 | 26°35'6.95S | 29°32'36.36E | Farm Portion |
| 103 | SUKKELAAR | 421 | 49 | 26°37'1.72S | 29°33'4.67E | Farm Portion |
| 104 | SUKKELAAR | 421 | 42 | 26°34'38.41S | 29°32'35.57E | Farm Portion |
| 105 | KLIPFONTEIN | 422 | 12 | 26°37'5.2S | 29°36'32.14E | Farm Portion |
| 106 | KLIPFONTEIN | 422 | 10 | 26°36'15.95S | 29°37'39.49E | Farm Portion |
| 107 | KLIPFONTEIN | 422 | 21 | 26°35'40.01S | 29°34'9.35E | Farm Portion |
| 108 | BEKKERSPRUIT | 423 | 15 | 26°32'21.3S | 29°37'18.48E | Farm Portion |
| 109 | BEKKERSPRUIT | 423 | 25 | 26°33'47.79S | 29°35'16.1E | Farm Portion |
| 110 | SUKKELAAR | 421 | 9 | 26°35'34.9S | 29°32'1.45E | Farm Portion |
| 111 | SUKKELAAR | 421 | 54 | 26°35'28.43S | 29°32'14.04E | Farm Portion |
| 112 | SUKKELAAR | 421 | 2 | 26°34'13.99S | 29°32'32.82E | Farm Portion |
| 113 | SUKKELAAR | 421 | 2 | 26°34'54.36S | 29°31'57.57E | Farm Portion |
| 114 | KLIPFONTEIN | 422 | 9 | 26°36'16.04S | 29°36'22.13E | Farm Portion |
| 115 | KLIPFONTEIN | 422 | 14 | 26°35'2.08S | 29°35'49.9E | Farm Portion |
| 116 | KLIPFONTEIN | 422 | 5 | 26°34'39.45S | 29°36'49.12E | Farm Portion |
| 117 | BEKKERSPRUIT | 423 | 17 | 26°34'28.4S | 29°38'20.01E | Farm Portion |
| 118 | BEKKERSPRUIT | 423 | 0 | 26°32'5.42S | 29°34'29.56E | Farm Portion |
| 119 | SPRINGBOKFONTEIN | 425 | 4 | 26°34'26.93S | 29°39'3.01E | Farm Portion |
| 120 | BRAKFONTEIN | 452 | 4 | 26°39'22.43S | 29°42'21.52E | Farm Portion |
| 121 | EBENHEAZER | 455 | 3 | 26°39'20.07S | 29°40'19.11E | Farm Portion |
| 122 | SUKKELAAR | 421 | 10 | 26°36'0.2S | 29°32'44.12E | Farm Portion |
| 123 | SUKKELAAR | 421 | 53 | 26°36'6.71S | 29°32'33.2E | Farm Portion |
| 124 | SUKKELAAR | 421 | 4 | 26°35'38.65S | 29°31'31.06E | Farm Portion |
| 125 | KLIPFONTEIN | 422 | 7 | 26°35'24.89S | 29°38'9.22E | Farm Portion |
| 126 | KLIPFONTEIN | 422 | 11 | 26°36'50.89S | 29°37'53.13E | Farm Portion |
| 127 | KLIPFONTEIN | 422 | 23 | 26°34'51.83S | 29°34'35.14E | Farm Portion |
| 128 | BEKKERSPRUIT | 423 | 19 | 26°34'2.6S | 29°36'10.5E | Farm Portion |
| 129 | BEKKERSPRUIT | 423 | 24 | 26°32'29.77S | 29°35'33.17E | Farm Portion |
| 130 | OSHOEK | 454 | 18 | 26°38'10.02S | 29°41'12.92E | Farm Portion |
| 131 | OSHOEK | 454 | 21 | 26°37'27.1S | 29°38'39.72E | Farm Portion |
| 132 | VAALBANK | 456 | 7 | 26°42'25.88S | 29°40'8.14E | Farm Portion |
| 133 | ROODEKRANS | 457 | 0 | 26°42'43.69S | 29°34'37.4E | Farm Portion |
| 134 | KLIPFONTEIN | 422 | 22 | 26°36'2.02S | 29°34'14.51E | Farm Portion |
| 135 | KLIPFONTEIN | 422 | 3 | 26°36'51.16S | 29°34'56.35E | Farm Portion |
| 136 | BEKKERSPRUIT | 423 | 1 | 26°33'5.24S | 29°34'36.67E | Farm Portion |
| 137 | BEKKERSPRUIT | 423 | 7 | 26°33'16.7S | 29°36'50.56E | Farm Portion |
| 138 | BEKKERSPRUIT | 423 | 11 | 26°34'8.81S | 29°36'58.28E | Farm Portion |
| 139 | BEKKERSPRUIT | 423 | 14 | 26°32'31.28S | 29°36'42.36E | Farm Portion |
| 140 | BEKKERSPRUIT | 423 | 23 | 26°32'1.83S | 29°35'24.89E | Farm Portion |

| | | | | | | |
|---|---|---|---|---|---|---|
| 141 | OSHOEK | 454 | 13 | 26°35'15.12S | 29°39'2.33E | Farm Portion |
| 142 | VAALBANK | 456 | 4 | 26°41'42.4S | 29°38'46.35E | Farm Portion |
| 143 | ROODEKRANS | 457 | 21 | 26°40'15.23S | 29°35'18.67E | Farm Portion |
| 144 | GOEDEGEDACHT | 458 | 14 | 26°39'32.96S | 29°35'53.11E | Farm Portion |
| 145 | GOEDEGEDACHT | 458 | 15 | 26°37'22.17S | 29°34'4.65E | Farm Portion |
| 146 | GOEDEGEDACHT | 458 | 37 | 26°39'19.68S | 29°34'59.69E | Farm Portion |
| 147 | GOEDEGEDACHT | 458 | 13 | 26°39'15.08S | 29°36'2.42E | Farm Portion |
| 148 | BEKKERSPRUIT | 423 | 4 | 26°32'24.66S | 29°36'4.51E | Farm Portion |
| 149 | OSHOEK | 454 | 7 | 26°37'37.77S | 29°40'27.45E | Farm Portion |
| 150 | VAALBANK | 456 | 1 | 26°40'9.59S | 29°39'45.98E | Farm Portion |
| 151 | VAALBANK | 456 | 2 | 26°40'40.32S | 29°40'27.02E | Farm Portion |
| 152 | VAALBANK | 456 | 19 | 26°42'6.86S | 29°40'39.98E | Farm Portion |
| 153 | ROODEKRANS | 457 | 4 | 26°42'37.32S | 29°36'59.48E | Farm Portion |
| 154 | ROODEKRANS | 457 | 21 | 26°40'24.92S | 29°34'55.77E | Farm Portion |
| 155 | GOEDEGEDACHT | 458 | 12 | 26°39'0.54S | 29°36'5.25E | Farm Portion |
| 156 | GOEDEGEDACHT | 458 | 16 | 26°37'40.59S | 29°36'19.96E | Farm Portion |
| 157 | GOEDEGEDACHT | 458 | 28 | 26°37'56S | 29°35'51.44E | Farm Portion |
| 158 | KLIPFONTEIN | 422 | 2 | 26°33'55.29S | 29°34'25.37E | Farm Portion |
| 159 | KLIPFONTEIN | 422 | 16 | 26°36'58.21S | 29°35'55.58E | Farm Portion |
| 160 | BEKKERSPRUIT | 423 | 20 | 26°33'47S | 29°36'52.99E | Farm Portion |
| 161 | BEKKERSPRUIT | 423 | 5 | 26°33'34.49S | 29°34'23.36E | Farm Portion |
| 162 | SPRINGBOKFONTEIN | 425 | 9 | 26°32'55.45S | 29°38'44.41E | Farm Portion |
| 163 | VAALBANK | 456 | 18 | 26°42'41.33S | 29°39'17.84E | Farm Portion |
| 164 | VAALBANK | 456 | 15 | 26°42'3.71S | 29°38'17.3E | Farm Portion |
| 165 | ROODEKRANS | 457 | 7 | 26°41'0.22S | 29°34'52.35E | Farm Portion |
| 166 | ROODEKRANS | 457 | 32 | 26°41'8.74S | 29°35'41.33E | Farm Portion |
| 167 | BRAKFONTEIN | 452 | 2 | 26°40'41.88S | 29°41'40.65E | Farm Portion |
| 168 | EBENHEAZER | 455 | 0 | 26°38'25.6S | 29°38'56.67E | Farm Portion |
| 169 | VAALBANK | 456 | 17 | 26°42'35.27S | 29°40'46.23E | Farm Portion |
| 170 | VAALBANK | 456 | 5 | 26°41'39.63S | 29°39'23.64E | Farm Portion |
| 171 | ROODEKRANS | 457 | 23 | 26°40'57.15S | 29°35'30.54E | Farm Portion |
| 172 | GOEDEGEDACHT | 458 | 22 | 26°37'50.27S | 29°34'17.2E | Farm Portion |
| 173 | GOEDEGEDACHT | 458 | 19 | 26°37'32.33S | 29°34'50E | Farm Portion |
| 174 | GOEDEGEDACHT | 458 | 8 | 26°38'8.31S | 29°37'8.93E | Farm Portion |
| 175 | GOEDEGEDACHT | 458 | 40 | 26°39'48.06S | 29°35'6.61E | Farm Portion |
| 176 | GOEDEGEDACHT | 458 | 33 | 26°37'33.09S | 29°35'32E | Farm Portion |
| 177 | GOEDEGEDACHT | 458 | 38 | 26°39'37.13S | 29°35'3.13E | Farm Portion |
| 178 | GOEDEGEDACHT | 458 | 11 | 26°39'28.38S | 29°36'58.83E | Farm Portion |
| 179 | GOEDEGEDACHT | 458 | 25 | 26°38'52.64S | 29°35'2.52E | Farm Portion |
| 180 | GOEDEGEDACHT | 458 | 10 | 26°39'6.53S | 29°36'57.58E | Farm Portion |
| 181 | TWEEFONTEIN | 467 | 2 | 26°45'19.67S | 29°39'47.8E | Farm Portion |
| 182 | TWEEFONTEIN | 467 | 9 | 26°45'3.9S | 29°37'58.12E | Farm Portion |
| 183 | TWEEFONTEIN | 467 | 0 | 26°43'32.5S | 29°38'15.31E | Farm Portion |
| 184 | RIETFONTEIN | 420 | 16 | 26°31'21.75S | 29°31'47.56E | Farm Portion |
| 185 | RIETFONTEIN | 420 | 18 | 26°31'46S | 29°31'47.28E | Farm Portion |
| 186 | SUKKELAAR | 421 | 8 | 26°34'29.33S | 29°31'54.11E | Farm Portion |
| 187 | SUKKELAAR | 421 | 36 | 26°35'24.37S | 29°33'30.94E | Farm Portion |
| 188 | SUKKELAAR | 421 | 51 | 26°36'24.68S | 29°32'43.5E | Farm Portion |
| 189 | SUKKELAAR | 421 | 11 | 26°36'22.26S | 29°32'52.22E | Farm Portion |
| 190 | KLIPFONTEIN | 422 | 13 | 26°36'20.97S | 29°34'43.89E | Farm Portion |
| 191 | KLIPFONTEIN | 422 | 19 | 26°35'1.93S | 29°36'43.73E | Farm Portion |
| 192 | BEKKERSPRUIT | 423 | 9 | 26°34'0.55S | 29°37'47.36E | Farm Portion |
| 193 | BEKKERSPRUIT | 423 | 13 | 26°31'48.98S | 29°35'30.69E | Farm Portion |
| 194 | GOEDEGEDACHT | 458 | 32 | 26°38'43.43S | 29°37'3.16E | Farm Portion |
| 195 | GOEDEGEDACHT | 458 | 18 | 26°38'9.56S | 29°35'24.26E | Farm Portion |
| 196 | GOEDEGEDACHT | 458 | 35 | 26°37'33.52S | 29°35'8.06E | Farm Portion |
| 197 | GOEDEGEDACHT | 458 | 34 | 26°37'31.86S | 29°35'22.04E | Farm Portion |
| 198 | GOEDEGEDACHT | 458 | 39 | 26°39'27.8S | 29°35'0.52E | Farm Portion |
| 199 | GOEDEGEDACHT | 458 | 4 | 26°37'17.27S | 29°33'36.2E | Farm Portion |
| 200 | BEKKERSPRUIT | 423 | 22 | 26°32'32.52S | 29°34'24.09E | Farm Portion |

| | | | | | | |
|---|---|---|---|---|---|---|
| 201 | OSHOEK | 454 | 12 | 26°35'30.34S | 29°40'5.42E | Farm Portion |
| 202 | OSHOEK | 454 | 1 | 26°36'31.5S | 29°39'7.13E | Farm Portion |
| 203 | EBENHEAZER | 455 | 1 | 26°39'22.42S | 29°38'31.26E | Farm Portion |
| 204 | ROODEKRANS | 457 | 1 | 26°40'17.73S | 29°36'28.15E | Farm Portion |
| 205 | ROODEKRANS | 457 | 22 | 26°41'7.04S | 29°36'37.14E | Farm Portion |
| 206 | ROODEKRANS | 457 | 23 | 26°40'48.38S | 29°35'58.31E | Farm Portion |
| 207 | GOEDEGEDACHT | 458 | 21 | 26°37'25.75S | 29°34'29.08E | Farm Portion |
| 208 | GOEDEGEDACHT | 458 | 27 | 26°37'30.54S | 29°35'51.57E | Farm Portion |
| 209 | GOEDEGEDACHT | 458 | 31 | 26°38'27.68S | 29°36'23.19E | Farm Portion |
| 210 | TWEEFONTEIN | 467 | 4 | 26°45'10.04S | 29°40'27.7E | Farm Portion |
| 211 | TWEEFONTEIN | 467 | 7 | 26°44'17.94S | 29°39'15.01E | Farm Portion |
| 212 | EBENHEAZER | 455 | 2 | 26°38'42.91S | 29°40'29.85E | Farm Portion |
| 213 | VAALBANK | 456 | 8 | 26°41'43.22S | 29°38'29.59E | Farm Portion |
| 214 | VAALBANK | 456 | 16 | 26°42'40.86S | 29°38'7.48E | Farm Portion |
| 215 | VAALBANK | 456 | 3 | 26°41'30.64S | 29°40'33.04E | Farm Portion |
| 216 | VAALBANK | 456 | 11 | 26°40'15.98S | 29°38'19.02E | Farm Portion |
| 217 | VAALBANK | 456 | 14 | 26°41'2.43S | 29°38'48.28E | Farm Portion |
| 218 | ROODEKRANS | 457 | 4 | 26°42'37.32S | 29°36'59.48E | Farm Portion |
| 219 | GOEDEGEDACHT | 458 | 5 | 26°37'51.07S | 29°37'36.47E | Farm Portion |
| 220 | GOEDEGEDACHT | 458 | 17 | 26°39'10.26S | 29°37'30.05E | Farm Portion |
| 221 | GOEDEGEDACHT | 458 | 26 | 26°38'40.56S | 29°35'49.83E | Farm Portion |
| 222 | GOEDEGEDACHT | 458 | 0 | 26°37'49.14S | 29°38'13.84E | Farm Portion |
| 223 | GOEDEGEDACHT | 458 | 21 | 26°38'9.96S | 29°34'2.22E | Farm Portion |
| 224 | DURABEL | 548 | 0 | 26°34'17.12S | 29°33'50.27E | Farm Portion |
| 225 | KLIPKRAAL | 469 | 5 | 26°42'9.75S | 29°41'47.94E | Farm Portion |
| 226 | TWEEFONTEIN | 467 | 1 | 26°43'55.72S | 29°40'26.65E | Farm Portion |
| 227 | TWEEFONTEIN | 467 | 8 | 26°43'8.01S | 29°40'25.78E | Farm Portion |
| 228 | ZEVENFONTEIN | 468 | 4 | 26°43'28.66S | 29°41'48.89E | Farm Portion |
| 229 | ZEVENFONTEIN | 468 | 2 | 26°43'19.23S | 29°41'15.41E | Farm Portion |
| 230 | TWEEFONTEIN | 467 | 5 | 26°45'1.33S | 29°40'52.08E | Farm Portion |
| 231 | KLIPKRAAL | 469 | 6 | 26°42'26.65S | 29°41'29.98E | Farm Portion |
| 232 | KLIPKRAAL | 469 | 8 | 26°42'32.85S | 29°41'47.14E | Farm Portion |
| 233 | BEKKERSPRUIT | 423 | 12 | 26°31'39.11S | 29°34'20.94E | Farm Portion |
| 234 | OSHOEK | 454 | 4 | 26°35'40.83S | 29°39'15.32E | Farm Portion |
| 235 | VAALBANK | 456 | 12 | 26°40'59.44S | 29°37'49.14E | Farm Portion |
| 236 | VAALBANK | 456 | 13 | 26°42'22.12S | 29°40'2.7E | Farm Portion |
| 237 | ROODEKRANS | 457 | 33 | 26°40'55.93S | 29°35'31.97E | Farm Portion |
| 238 | GOEDEGEDACHT | 458 | 29 | 26°38'18.47S | 29°35'50.94E | Farm Portion |
| 239 | GOEDEGEDACHT | 458 | 9 | 26°38'43.44S | 29°37'39.08E | Farm Portion |
| 240 | GOEDEGEDACHT | 458 | 2 | 26°39'46.55S | 29°36'36.44E | Farm Portion |
| 241 | TWEEFONTEIN | 467 | 10 | 26°43'48.16S | 29°39'23.92E | Farm Portion |
| 242 | TWEEFONTEIN | 467 | 6 | 26°43'16.91S | 29°39'25.86E | Farm Portion |
| 243 | KLIPKRAAL | 469 | 7 | 26°42'27.05S | 29°41'12.41E | Farm Portion |

Development footprint[1] 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

[1] "development footprint", means the area within the site on which the development will take place and incudes 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.

| No | EIA Reference No | Classification | Status of application | Distance from proposed area (km) |
|---|---|---|---|---|
| 1 | 14/12/16/3/3/2/754 | Solar PV | Approved | 25.7 |
| 2 | 14/12/16/3/3/2/754 | Solar PV | Approved | 25.7 |

### 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|Generation|Renewable|Wind**.

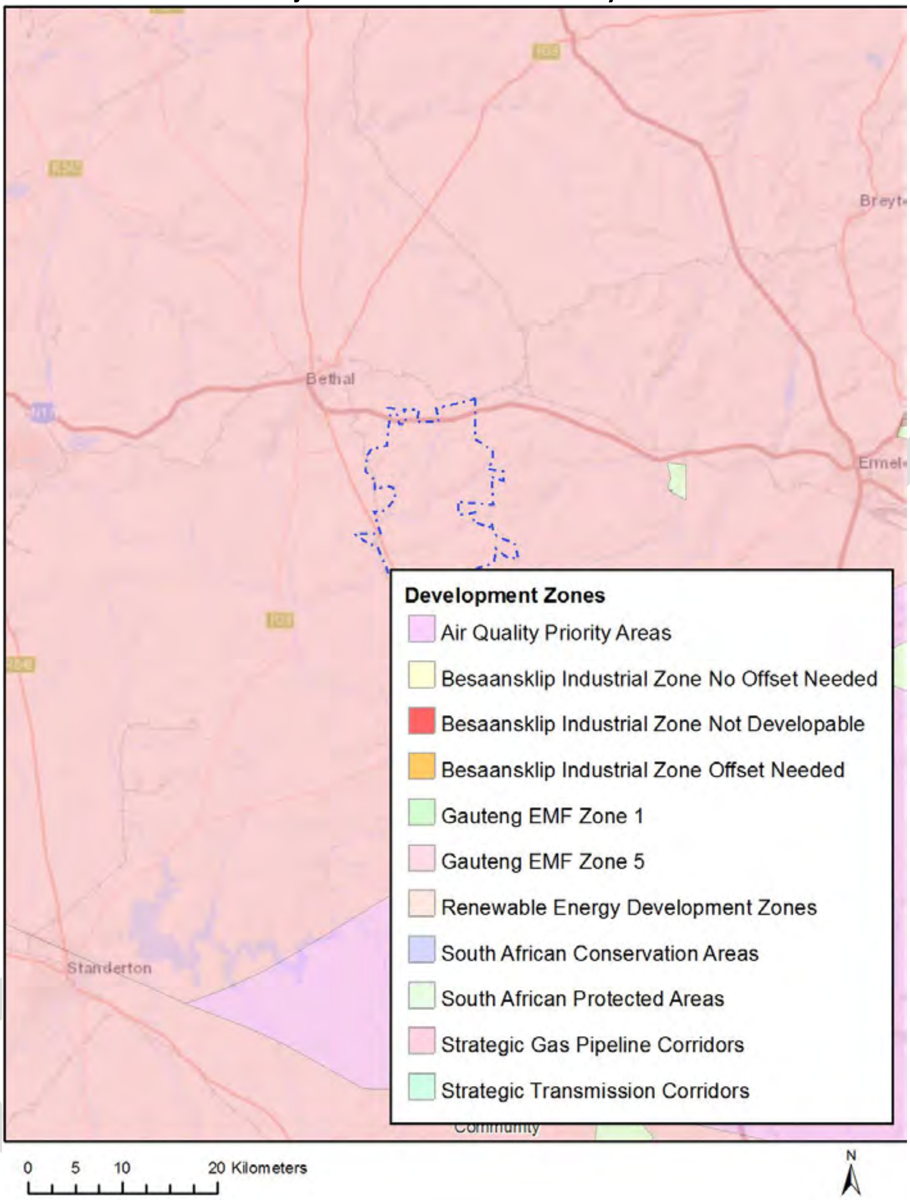
### Relevant development incentives, restrictions, exclusions or prohibitions

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 Quality-Highveld Priority Area | https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/HIGHVELD_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

**Project Location: Ummbila Emoyeni**




## 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 |
| Avian (Wind) Theme | | | | X |
| Bats (Wind) Theme | | X | | |
| Civil Aviation (Wind) Theme | | X | | |
| Defence (Wind) Theme | | | | X |
| Flicker Theme | X | | | |
| Landscape (Wind) Theme | X | | | |
| Paleontology Theme | X | | | |
| Noise Theme | X | | | |
| Plant Species Theme | | | X | |
| RFI (Wind) 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.

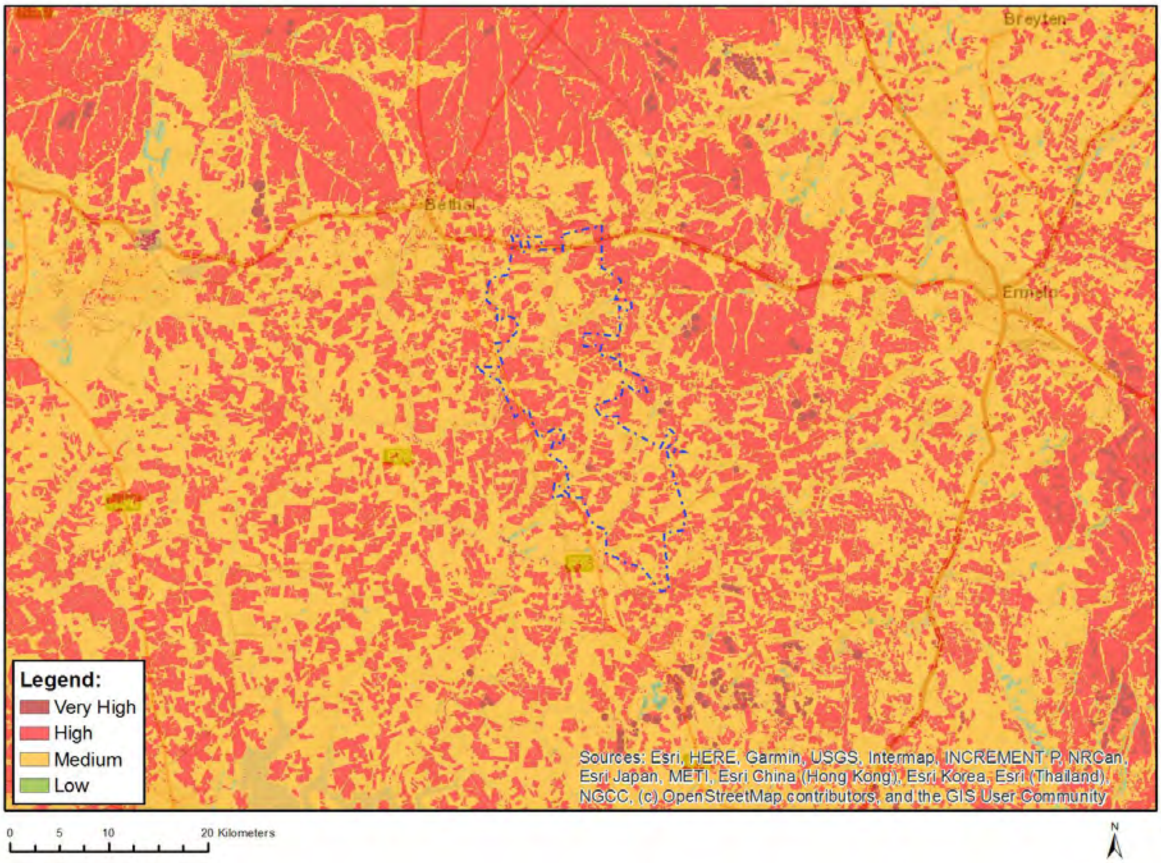
| No | Specialist assessment | Assessment Protocol |
|---|---|---|
| 1 | Agricultural Impact Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_WindAndSolar_Agriculture_Assessment_Protocols.pdf |
| 2 | Landscape/Visual Impact Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_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 | Defense Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Defence_Installations_Assessment_Protocols.pdf |
| 10 | RFI Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf |
| 11 | Noise Impact Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.pdf |
| 12 | Flicker Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf |
| 13 | Traffic Impact Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf |
| 14 | Geotechnical Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf |
| 15 | Socio-Economic Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf |
| 16 | Plant Species Assessment | https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf |
| 17 | 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

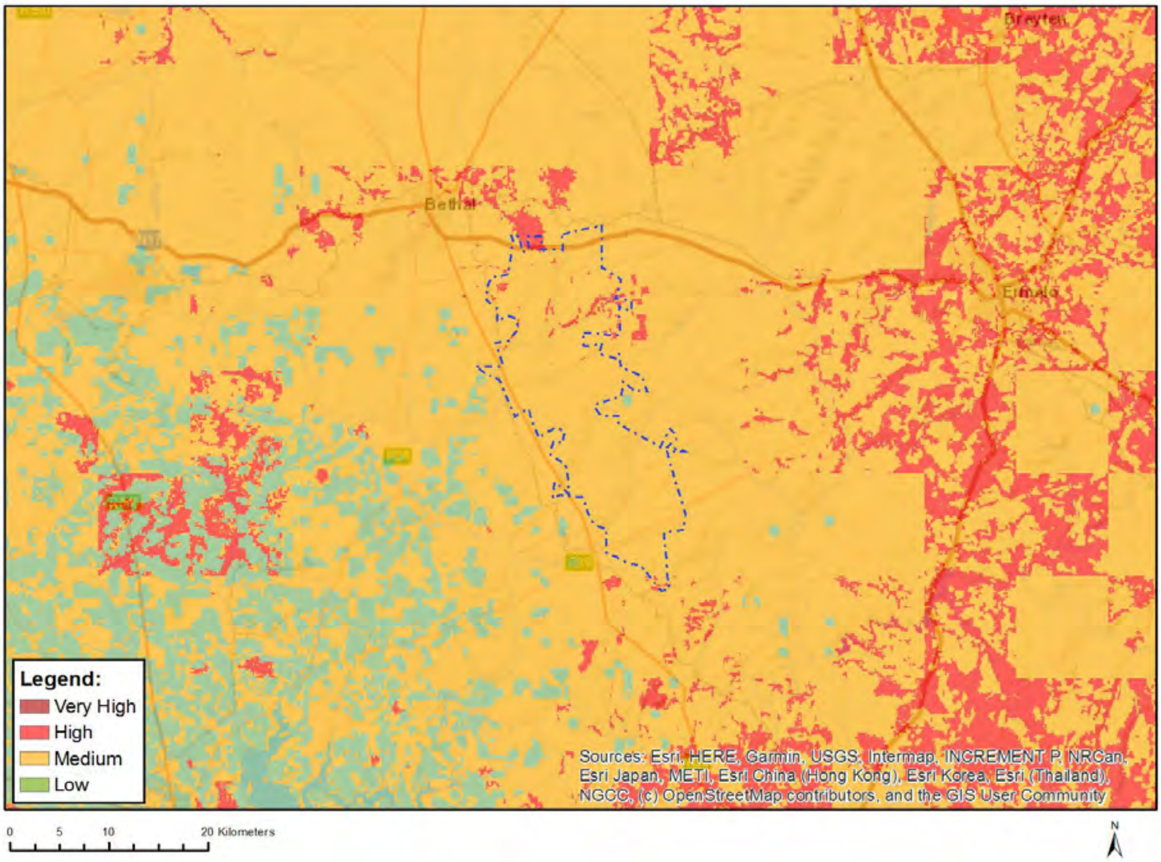



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | X | | |

**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



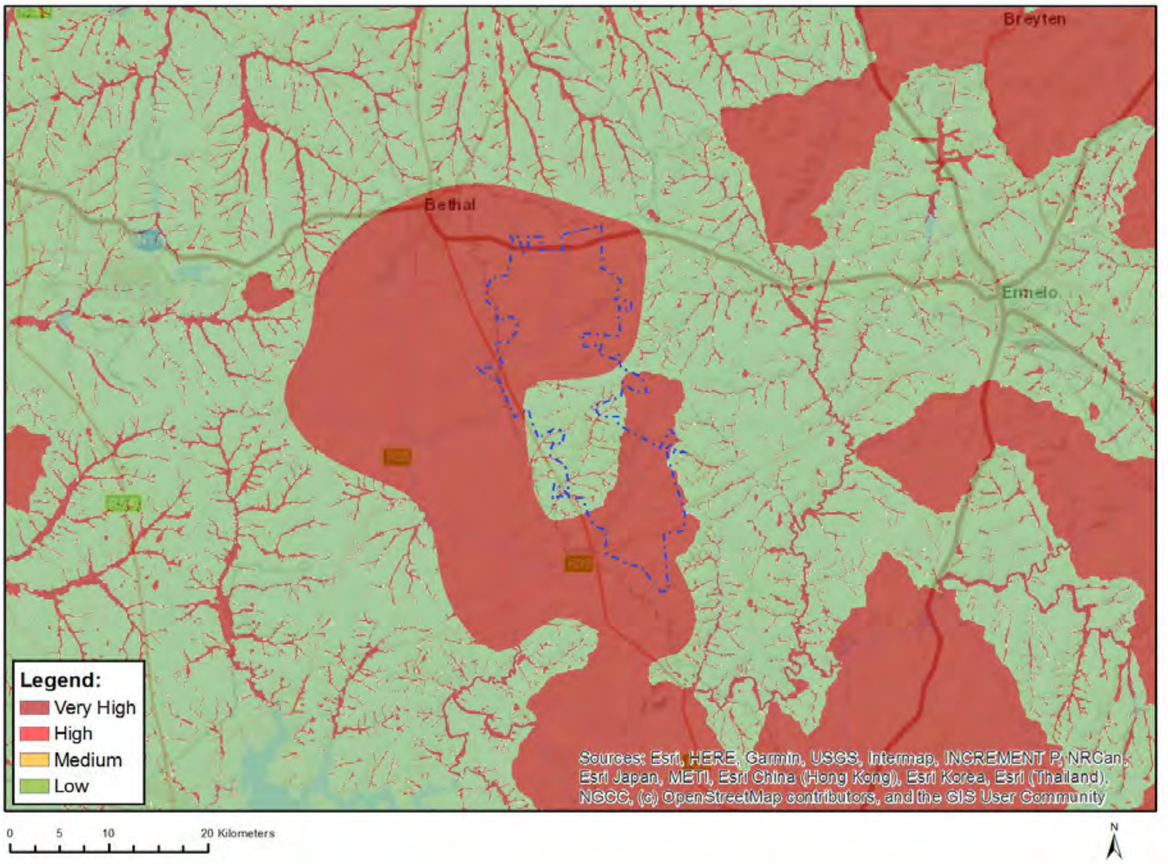

Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their 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 | Sensitive species 2 |
| High | Aves-Sagittarius serpentarius |
| High | Aves-Geronticus calvus |
| Medium | Aves-Tyto capensis |
| Medium | Sensitive species 2 |
| Medium | Aves-Sagittarius serpentarius |
| Medium | Aves-Geronticus calvus |
| Medium | Aves-Circus ranivorus |
| Medium | Aves-Neotis denhami |
| Medium | Insecta-Lepidochrysops procera |
| Medium | Mammalia-Crocidura maquassiensis |
| Medium | Mammalia-Hydrictis maculicollis |
| Medium | Mammalia-Ourebia ourebi ourebi |

## MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

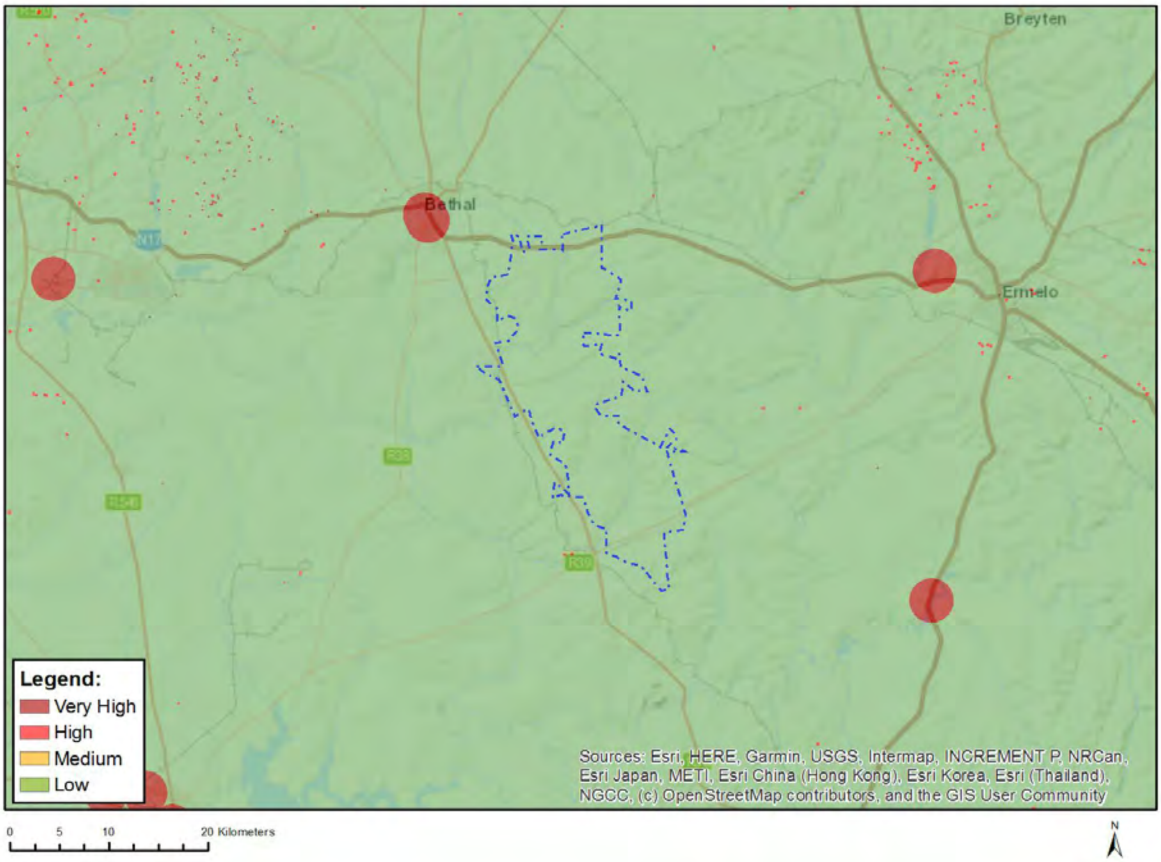



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| X | | | |

**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

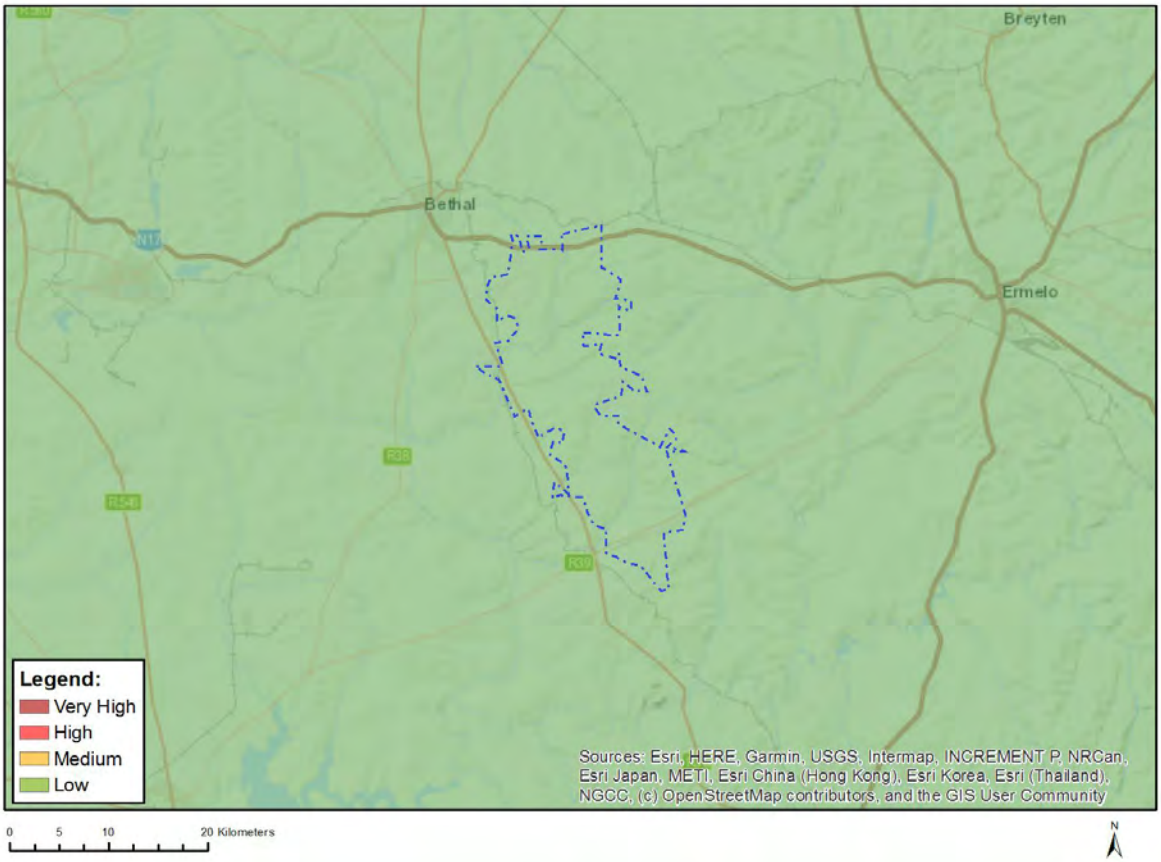



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | | | X |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Low sensitivity |

## MAP OF RELATIVE AVIAN (WIND) THEME SENSITIVITY

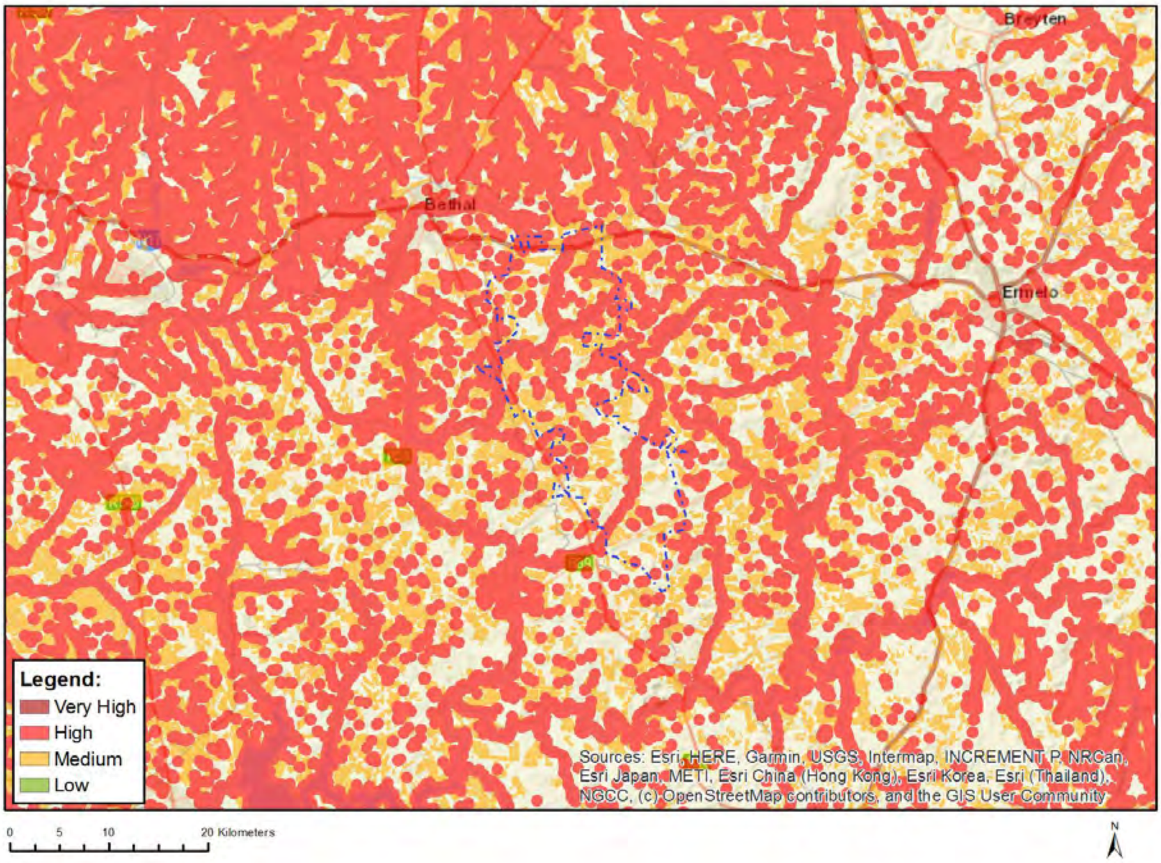



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | | | X |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Area Outside Sensitivities |

## MAP OF RELATIVE BATS (WIND) THEME SENSITIVITY

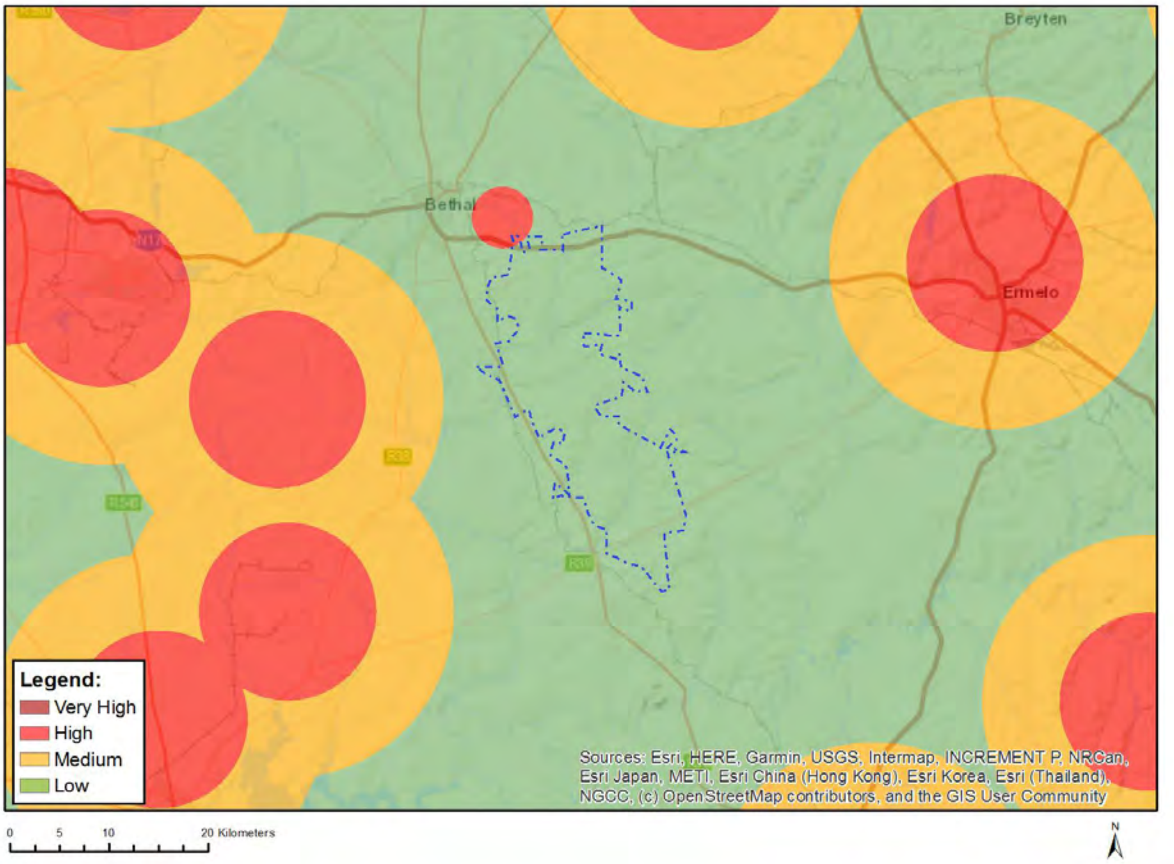



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | X | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| High | Within 500 m of a river |
| High | Wetland |
| High | Within 500 m of a wetland |
| Medium | Croplands |

## MAP OF RELATIVE CIVIL AVIATION (WIND) THEME SENSITIVITY

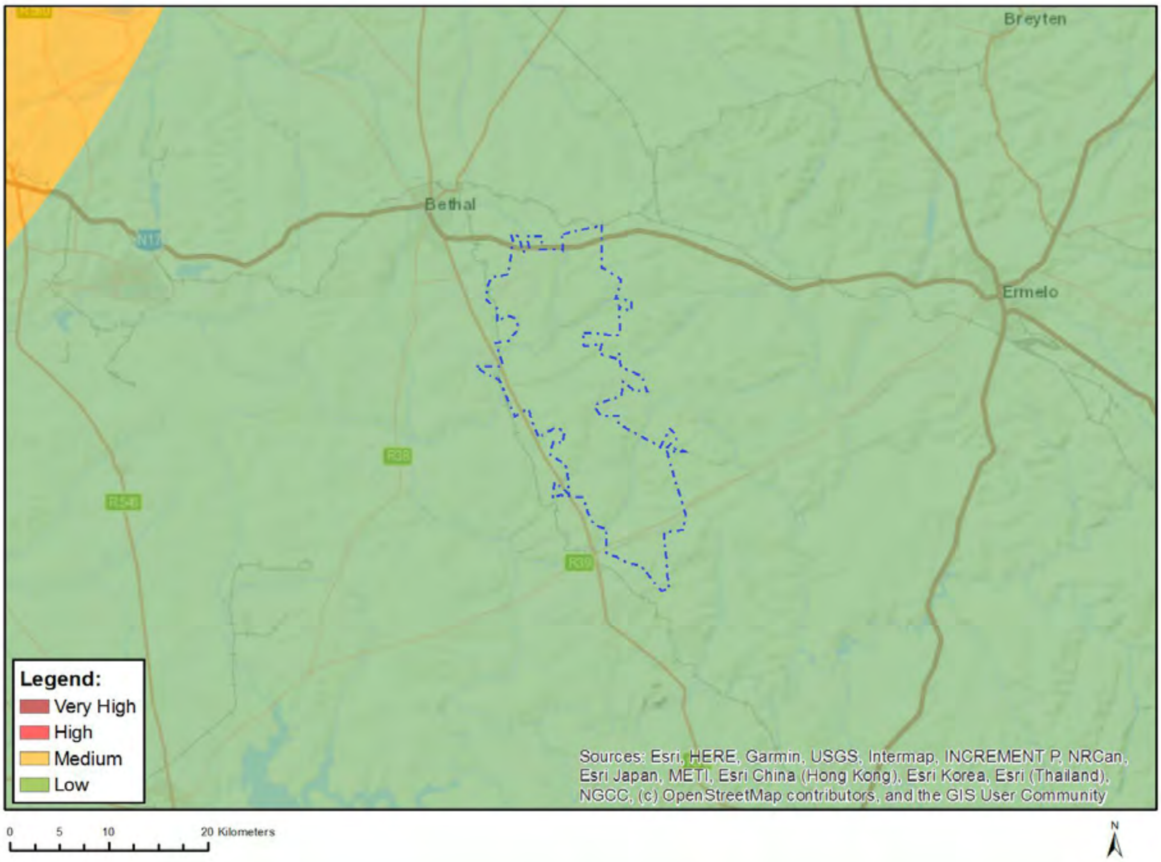



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | X | | |

**Sensitivity Features:**

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

## MAP OF RELATIVE DEFENCE (WIND) THEME SENSITIVITY

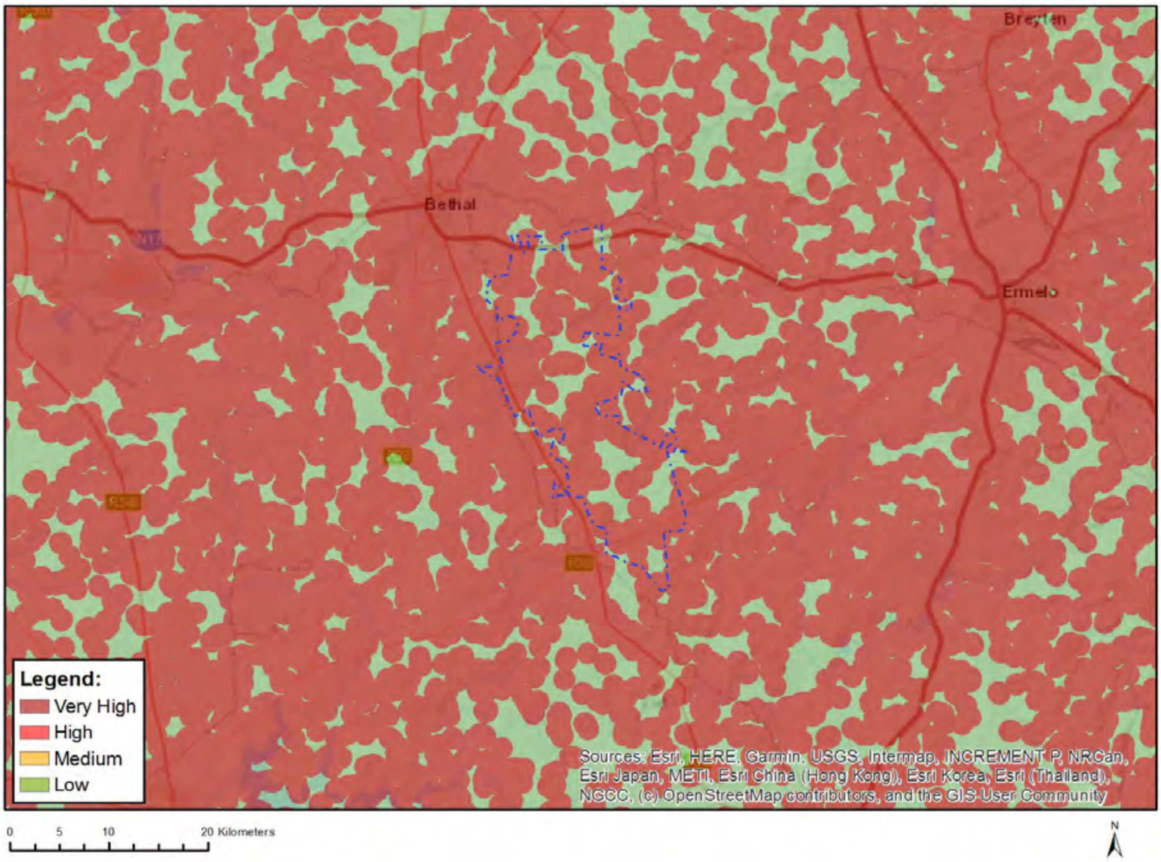



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| | | | X |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Low sensitivity |

## MAP OF RELATIVE FLICKER THEME SENSITIVITY

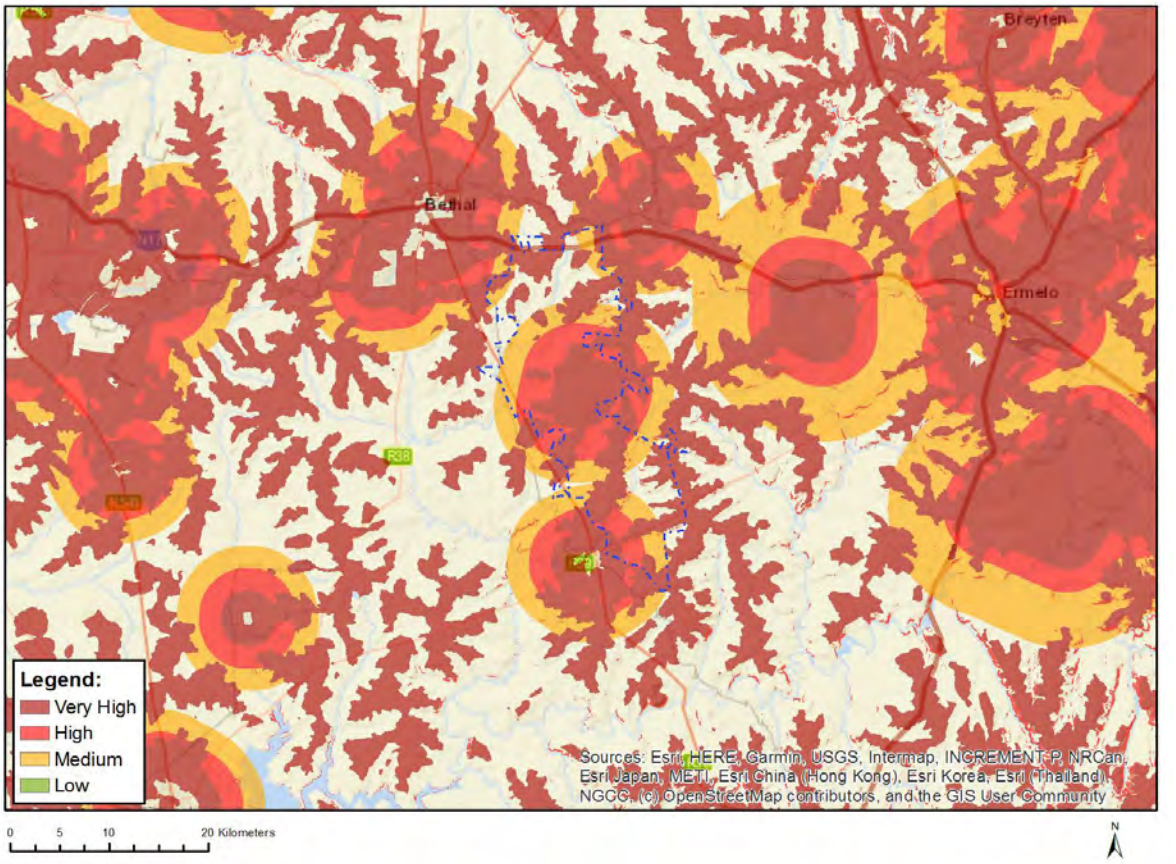



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| X | | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Area of low sensitivity |
| Very High | Potential temporarily or permanently inhabited residence |

## MAP OF RELATIVE LANDSCAPE (WIND) THEME SENSITIVITY

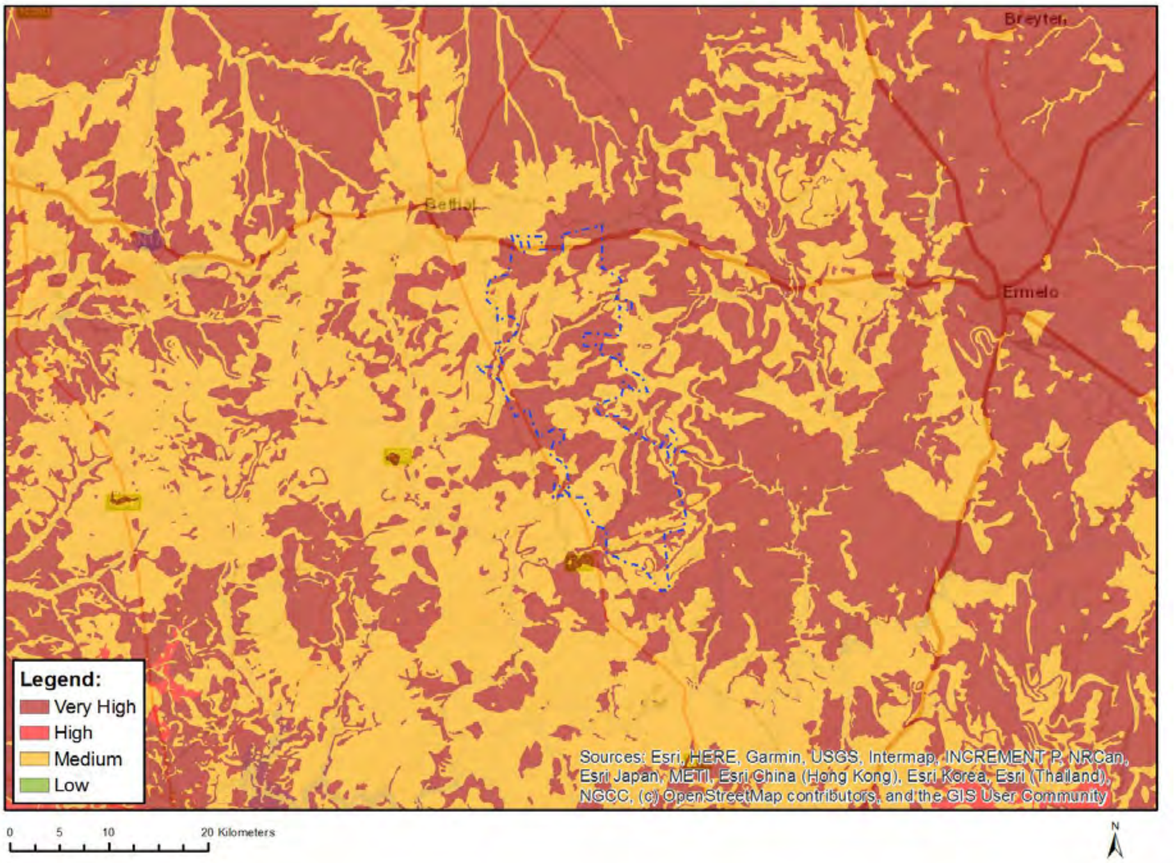



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| X | | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| High | Between 2 and 4 km of a town or village |
| High | Slope between 1:4 and 1:10 |
| High | Between 2 and 5 km of a game farm |
| Low | Slope less than 1:10 |
| Medium | Between 4 and 6 km of a town or village |
| Medium | Between 5 and 7 km of a game farm |
| Very High | Within 2 km of a town or village |
| Very High | Mountain tops and high ridges |
| Very High | Game farm |
| Very High | Within 2 km of a game farm |
| Very High | Slope more than 1:4 |

## MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

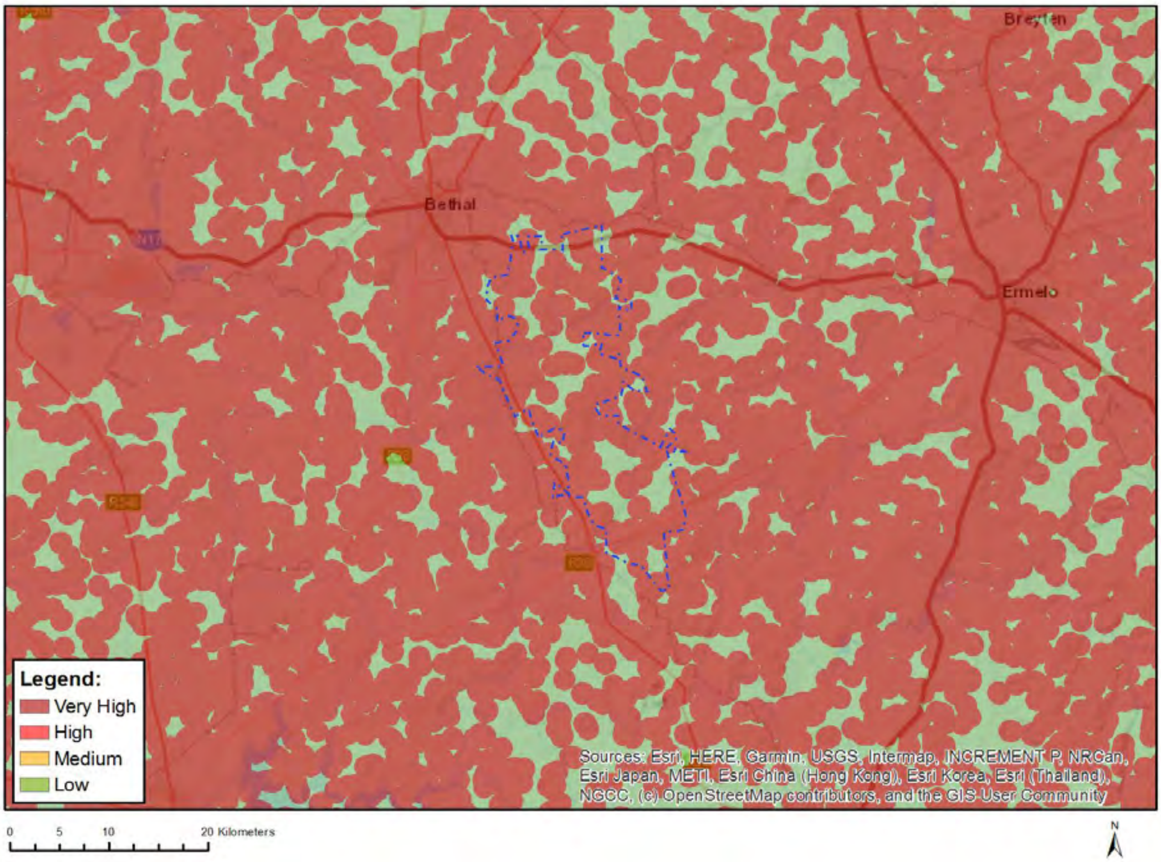



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| X | | | |

**Sensitivity Features:**

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

## MAP OF RELATIVE NOISE THEME SENSITIVITY

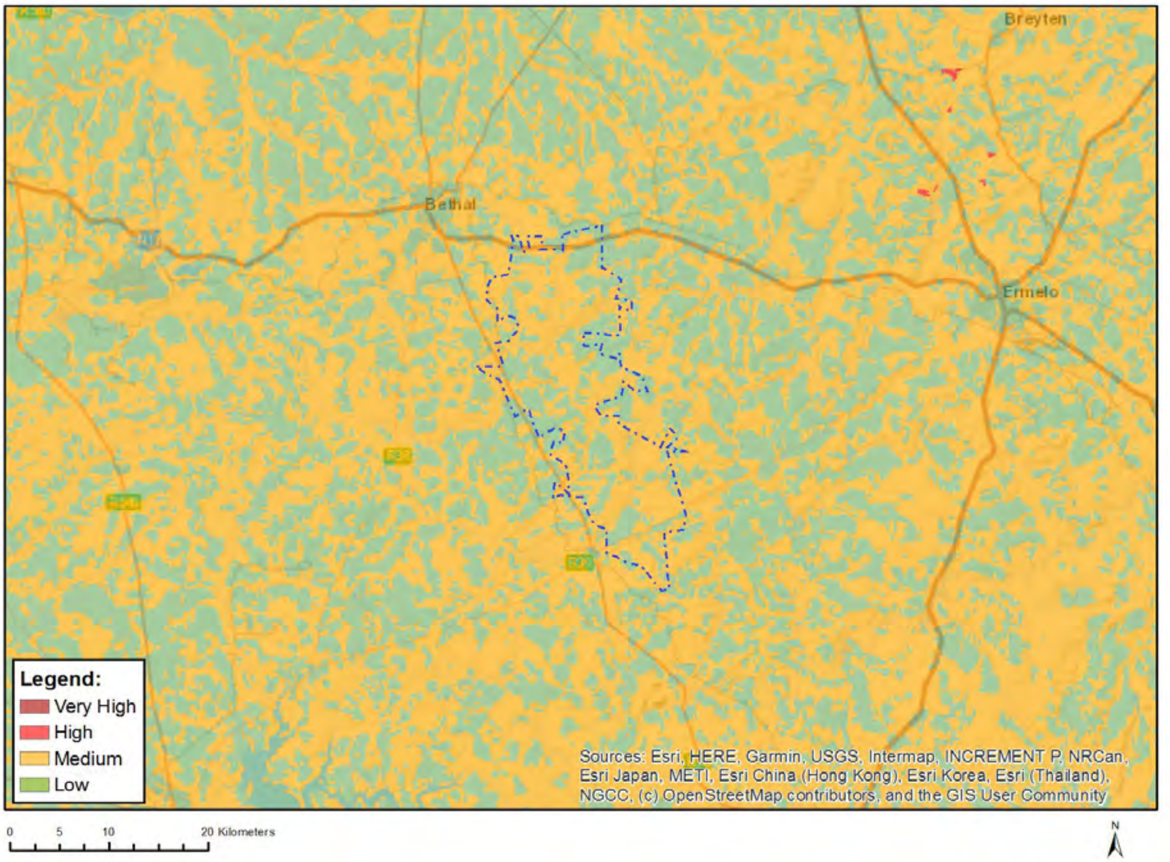



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| X | | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Area of low sensitivity |
| Very High | Potential temporarily or permanently inhabited residence |

## MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



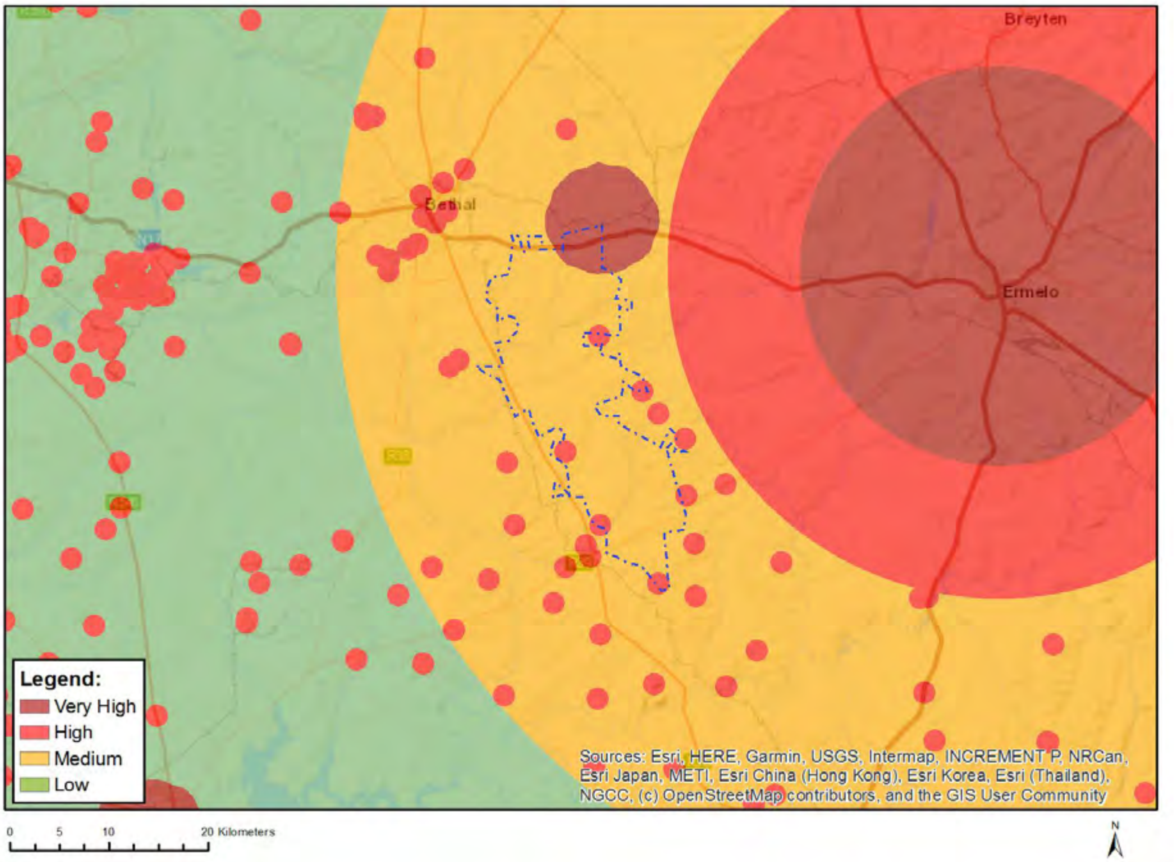

Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their 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 RFI (WIND) THEME SENSITIVITY

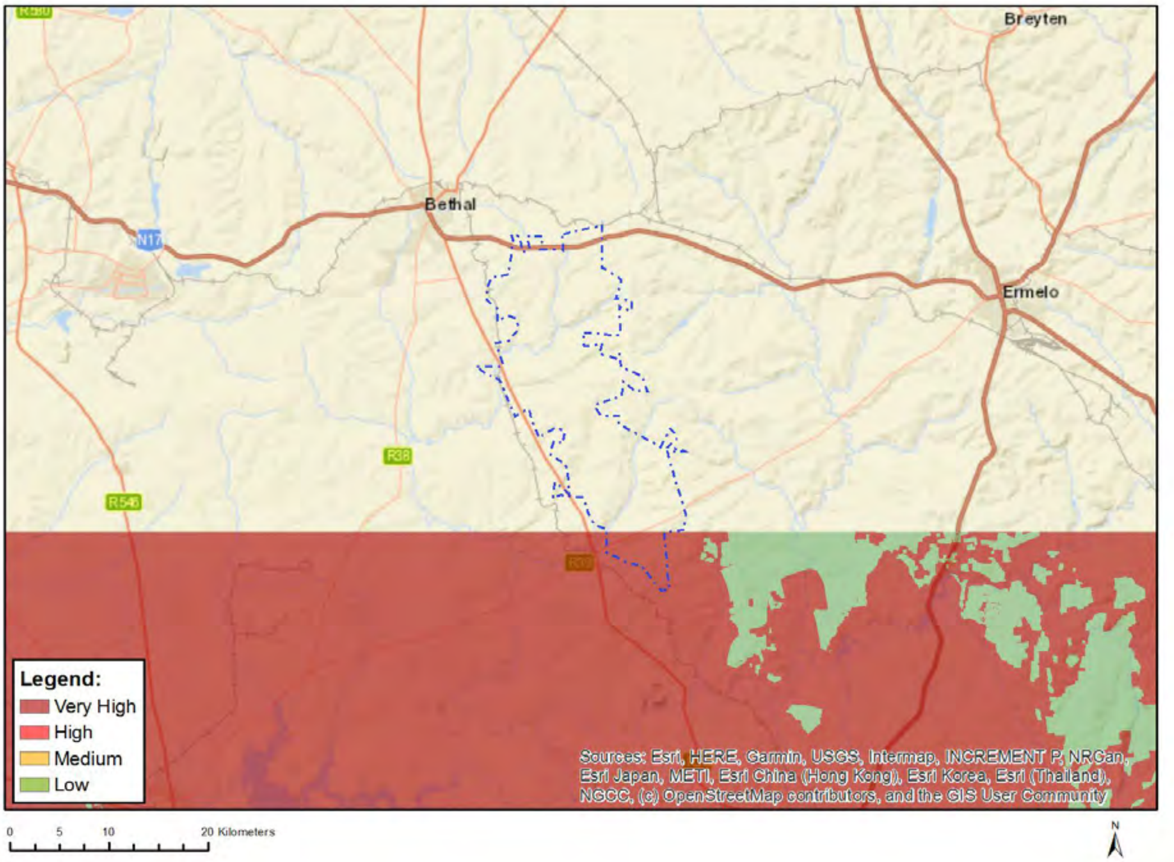



| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| X | | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| High | Within 1 km of a telecommunication facility;None;Between 30 and 60 km from a Weather Radar installation and within the radar's line of sight |
| Medium | Low sensitivity for telecommunications;None;Between 30 and 60 km from a Weather Radar installation and within the radar's line of sight |
| Very High | Within 5 km of a Sentech High Power Terrestrial Broadcasting Facility;None;Between 30 and 60 km from a Weather Radar installation and within the radar's line of sight |
| Very High | Within 5 km of a Sentech High Power Terrestrial Broadcasting Facility;Within 1 km of a telecommunication facility;None;Between 30 and 60 km from a Weather Radar installation and within the radar's line of sight |

## 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 biodiveristy area 1 |
| Very High | Critical biodiveristy 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**

**CONTENTS**



**APPENDICES**

1. SAHRA Minimum Standards for Archaeological Site Museums and Rock Art Sites open to the Public
2. Chance Fossil Finds Procedure

## 1. INTRODUCTION

Ummbila Emoyeni Renewable Energy Farm (Pty) Ltd is proposing the development of renewable energy facilities, collectively known as the Ummbila 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 Ummbila Emoyeni (Pty) Ltd as a technically suitable area for the development of the Ummbilla 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 line[1]. 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 Morgenzon 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 |

| | |
|---|---|
| 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**

<table>
<tr><th>No.</th><th>Portion</th><th>Landowner</th><th>Contact Details</th></tr>
<tr><td>261</td><td>15</td><td>NICJAC PIETERSE BOERDERY CC</td><td>Jacobus H Pieterse - 082 783 2687<br>Simon N Pieterse - 087 550 0930<br>Jacques - 082 783 2687<br>Nico - 082 567 8085<br>andre@njptransport.co.za<br>jacques@njptransport.co.za<br>nico@njptransport.co.za</td></tr>
<tr><td>261</td><td>21</td><td>Johannes Fourie</td><td></td></tr>
<tr><td>264</td><td>0</td><td>NICJAC PIETERSE BOERDERY CC</td><td rowspan="2">Jacobus H Pieterse - 082 783 2687<br>Simon N Pieterse - 087 550 0930<br>Jacques - 082 783 2687<br>Nico - 082 567 8085<br>andre@njptransport.co.za<br>jacques@njptransport.co.za<br>nico@njptransport.co.za</td></tr>
<tr><td>264</td><td>1</td><td>NICJAC PIETERSE BOERDERY CC</td></tr>
<tr><td>264</td><td>3</td><td>ROOIBLOM BOERDERY NO 1 TRUST</td><td>Neil Claasen - 082 809 9967 - niel@rooiblom.co.za</td></tr>
<tr><td>264</td><td>4</td><td>ROOIBLOM BOERDERY NO 1 TRUST</td><td>Neil Claasen - 082 809 9967 - niel@rooiblom.co.za</td></tr>
<tr><td>264</td><td>5</td><td>ROOIBLOM BOERDERY NO 1 TRUST</td><td>Neil Claasen - 082 809 9967 - niel@rooiblom.co.za</td></tr>
<tr><td>264</td><td>6</td><td>HENNIE FOURIE TRUST</td><td>Sterk Gert' - 0828944275</td></tr>
<tr><td>264</td><td>8</td><td>GELUKSPLAATS BELEGGINGS TRUST</td><td>Bertus Louw - 082 492 0945</td></tr>
</table>

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

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

| | | | |
|---|---|---|---|
| **421** | 37 | Frik Human Plase cc | |
| **421** | 38 | Klipfontein Family Trust | |
| **421** | 39 | Van Rooyen | |
| **421** | 40 | ROUX FRANCINA JOHANNA4105020022086 | Hennie Roux - 083 232 6236 - hennie958@gmail.com |
| **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 | Hennie Roux - 083 232 6236 - hennie958@gmail.com |
| **422** | 3 | Klipfontein Family Trust | Hannes Human - hanneshuman1@gmail.com - 082 550 3670 |
| **422** | 4 | PIETER FRANCOIS ERASMUS - Pietman | Pietman - 082 571 5561 - pietman.bekkersrust@gmail.com |
| **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

***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 anthropogenic disturbances for a very long time.

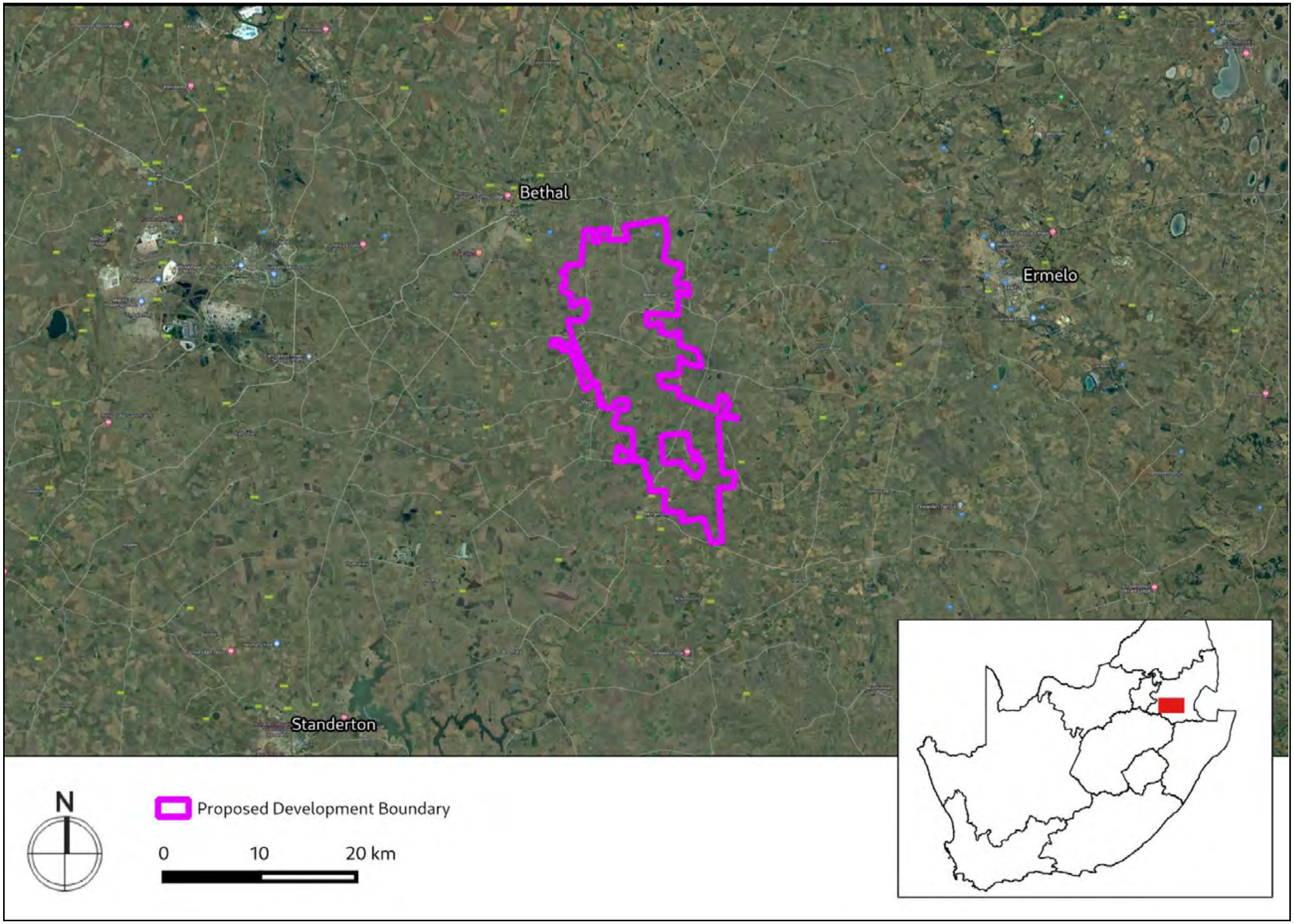



**Figure 1: Location of Site**

### 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

**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.

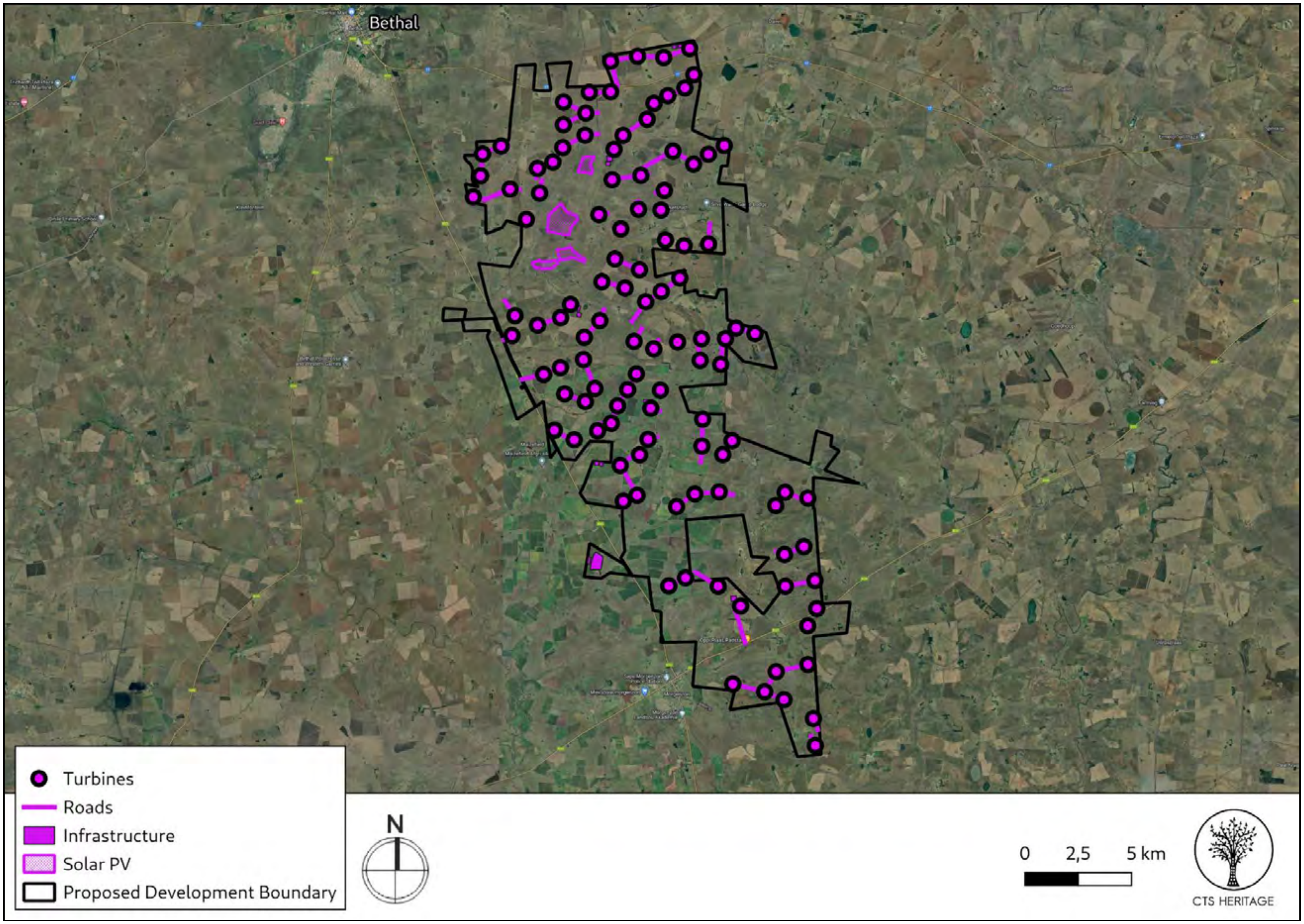



**Figure 2: Ummbila Emoyeni WEF and PV Layout**

### 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.

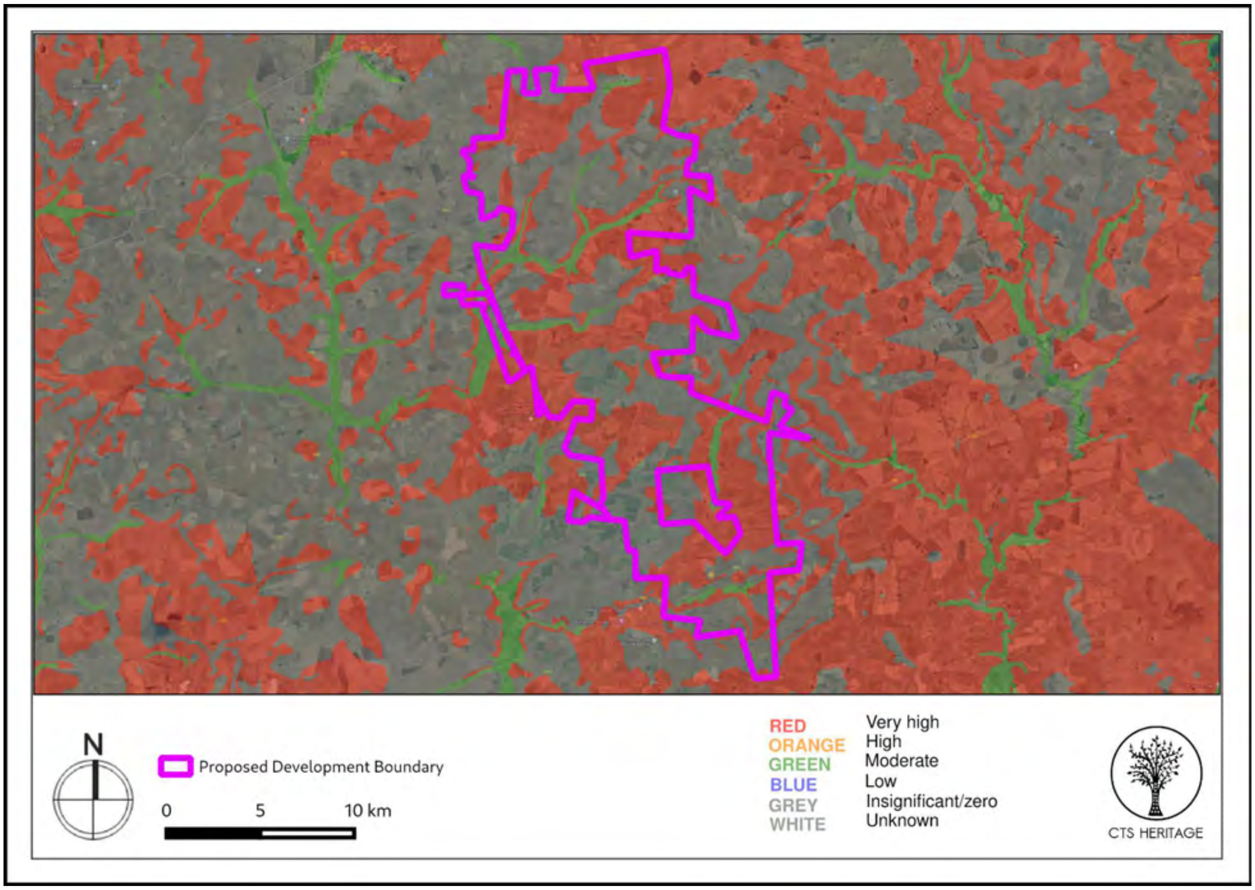



**Figure 3.1: Palaeosensitivity Map. Indicating Zero to Very High fossil sensitivity underlying the study area for the facility**

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.

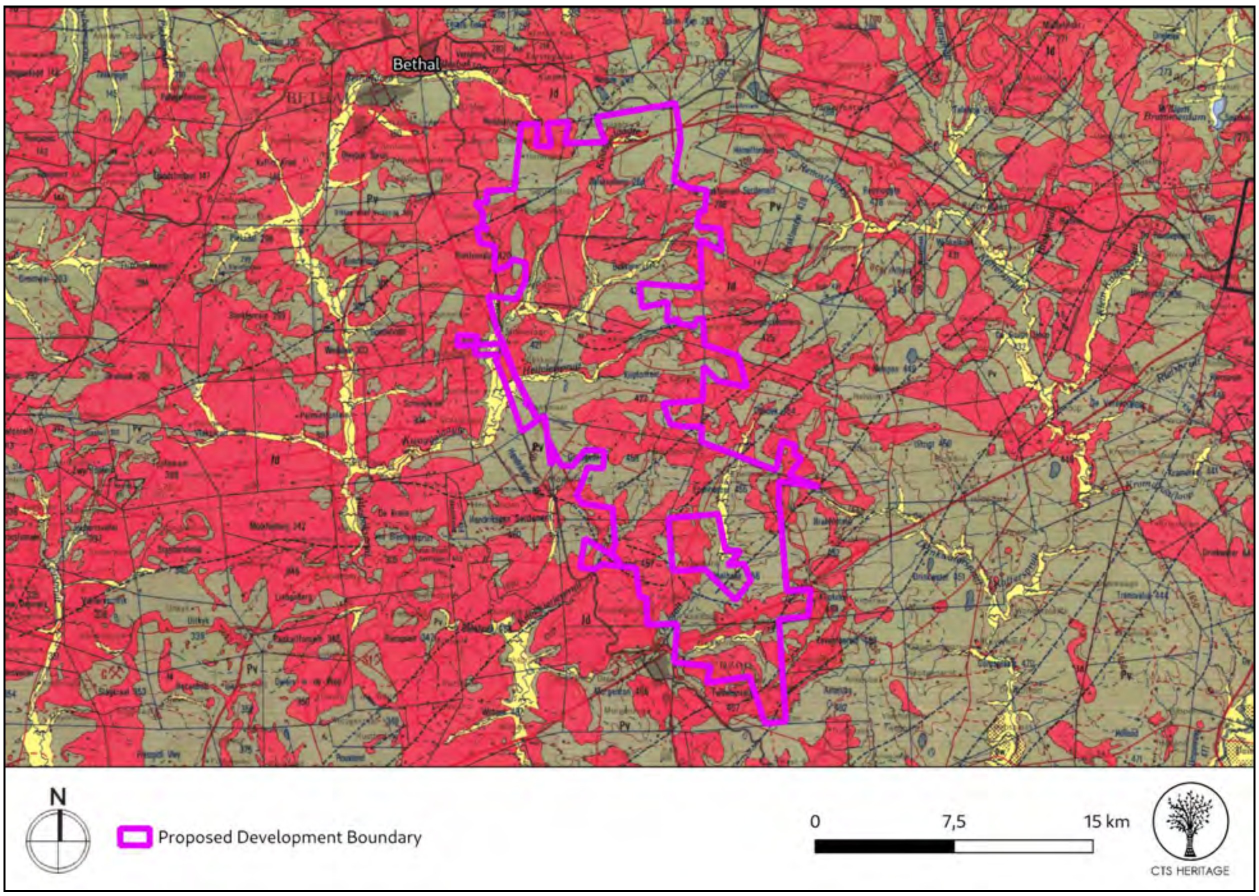



**Figure 3.2: Geology Map. Extract from the CGS 2628 East Rand Map indicating that the development area for the REF development is underlain by sediments of Pv: Vryheid Formation of the Ecca Group and Jd: Jurassic Dolerite as well as Quaternary Sands**

### 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 IIIC, 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<br>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<br>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<br>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<br>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<br>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<br>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<br>One stone cairn | -26.50435 | 29.59498889 | IIIA | No direct impact anticipated |
| 9 | Umbila Emoyeni 009 | HISTORIC YARD MIDDEN<br>Part of the historical identity of the area, including stone structures and | -26.50869722 | 29.58020833 | IIIC | No direct impact anticipated. Part of historic cluster |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | foundations. | | | | |
| 10 | Umbila Emoyeni 010 | HISTORICAL HOUSE AND YARD<br>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<br>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<br>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<br>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<br>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.

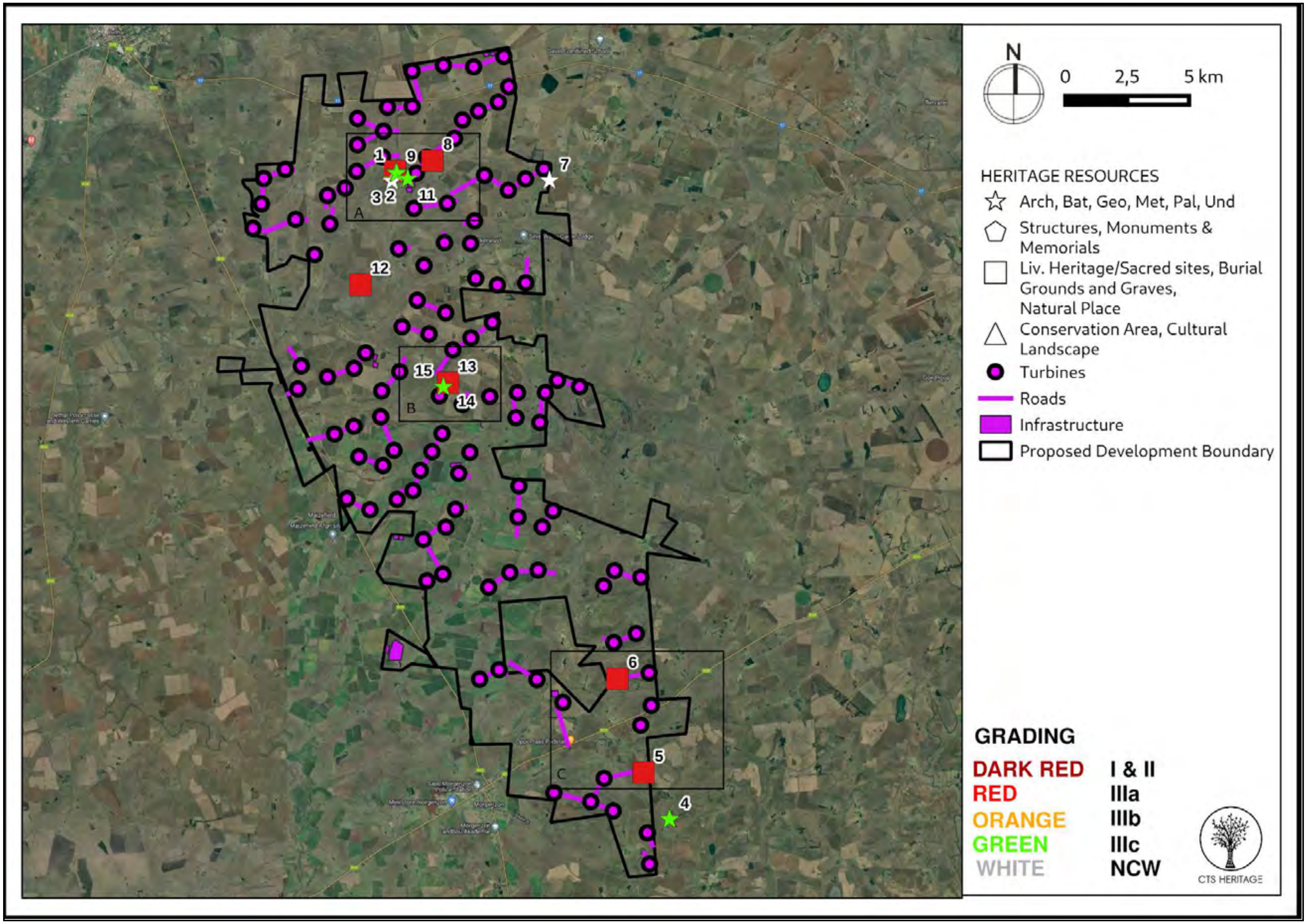



**Figure 4.: Map of archaeological heritage resources within the proposed development area**

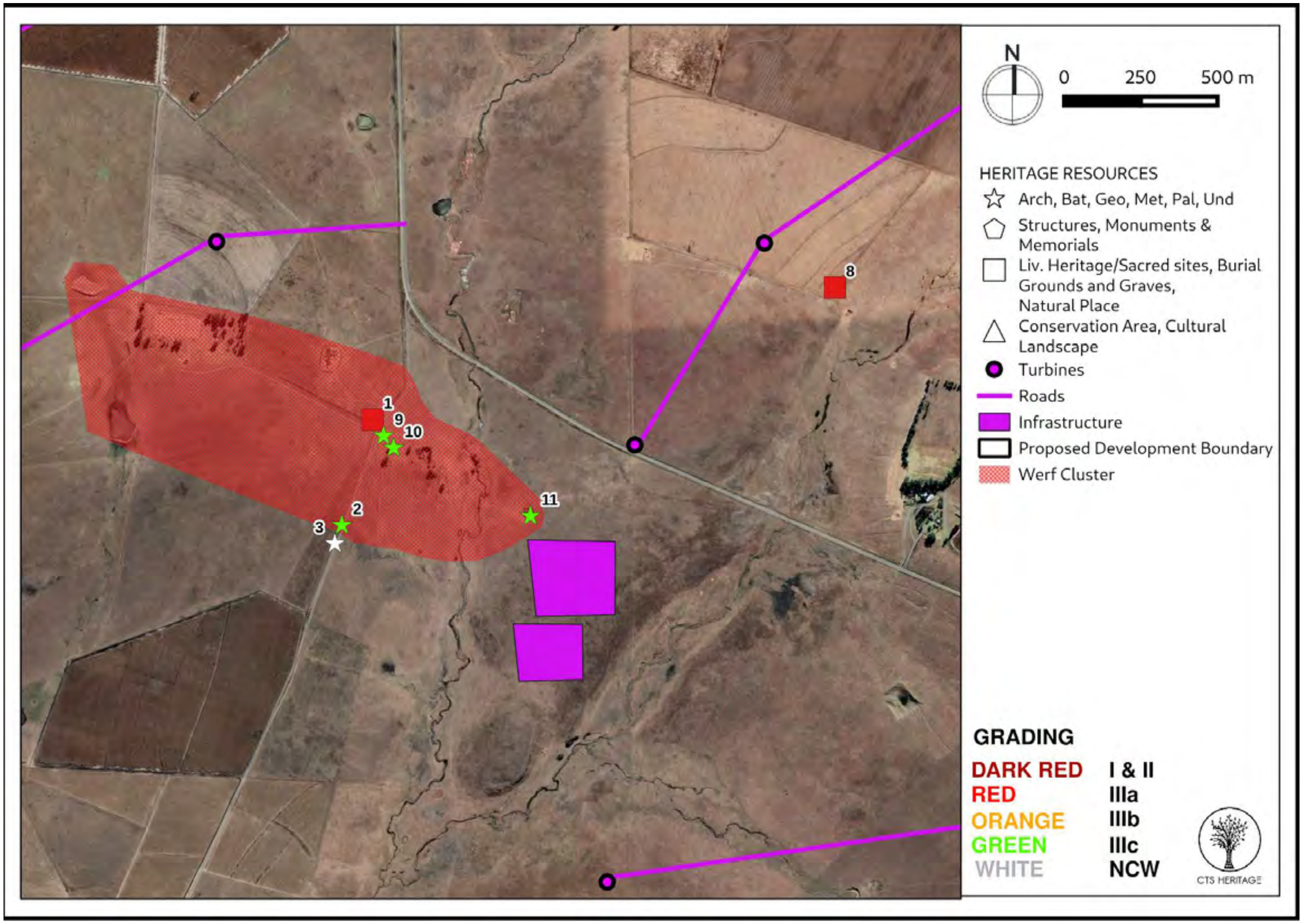



**Figure 4.1: Map of all sites and observations noted within the development area - Inset A**

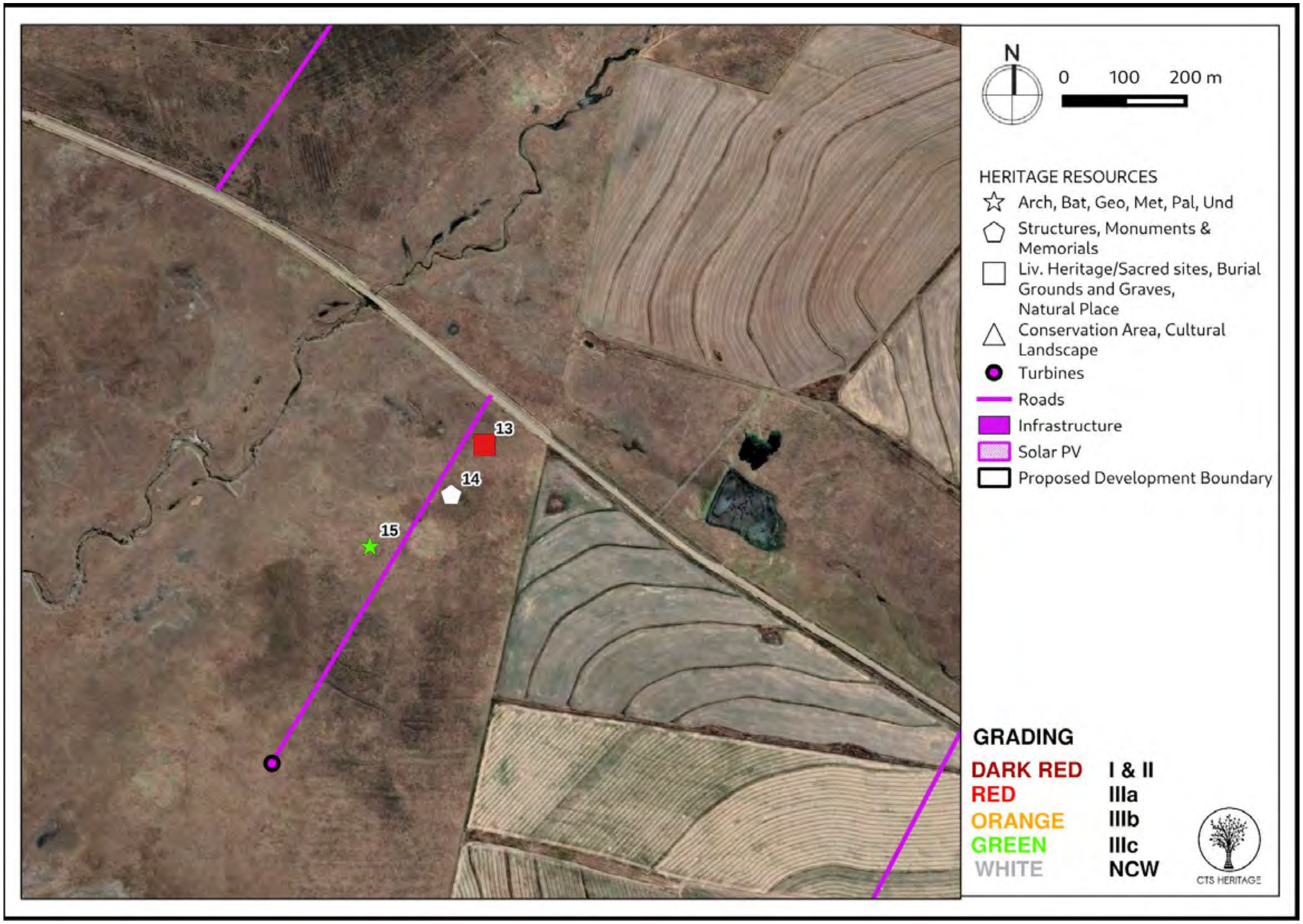



**Figure 4.2: Map of all sites and observations noted within the development area - Inset B**

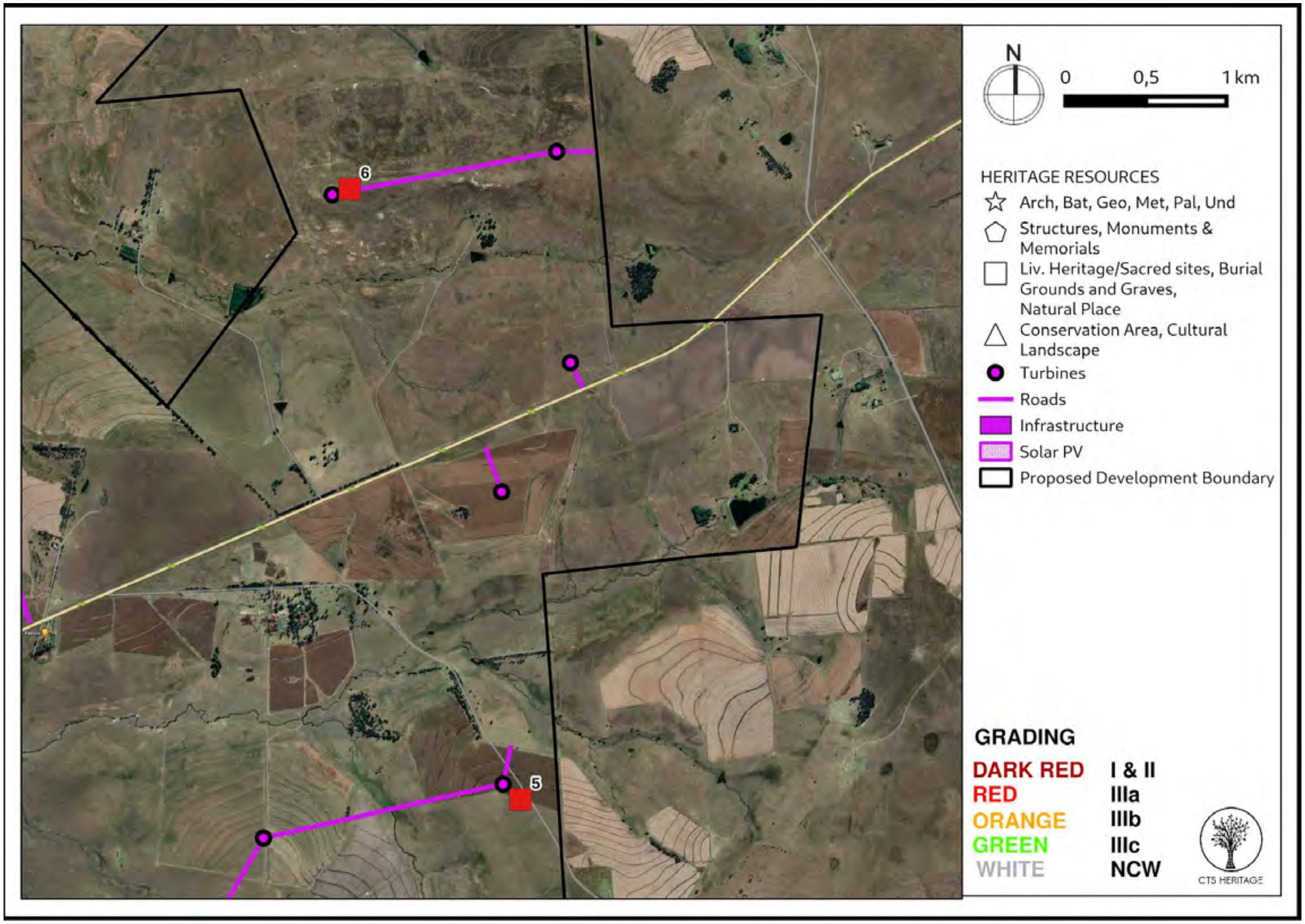



**Figure 4.3: Map of all sites and observations noted within the development area - Inset C**

## 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

- 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<br>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 |

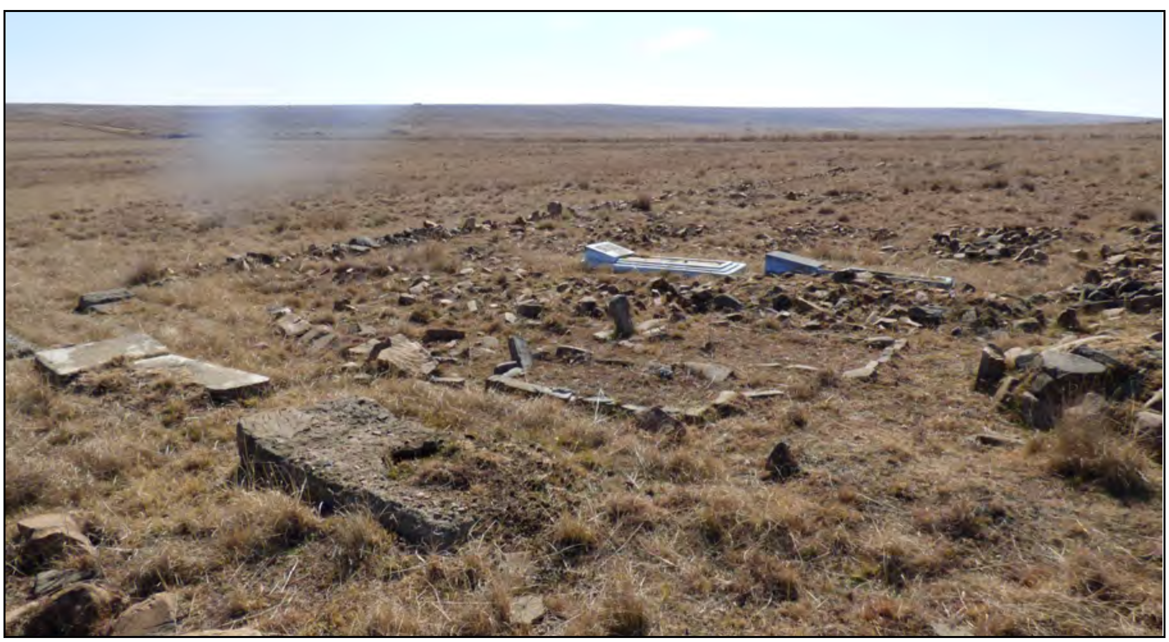
| | | | |
|---|---|---|---|
| All site crew should be informed of the heritage significance of the resources in the study area | Site Manager | Meeting held with site crew | Minutes of meeting |
| Visitors are to be allowed access to the burial sites as per the list of identified relatives and community 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 |

| | | | |
|---|---|---|---|
| | | | 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. |

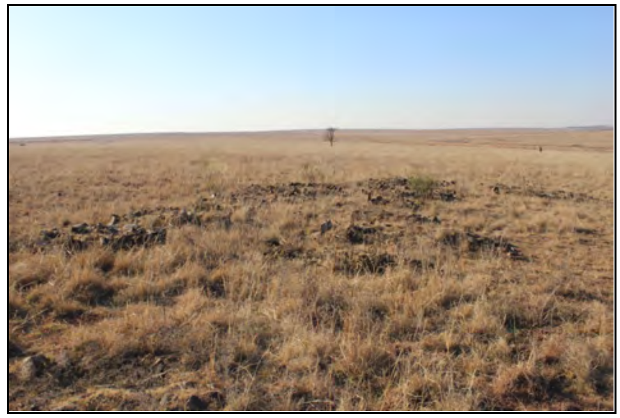
### 4.3 Guide on how to identify marked and unmarked burials and how to proceed should previously unidentified burials be uncovered during the construction process

#### *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.



Sometimes, especially in more rural areas, burials are marked by piles of stones stacked on top of eachother, 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 acility 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 5000m$^2$. 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 Ummbila 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 Ummbila 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 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.

## 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 |

# APPENDICES

**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;

* 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 he 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;

* 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.

* 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

Tel: 021 462 4502

Email: phine@sahra.org.za

Website: www.sahra.org.za

**Mpumalanga PHRA**

Contact Person: Mr Benjamin Moduka

Tel: 013 766 5196

Email: bmoduka@mpg.gov.za

**National Museum of Bloemfontein**

Contact Person: Dr Will Archer

Tel: +27 51 447 9609

Email: will.archer@nasmus.co.za

Website: www.nasmus.co.za

**University of Cape Town: Archaeology Department**

Contact Person: Prof. Deano Stynder

Tel: 021 650 2353

Email: deano.stynder@uct.ac.za

Website: http://www.archaeology.uct.ac.za/

CTS HERITAGE

## APPENDIX 2:

## Chance Fossil Finds Procedure

APPENDIX 5: REHABILITATION PLAN

# Freshwater Rehabilitation Plan & Monitoring for the Ummbila 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 Ummbila Wind Energy Facility (WEF) Project |
| Submitted to | |
| Report Writer | Andrew Husted |
| | 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. |
| Declaration | 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. |

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## Figures



## Tables

# 1 Introduction

The Biodiversity Company was commissioned by Savannah Environmental to develop an aquatic Rehabilitation and Monitoring Plan for the Ummbila 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 Ummbila Emoyeni Solar Photovoltaic (PV) facilities as well as the Ummbila 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 Ummbila 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 eThekwini'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 Ummbila 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.

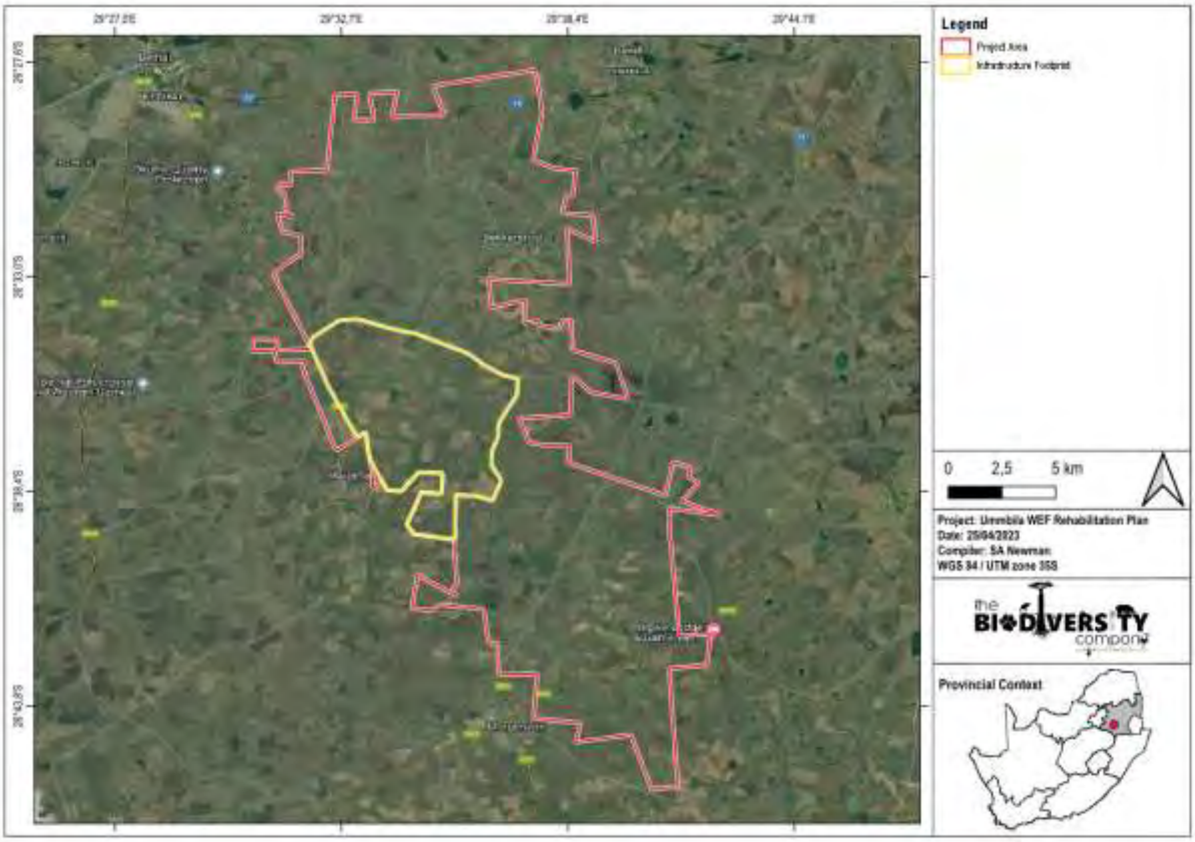



*Figure 2-1 Map illustrating the proposed Ummbila Emoyeni Phase One Area (yellow) and the overall Project Area (red)*

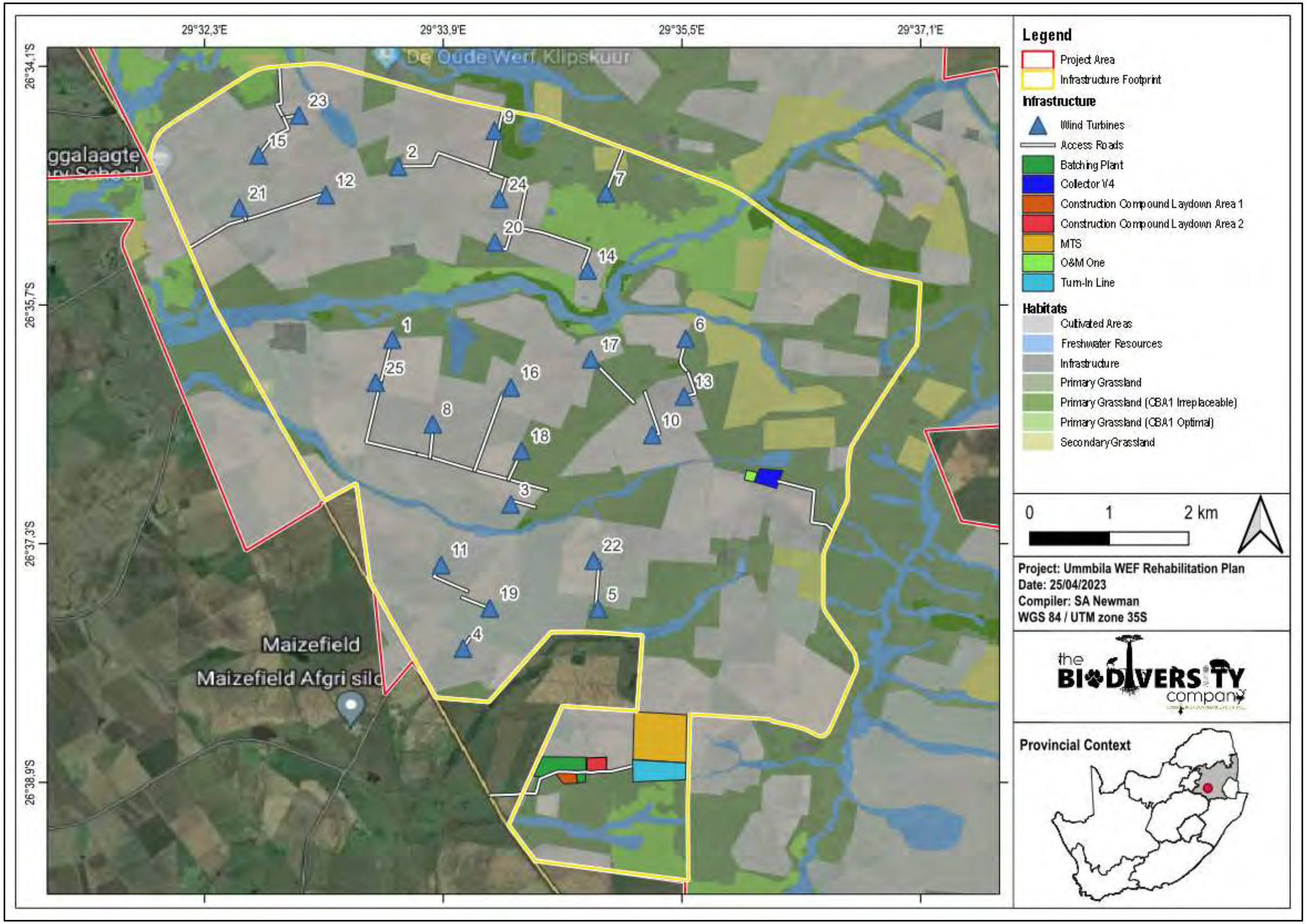



*Figure 2-2 The location and details of the Project Area, including associated important habitat features*

# 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 Ummbila 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 / $m^2$ for large plants such as rushes to 8 plants / $m^2$ for small sedges and grasses) but is generally around 2–3 plants / $m^2$ 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 |
|---|---|---|
| *Digitaria eriantha* | *Imperata cylindrica* | *Echinochloa pyramidalis* |
| *Cynodon dactylon* | *Agrostis lachnantha* | *Leersia hexandra* |
| *Eragrostis curvula* | *Setaria sphacelata var sericea* | *Cyperus congestus* |
| *Eragrostis chloromelas* | | *Cyperus longus* |
| *Eragrostis lehmanniana* | | *Cyperus esculentus* |
| *Themeda triandra* | | *Cyperus marginatus* |
| *Setaria sphacelata var sphacelata* | | *Setaria pumila* |
| | | *Schoenoplectus decipiens* |

#### 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 | *Cirsium vulgare* | Spear thistle | 1b |
| Asteraceae | *Xanthium strumarium* | Large Cocklebur | 1b |
| Fabaceae | *Gleditsia triacanthos* | Honey Locust | 1b |
| Myrtaceae | *Eucalyptus camaldulensis* | River Red Gum | 1b |
| Rosaceae | *Pyracantha angustifolia* | Narrowleaf Firethorn | 1b |
| Rosaceae | *Pyracantha crenulata* | Nepal Firethorn | 1b |
| Rosaceae | *Rosa rubiginosa* | Sweet Brier | 1b |
| Solanaceae | *Datura stramonium* | Common Thorn Apple | 1b |
| Verbenaceae | *Verbena bonariensis* | Tall Verbena | 1b |
| Verbenaceae | *Verbena brasiliensis* | Brazilian Vervain | 1b |
| Verbenaceae | *Verbena rigida* | 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.

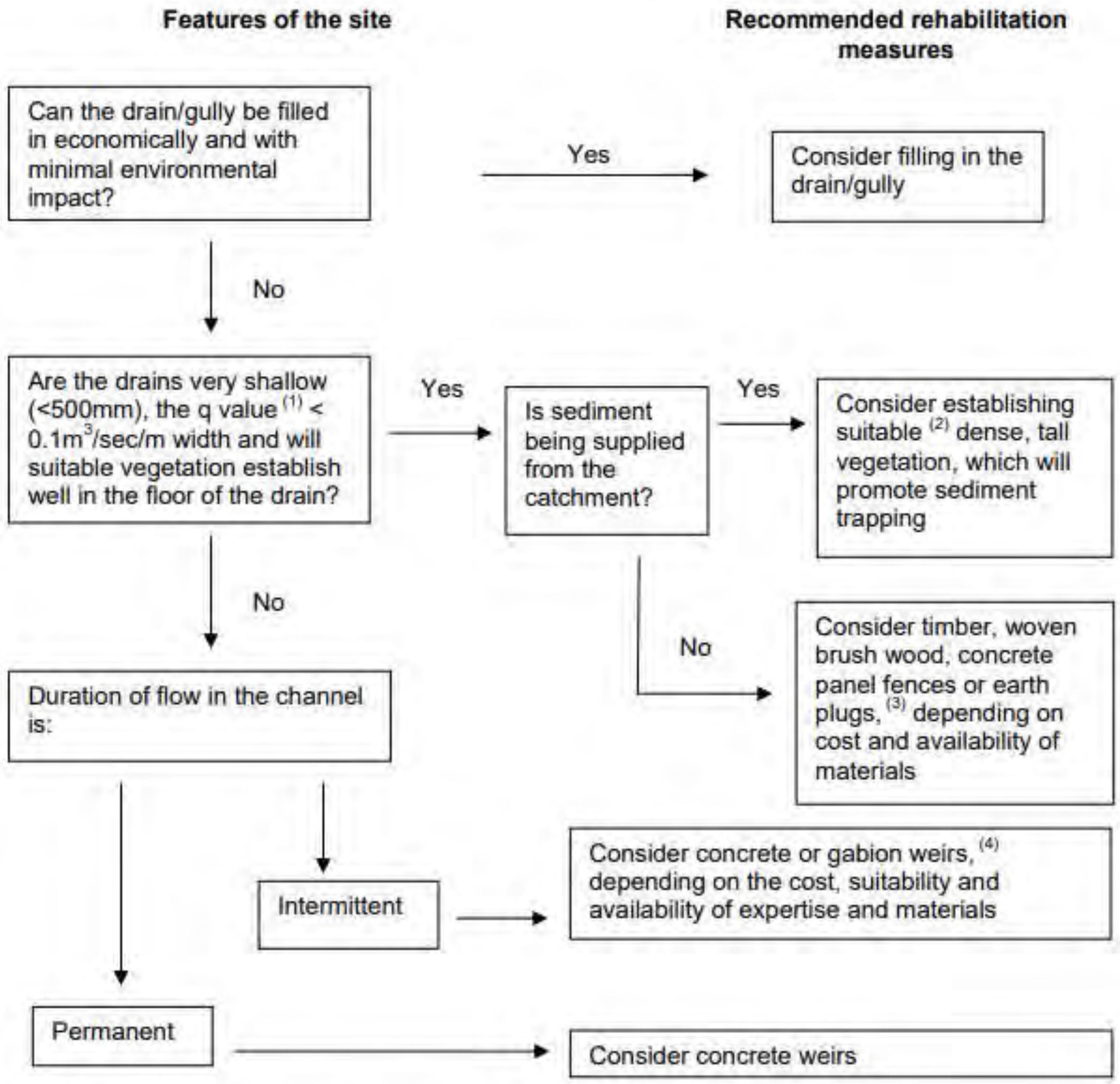
### 3.1.3 Shaping to reinstate drainage & stormwater measures

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)*

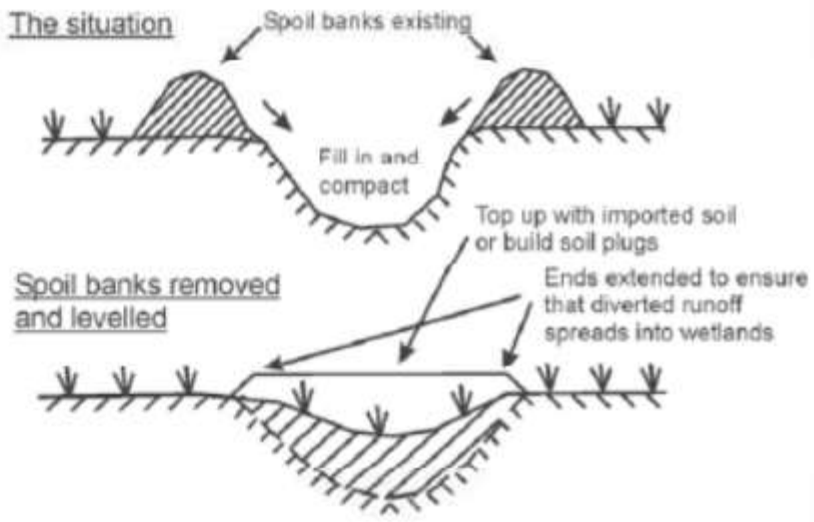



*Figure 3-2 Example to backfill a drain / gully (Russell, 2009)*

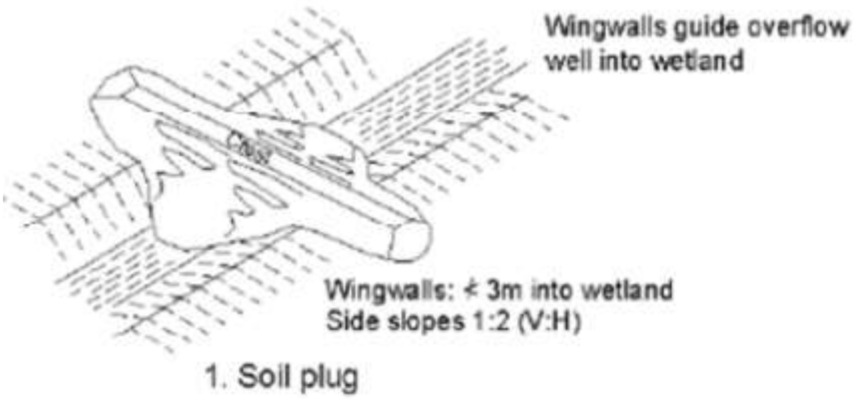



*Figure 3-3 Example of an 'earth plug' (Russell, 2009)*

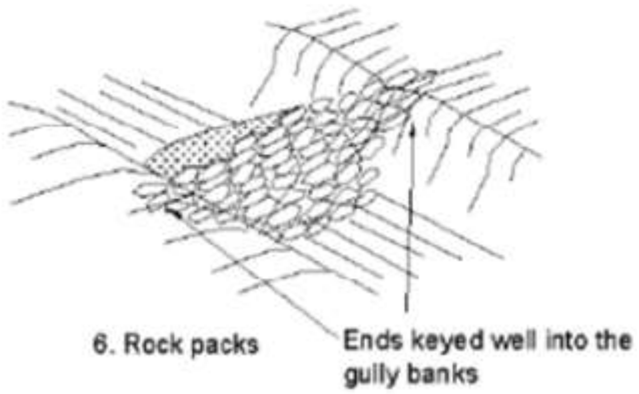



*Figure 3-4 Example of 'rock packs' for drains (Russell, 2009)*

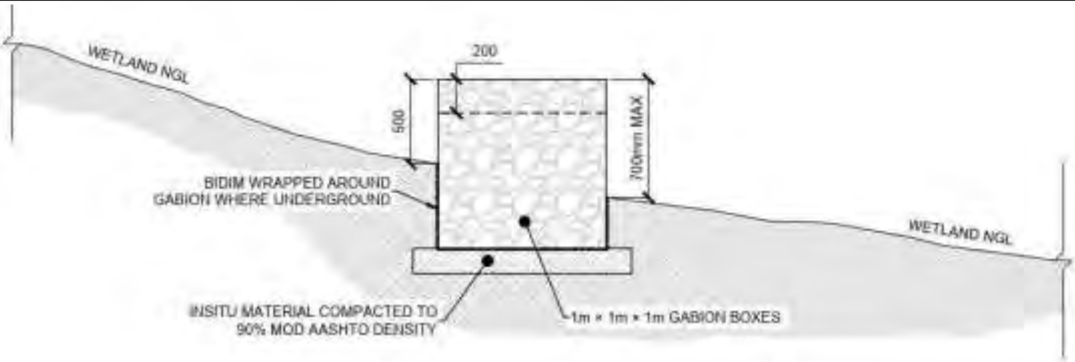



*Figure 3-5 Gabion 'plugs' designed for the development (Struxit Projects, 2022)*

#### 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 feasibly 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.

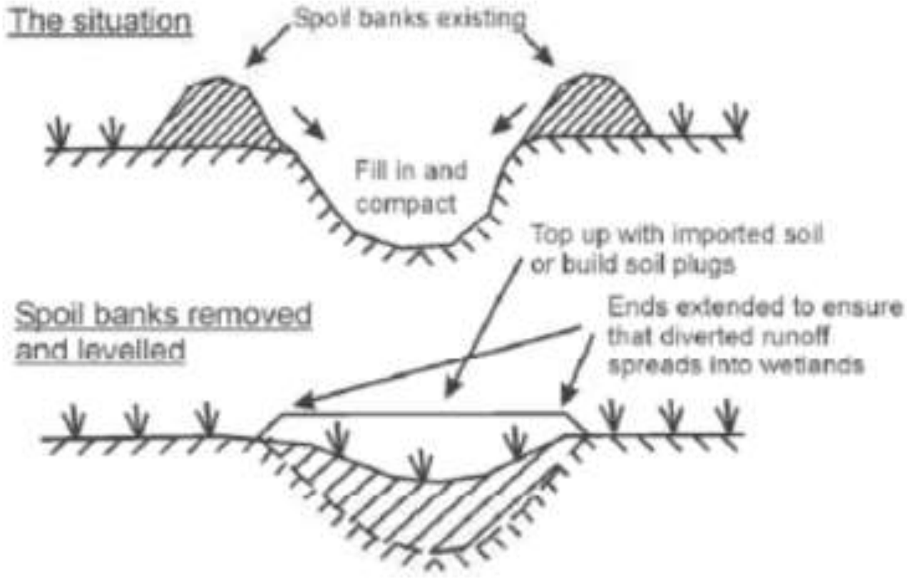



*Figure 3-6 Back-filling of drains / gullies (Russell, 2009)*

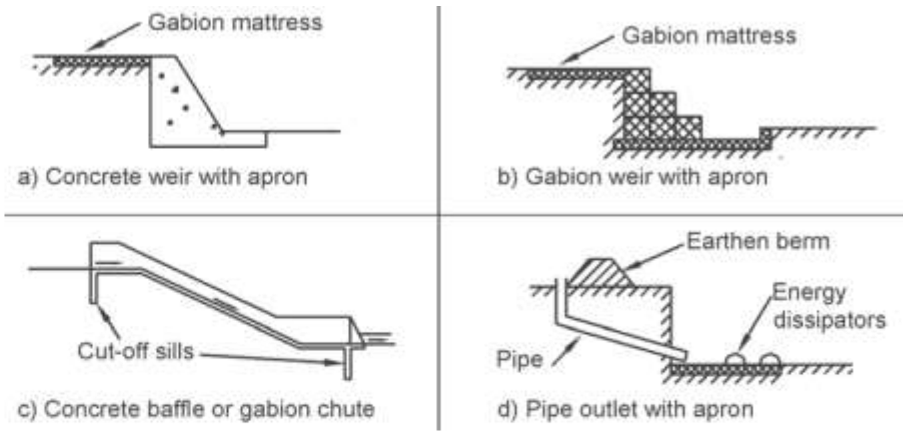



*Figure 3-7 Side views of various structures to stabilize headcuts (Russell, 2009)*

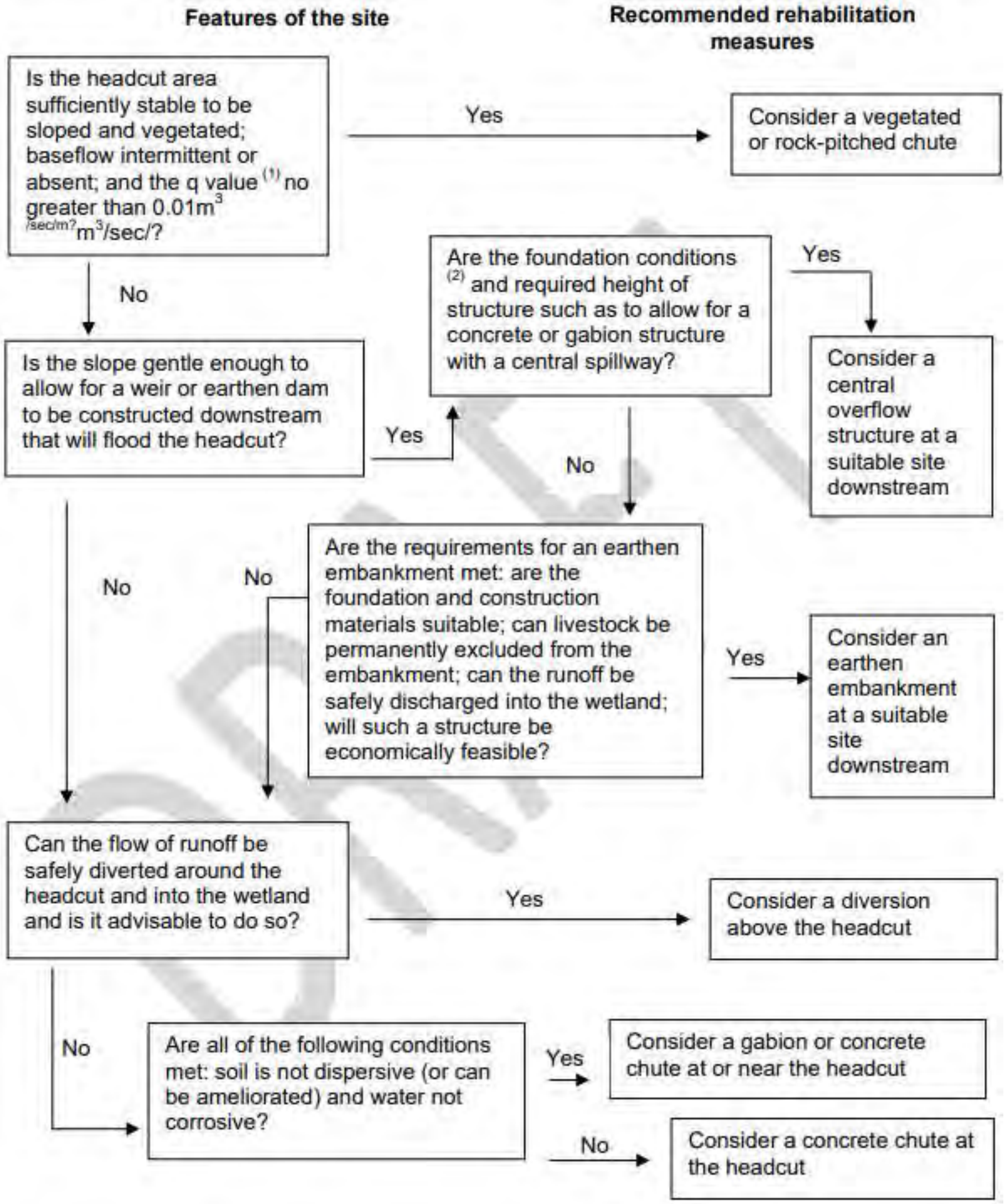



*Figure 3-8 Decision tree for choosing a mechanism to stabilize active headcut erosion (Russell, 2009)*

### 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 | • Wetland Present Ecological State, Functioning & Ecological Importance & Sensitivity<br>• Determine if habitat quality deterioration is occurring. | • Bi-annual for 2-years as a minimum, thereafter to be determined by the wetland specialist in agreement with the relevant Department. | • Wetland WET-Series<br>• Monitor for presence erosion, alien vegetation, wetland rehabilitation succession, and sedimentation | Wetland unit Recommended Ecological Class |
| | • Determine if water quality deterioration is occurring. | • Quarterly for 2-years as a minimum, thereafter to be determined by the wetland specialist in agreement with the relevant Department. | • 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 | • Monitor species and cover abundance;<br>• Monitor indigenous vs alien plant encroachment; and<br>• Fixed point photography | • After rehabilitation; and<br>• Seasonal for the first two years. | • Establishment of primarily indigenous plants; and<br>• 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 | • On-site inspection;<br>• Fixed point photography; and<br>• Compare to adjacent areas | • After rehabilitation; and<br>• Seasonal for the first two year. | • Areas with no cover;<br>• Erosion gullies;<br>• Wetland outlet; and<br>• Eroded wetland systems | • Short term: Rocks / boulders, and on-site debris;<br>• Medium term: Replanting of indigenous vegetation; and<br>• Long term: Rehab methods that may include gabion baskets, mattresses and should be discussed with specialists |
| Sedimentation | • On-site inspection; and<br>• Fixed point photography | • After rehabilitation; and<br>• Seasonal for the first two years. | • Excess sediment in wetlands | Sources of sedimentation should be noted and addressed<br>If possible, excess sediment can be removed manually. |
| Invasive Plant Species | • Monitor invasive plant encroachment;<br>• On-site inspection; and<br>• Fixed point photography | • After rehabilitation and follow- up clearing; and<br>• Seasonal for the first two years. | • 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 | • On-site inspection; and<br>• Fixed point photography | • After rehabilitation and follow-up clearing; and<br>• Monthly (by O&M or Project Company / representatives) | The presence of:<br>• Litter;<br>• Dumping material; and/or<br>• 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 eThekwini'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 Wind Energy Facility (WEF) Project

# Bethal, Mpumalanga Province

April 2023

**CLIENT**

**Prepared by:**

**The Biodiversity Company**

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| | |
|---|---|
| Report Name | Fire Management Plan for the Ummbila Wind Energy Facility (WEF) Project |
| Submitted to | |
| Report Writer | Sarah Newman<br><br>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. |
| Report reviewer | Andrew Husted<br><br>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. |
| Declaration | 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. |

# Table of Contents

## Tables



## Figures

# 1 Introduction

The Biodiversity Company was appointed by Savannah Environmental to compile a fire management plan for the Ummbila Emoyeni Wind Energy Facility (WEF), 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

Ummbila Emoyeni (Pty) Ltd is proposing the development of a commercial wind farm. The authorised Ummbila Emoyeni (Phase 1) WEF, 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 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.

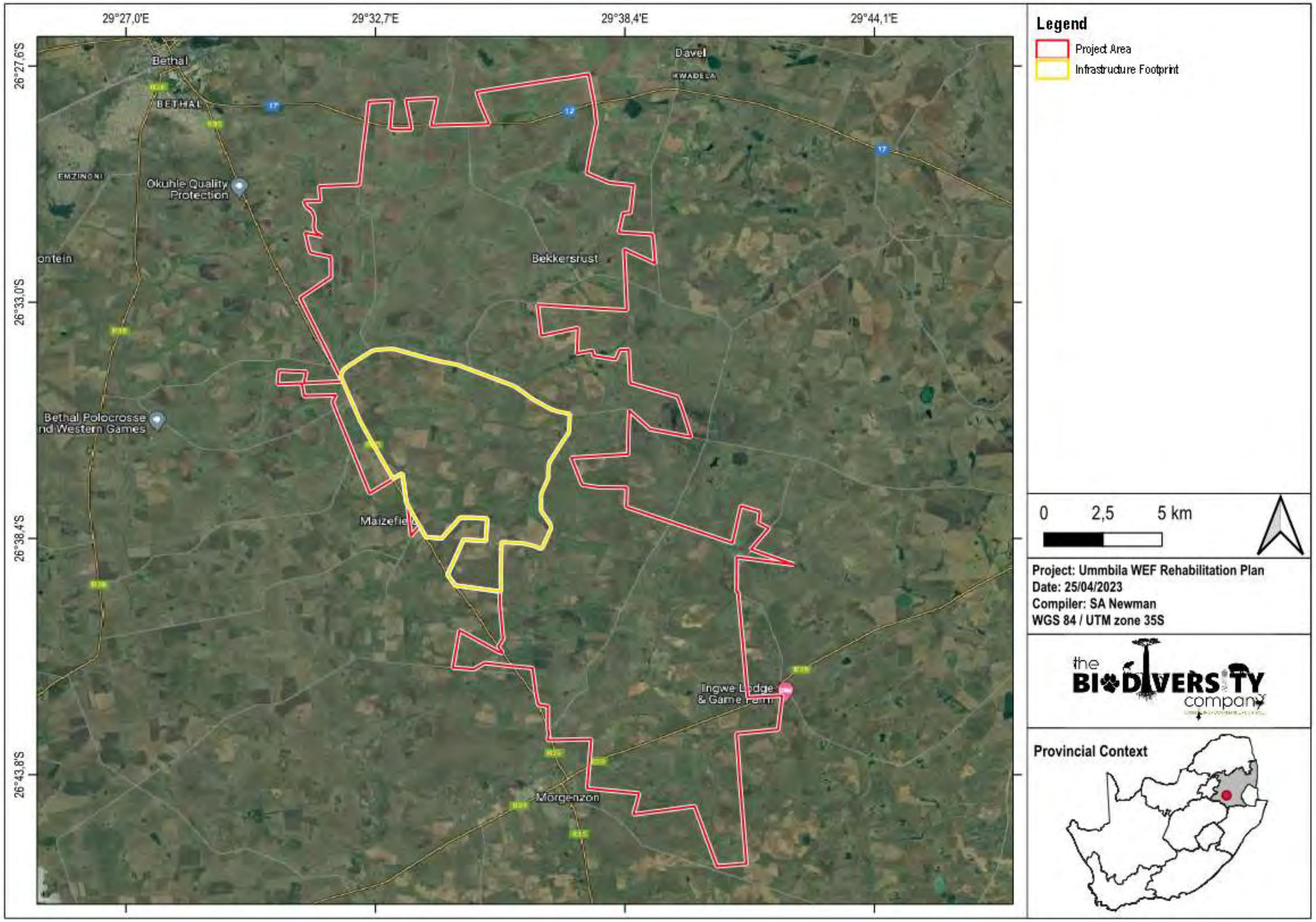


*Figure 1-1 Map illustrating the Ummbila Emoyeni Phase 1 Footprint (yellow) and the overall Project Footprint (red)*

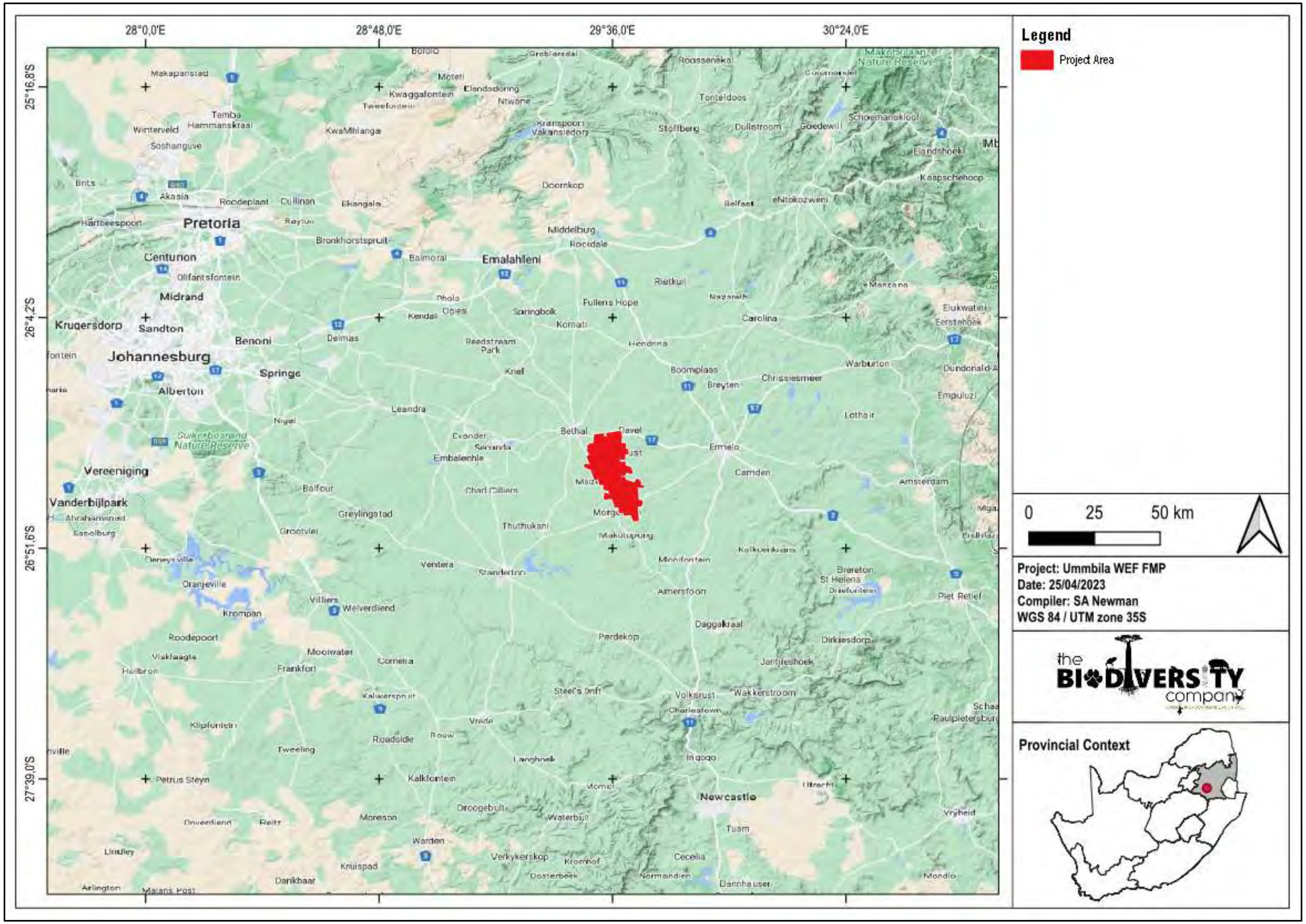


*Figure 1-2 Map illustrating the regional context of the Project Area*

## 1.2 Terms of Reference

A Fire Management Plan for the Wind Energy Facility (WEF) 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 Occupatinal 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).

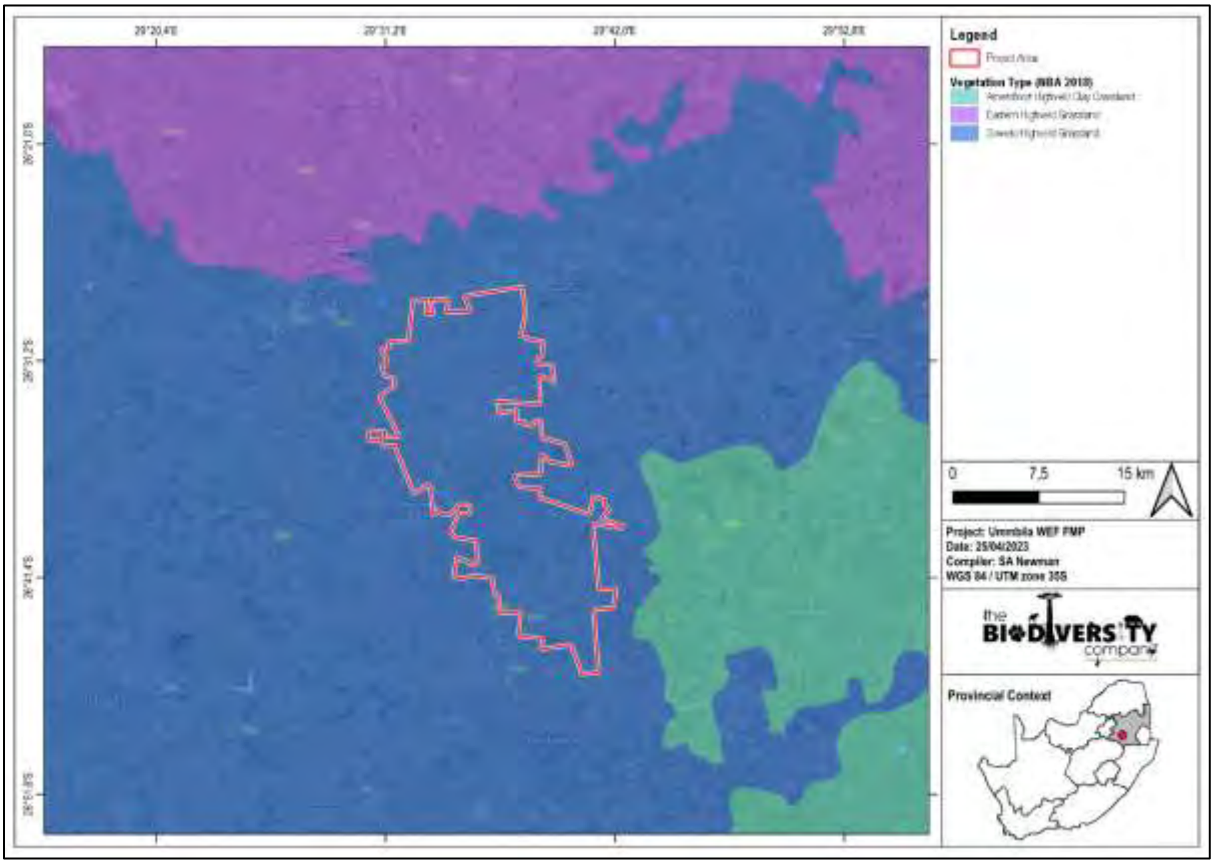


*Figure 2-1 Project area in relation to the SA vegetation map (SANBI, 2018).*

## 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.

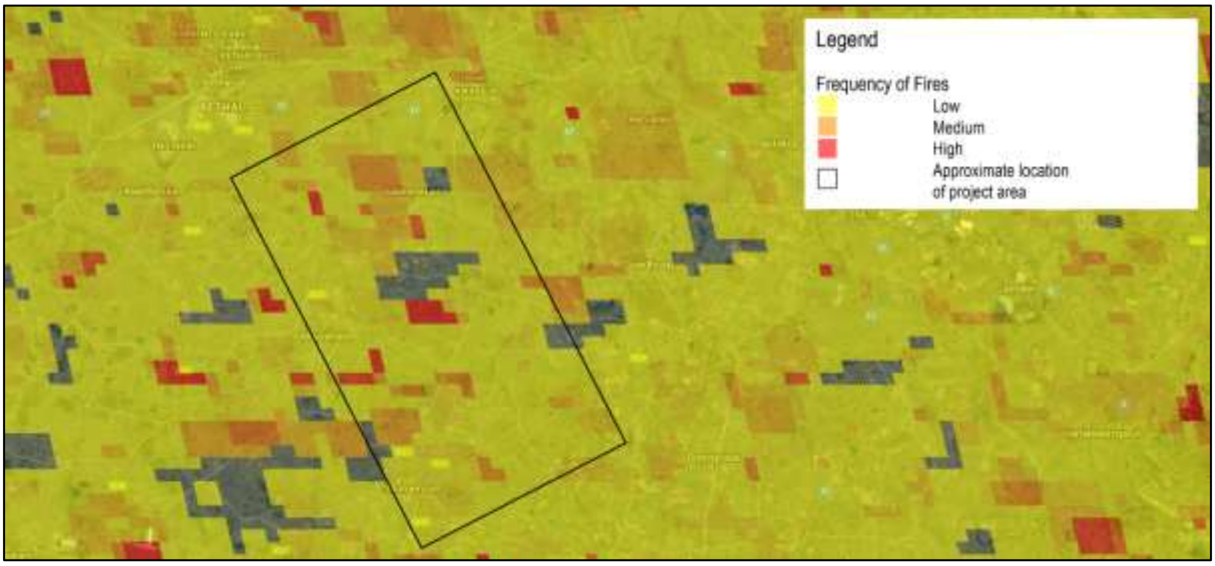


*Figure 2-2 The frequency of fires in the area based on data for the period between 1 January 2000 and 31 March 2023 (FIRMS, 2021).*

### 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.

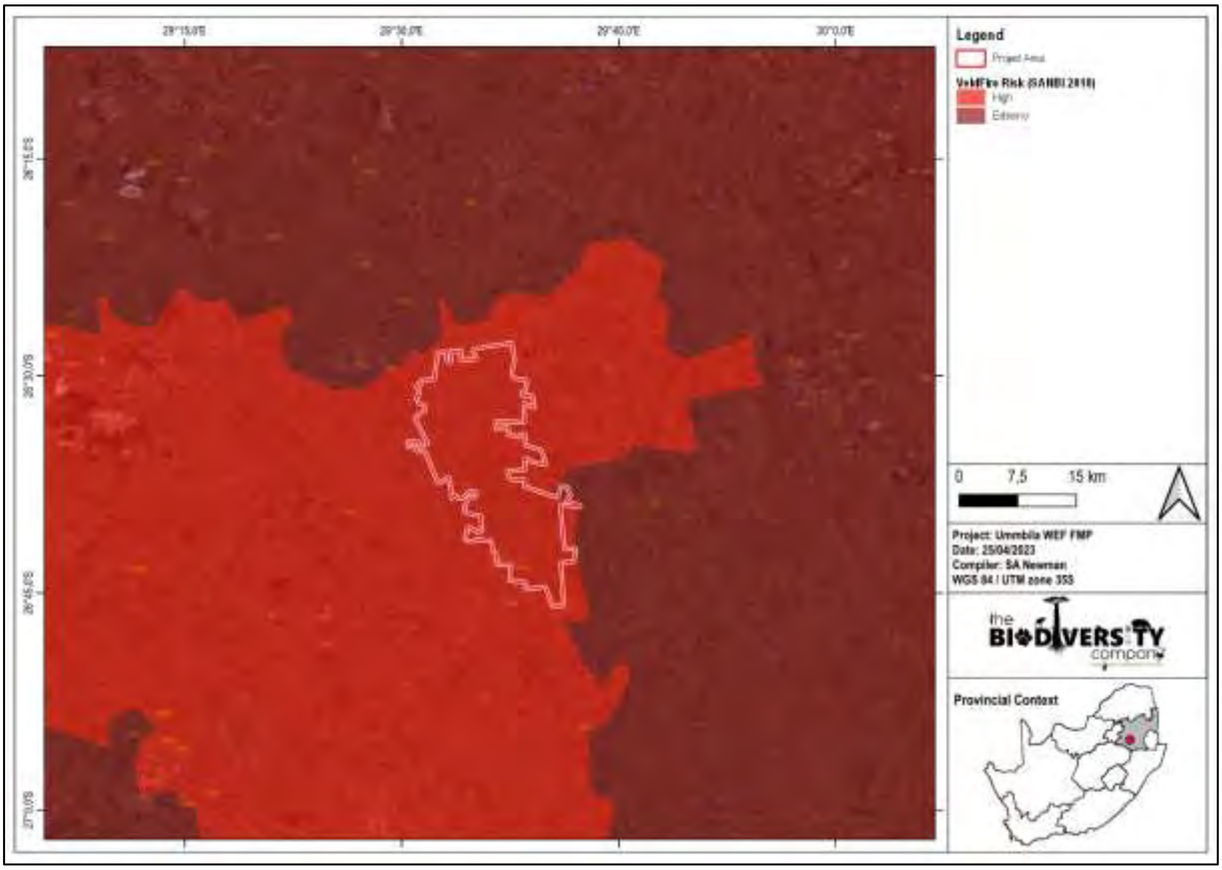


*Figure 2-3 Project area in relation to the Veldfire Risk (SANBI, 2010)*

## 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 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 | Monitoring | |
| | Responsible Party | Aspect | 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 | Monitoring | |
| | Responsible Party | 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:<br>• Fire Fighting training for designated site staff;<br>• Sources of fire risk and hazards;<br>• How to comply with any requirements of local authority fire departments and standards;<br>• How to minimise the risk of accidental fires; and<br>• 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

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 Blessbokspruit 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, Steelport, 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 Bleskbokspruit 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 facilty 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
Ummbila Emoyeni (Pty) Ltd

Produced by
Camissa Sustainability Consulting

CONTENTS

# 1 INTRODUCTION

Ummbila Emoyeni (Pty) Ltd has received an environmental authorisation for the construction and operation of the Ummbila 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.

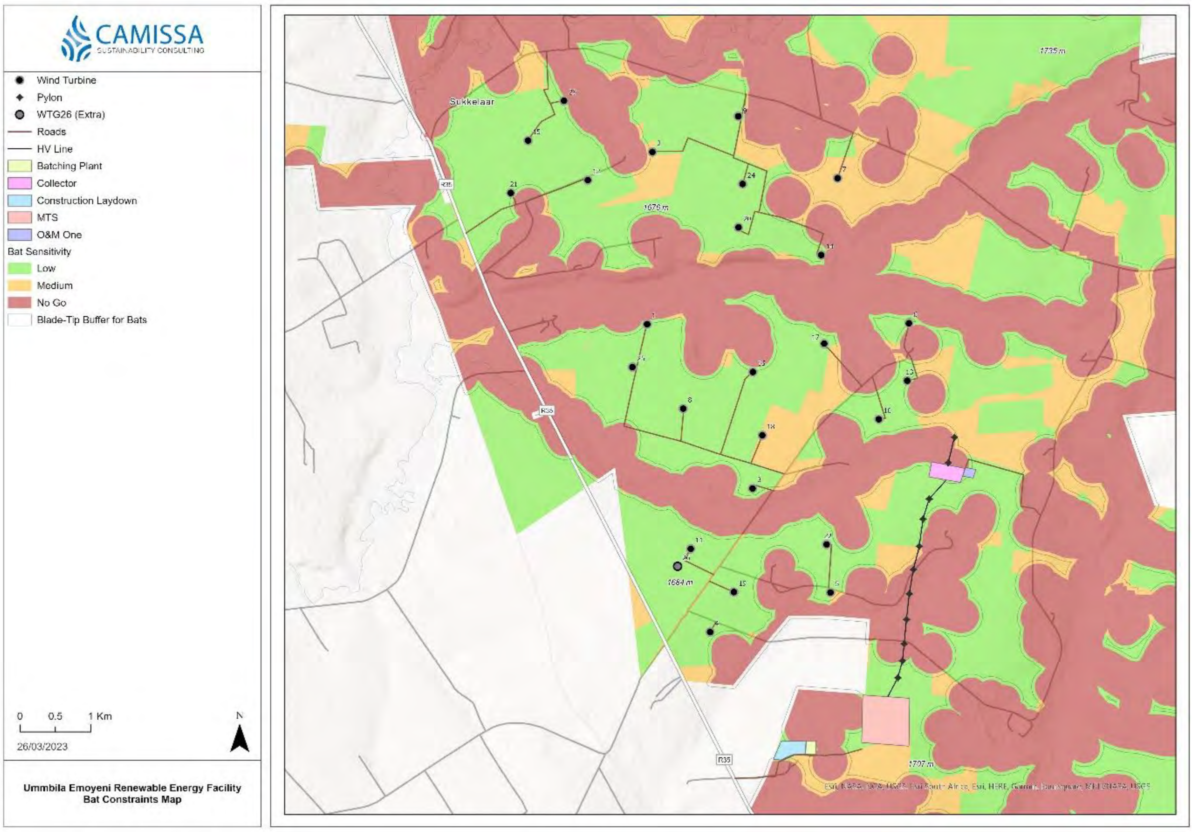


Figure 1: Layout of the Ummbila Emoyeni One Wind Farm, Mpumalanga Province, South Africa showing bat constraints including areas that are No Go for turbine placement.

# 2 PRIORITY SPECIES

A systematic method was used to identify priority bat species considered to be at highest risk from Ummbila 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 Ummbila 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 Ummbila 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 Ummbila 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 Ummbila 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 Ummbila 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 (*Cloeotis 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 Ummbila 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. Ummbila 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 Ummbila 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:

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

Where,

- *a:* the area of influence of the Ummbila 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:

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

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

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

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: Ummbila Emoyeni One Wind Farm Fatality Thresholds*

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

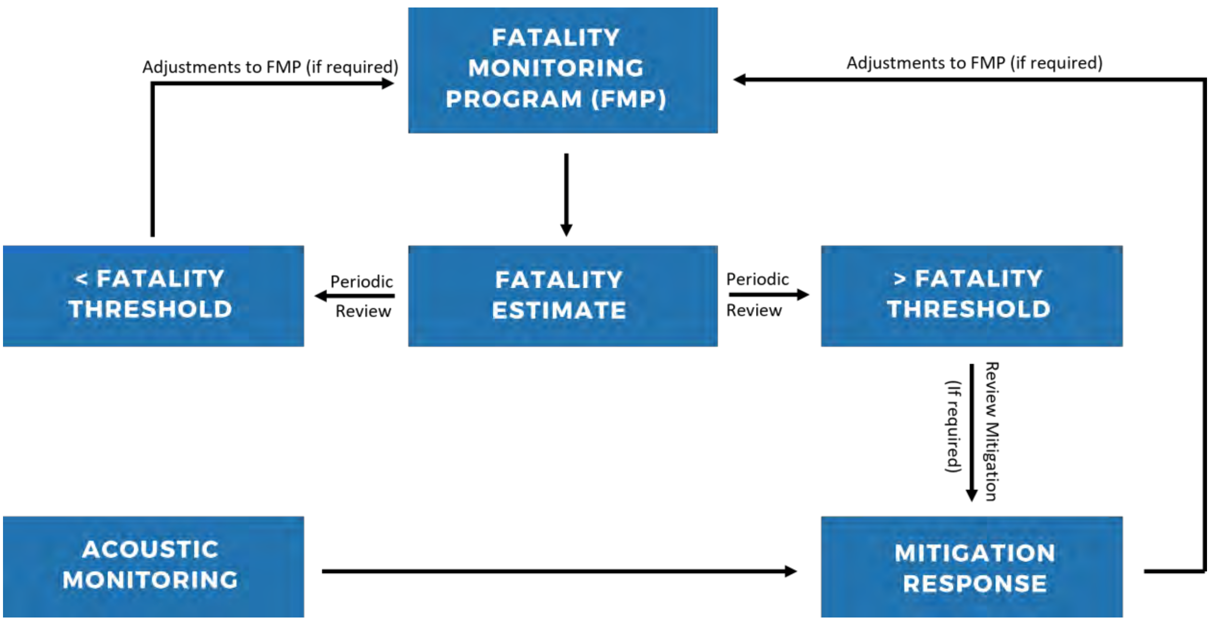


Figure 2: Summary of the Adaptive Management Process

### 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: Ummbila 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 Ummbila 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 Ummbila 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 reasonable 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). Ummbila 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 Ummbila 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Taphozous mauritianus* | Mauritian tomb bat | LC | unknown | 3 | 0 | 1 | 2 | 3 | Medium | 519.0 | 305826.7 | 0.2 | Negligible | Low |
| *Hipposideros caffer* | Sundevall's Leaf-nosed bat | LC | declining | 1 | 0 | 2 | 0 | 2 | Medium | 519.0 | 244600.7 | 0.2 | Negligible | Low |
| *Cloeotis percivali* | Percival's Short-eared Trident bat | EN | unknown | 1 | 3 | 1 | 0 | 4 | High | 519.0 | 199930.0 | 0.3 | Negligible | Low |
| *Miniopterus natalensis* | Natal Long-fingered bat | LC | unknown | 2 | 0 | 1 | 1 | 2 | Medium | 519.0 | 496702.0 | 0.1 | Negligible | Low |
| *Chaerephon pumilus* | Little Free-tailed bat | LC | unknown | 3 | 0 | 1 | 2 | 3 | Medium | 519.0 | 105038.6 | 0.5 | Negligible | Low |
| *Mops midas* | Midas Free-tailed bat | LC | declining | 3 | 0 | 2 | 2 | 4 | High | 519.0 | 15141.8 | 3.4 | Medium | High |
| *Tadarida aegyptiaca* | Egyptian Free-tailed bat | LC | unknown | 3 | 0 | 1 | 2 | 3 | Medium | 519.0 | 1193357.5 | 0.0 | Negligible | Low |
| *Nycteris thebaica* | Egyptian Slit-faced bat | LC | unknown | 1 | 0 | 1 | 0 | 1 | Low | 519.0 | 856680.1 | 0.1 | Negligible | Negligible |
| *Epomophorus wahlbergi* | Wahlberg's Epauletted fruit bat | LC | stable | 4 | 0 | 0 | 2 | 2 | Low | 519.0 | 280957.6 | 0.2 | Negligible | Negligible |
| *Eidolon helvum* | African Straw-coloured fruit bat | LC | declining | 4 | 0 | 2 | 2 | 4 | High | 519.0 | 668016.0 | 0.1 | Negligible | Low |
| *Rousettus aegyptiacus* | Egyptian Rousette | LC | stable | 4 | 0 | 0 | 2 | 2 | Medium | 519.0 | 379575.4 | 0.1 | Negligible | Low |
| *Rhinolophus clivosus* | Geoffroy's Horseshoe bat | LC | unknown | 1 | 0 | 1 | 0 | 1 | Low | 519.0 | 729899.8 | 0.1 | Negligible | Negligible |
| *Rhinolophus simulator* | Bushveld Horseshoe bat | LC | declining | 1 | 0 | 2 | 0 | 2 | Medium | 519.0 | 223252.0 | 0.2 | Negligible | Low |
| *Rhinolophus blasii* | Blasius's Horseshoe bat | NT | declining | 1 | 1 | 2 | 0 | 3 | Medium | 519.0 | 34661.3 | 1.5 | Medium | Medium |
| *Rhinolophus darlingi* | Darling's Horseshoe bat | LC | unknown | 1 | 0 | 1 | 0 | 1 | Low | 519.0 | 654218.9 | 0.1 | Negligible | Negligible |
| *Laephotis capensis* | Cape Serotine | LC | stable | 2 | 0 | 0 | 1 | 1 | Low | 519.0 | 1140060.6 | 0.0 | Negligible | Negligible |
| *Myotis tricolor* | Temminck's Myotis | LC | unknown | 2 | 0 | 1 | 1 | 2 | Medium | 519.0 | 362242.1 | 0.1 | Negligible | Low |
| *Myotis welwitschii* | Welwitsch's Myotis | LC | unknown | 2 | 0 | 1 | 1 | 2 | Medium | 519.0 | 337995.6 | 0.2 | Negligible | Low |
| *Scotophilus dinganii* | Yellow-bellied house bat | LC | unknown | 2 | 0 | 1 | 1 | 2 | Medium | 519.0 | 582661.3 | 0.1 | Negligible | Low |
| *Scotophilus viridis* | Green House bat | LC | unknown | 2 | 0 | 1 | 1 | 2 | Medium | 519.0 | 38404.9 | 1.4 | Medium | Medium |
| *Pipistrellus hesperidus* | Dusky Pipistrelle | LC | unknown | 2 | 0 | 1 | 1 | 2 | Medium | 519.0 | 98877.5 | 0.5 | Negligible | Low |
| *Pipistrellus rusticus* | Rusty Pipistrelle | LC | unknown | 2 | 0 | 1 | 1 | 2 | Medium | 519.0 | 142229.8 | 0.4 | Negligible | Low |
| *Eptesicus hottentotus* | Long-tailed Serotine | LC | unknown | 2 | 0 | 1 | 1 | 2 | Medium | 519.0 | 964421.0 | 0.1 | Negligible | Low |
| *Laephotis botswanae* | 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 | *Taphozous mauritianus* | Mauritian tomb bat | ACR | RSA $pop^n$ | Low | Low | Low | No |
| HIPPOSIDERIDAE | *Hipposideros caffer* | Sundevall's Leaf-nosed bat | ACR | RSA $pop^n$ | Low | Negligible | Negligible | No |
| HIPPOSIDERIDAE | *Cloeotis percivali* | Percival's Short-eared Trident bat | ACR | RSA $pop^n$ | Low | Negligible | Negligible | Yes |
| MINIOPTERIDAE | *Miniopterus natalensis* | Natal Long-fingered bat | ESIA/Baseline | RSA $pop^n$ | Low | Medium | Low | No |
| MOLOSSIDAE | *Chaerephon pumilus* | Little Free-tailed bat | ESIA/Baseline | RSA $pop^n$ | Low | Medium | Low | No |
| MOLOSSIDAE | *Mops midas* | Midas Free-tailed bat | ACR | RSA $pop^n$ | High | Negligible | Low | No |
| MOLOSSIDAE | *Tadarida aegyptiaca* | Egyptian Free-tailed bat | ESIA/Baseline | RSA $pop^n$ | Low | High | Medium | Yes |
| NYCTERIDAE | *Nycteris thebaica* | Egyptian Slit-faced bat | ACR | RSA $pop^n$ | Negligible | Low | Negligible | No |
| PTEROPODIDAE | *Epomophorus wahlbergi* | Wahlberg's Epauletted fruit bat | ACR | RSA $pop^n$ | Negligible | Low | Negligible | Yes |
| PTEROPODIDAE | *Eidolon helvum* | African Straw-coloured fruit bat | ACR | RSA $pop^n$ | Low | Negligible | Negligible | Yes |
| PTEROPODIDAE | *Rousettus aegyptiacus* | Egyptian Rousette | ACR | RSA $pop^n$ | Low | Low | Low | Yes |
| RHINOLOPHIDAE | *Rhinolophus clivosus* | Geoffroy's Horseshoe bat | ACR | RSA $pop^n$ | Negligible | Negligible | Negligible | No |
| RHINOLOPHIDAE | *Rhinolophus simulator* | Bushveld Horseshoe bat | ACR | RSA $pop^n$ | Low | Negligible | Negligible | No |
| RHINOLOPHIDAE | *Rhinolophus blasii* | Blasius's Horseshoe bat | ACR | RSA $pop^n$ | Medium | Negligible | Low | Yes |
| RHINOLOPHIDAE | *Rhinolophus darlingi* | Darling's Horseshoe bat | ACR | RSA $pop^n$ | Negligible | Negligible | Negligible | No |
| VESPERTILIONIDAE | *Laephotis capensis* | Cape Serotine | ESIA/Baseline | RSA $pop^n$ | Negligible | High | Low | No |
| VESPERTILIONIDAE | *Myotis tricolor* | Temminck's Myotis | ACR | RSA $pop^n$ | Low | Low | Low | No |
| VESPERTILIONIDAE | *Myotis welwitschii* | Welwitsch's Myotis | ACR | RSA $pop^n$ | Low | Negligible | Negligible | No |
| VESPERTILIONIDAE | *Scotophilus dinganii* | Yellow-bellied house bat | ESIA/Baseline | RSA $pop^n$ | Low | Low | Low | No |
| VESPERTILIONIDAE | *Scotophilus viridis* | Green House bat | ACR | RSA $pop^n$ | Medium | Negligible | Low | No |
| VESPERTILIONIDAE | *Pipistrellus hesperidus* | Dusky Pipistrelle | ACR | RSA $pop^n$ | Low | Negligible | Negligible | No |
| VESPERTILIONIDAE | *Pipistrellus rusticus* | Rusty Pipistrelle | ACR | RSA $pop^n$ | Low | Negligible | Negligible | No |
| VESPERTILIONIDAE | *Eptesicus hottentotus* | Long-tailed Serotine | ESIA/Baseline | RSA $pop^n$ | Low | Low | Low | No |
| VESPERTILIONIDAE | *Laephotis botswanae* | Botswana Long-eared bat | ACR | RSA $pop^n$ | Medium | Negligible | Low | No |

## APPENDIX 9: GRIEVANCE MECHANISM FOR PUBLIC COMPLAINTS AND ISSUES

# GRIEVANCE MECHANISM / PROCESS

## 1. PURPOSE

This Grievance Mechanism has been developed to receive and facilitate the resolution of concerns and grievances regarding the project's environmental and social performance. The aim of the Grievance Mechanism is to ensure that grievances or concerns raised by stakeholders are addressed in a manner that:

- Provides a predictable, accessible, transparent, and credible process to all parties, resulting in outcomes that are fair and equitable, accountable and efficient.
- Promotes trust as an integral component of broader community relations activities.
- Enables more systematic identification of emerging issues and trends, facilitating corrective action and pre-emptive engagement.

The aim of this Grievance Mechanism is to provide a process to address grievances in a manner that does not require a potentially costly and time-consuming legal process.

## 2. PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES

The following proposed grievance procedures are to be complied with throughout the construction, operation and decommissioning phases of the project. These procedures should be updated as and when required to ensure that the Grievance Mechanism is relevant for the project and effective in providing the required processes.

- Local landowners, communities and authorities must be informed in writing by the Developer of the grievance mechanism and the process by which grievances can be brought to the attention of the Developer through its designated representative. This must be undertaken with the commencement of the construction phase.
- A company representative must be appointed as the contact person to which grievances can be directed. The name and contact details of the contact person must be provided to local landowners, communities and authorities when requested.
- Project related grievances relating to the construction, operation and or decommissioning phases must be addressed in writing to the contact person. The contact person should assist local landowners and/or communities who may lack resources to submit/prepare written grievances, by recording grievances and completing written grievance notices where applicable, translating requests or concerns or by facilitating contact with relevant parties who can address the raised concerns. The following information should be obtained, as far as possible, regarding each written grievance, which may act as both acknowledgement of receipt as well as record of grievance received:
    a. The name and contact details of the complainant;
    b. The nature of the grievance;
    c. Date raised, received, and for which the meeting was arranged;
    d. Persons elected to attend the meeting (which will depend on the grievance); and
    e. A clear statement that the grievance procedure is, in itself, not a legal process. Should such avenues be desired, they must be conducted in a separate process and do not form part of this grievance mechanism.

» The grievance must be registered with the contact person who, within 2 working days of receipt of the grievance, must contact the Complainant to discuss the grievance and, if required, agree on a suitable date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within 2 weeks of receipt of the grievance.
» The contact person must draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed and only if required).
» A grievance register must be kept on site (in electronic format, so as to facilitate editing and updating), and shall be made available to all parties wishing to gain access thereto.
» Prior to the meeting being held the contact person must contact the Complainant to discuss and agree on the parties who should attend the meeting, as well as a suitable venue. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or Developer are entitled to invite their legal representatives to attend the meeting/s, it should be made clear to all the parties involved in the process that the grievance mechanism process is not a legal process, and that if the Complainant invites legal representatives, the cost will be their responsibility. It is therefore recommended that the involvement of legal representatives be limited as far as possible, as a matter of last resort, and that this process be primarily aimed at stakeholder relationship management as opposed to an arbitration or litigation mechanism.
» The meeting should be chaired by the Developer's representative appointed to address grievances. The Developer must supply and nominate a representative to capture minutes and record the meeting/s.
» Draft copies of the minutes must be made available to the Complainant and the Developer within 5 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 5 working days of receipt of the draft minutes.
» The meeting agenda must be primarily the discussion of the grievance, avoidance and mitigation measures available and proposed by all parties, as well as a clear indication of the future actions and responsibilities, in order to put into effect the proposed measures and interventions to successfully resolve the grievance.
» In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
» In the event of a dispute between the Complainant and the Developer regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s must note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned.
» In the event that the parties agree to appoint a mediator, the Developer will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the Developer, must identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator must be borne by the Developer. The Developer must supply and nominate a representative to capture minutes and record the meeting/s.

» In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
» In the event of the dispute not being resolved, the mediator must prepare a draft report that summaries the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.
» The draft report must be made available to the Complainant and the Developer for comment before being finalised and signed by all parties, which signature may not be unreasonably withheld by either party. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 5 working days. The way forward will be informed by the recommendations of the mediator and the nature of the grievance.

A Complaint is closed out when no further action is required, or indeed possible. Closure status must be classified and captured following mediation or successful resolution in the Complaints Register as follows:
» Resolved. Complaints where a resolution has been agreed and implemented and the Complainant has signed the Confirmation Form.
» Unresolved. Complaints where it has not been possible to reach an agreed resolution despite mediation.
» Abandoned. Complaints where the Complainant is not contactable after one month following receipt of a Complaint and efforts to trace his or her whereabouts have been unsuccessful.

The grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. In the event of the grievance not being resolved to the satisfaction of Complainant and or the Developer, either party may be entitled to legal action if an appropriate option, however, these grievance mechanisms aim to avoid such interactions by addressing the grievances within a short timeframe, and to mutual satisfaction, where possible.

APPENDIX 10: ALIEN PLANT AND OPEN SPACE MANAGEMENT PLAN

# ALIEN PLANT AND OPEN SPACE MANAGEMENT PLAN

## 1. PURPOSE

Invasive alien plant species pose the second largest threat to biodiversity after direct habitat destruction. The purpose of this Alien Plant and Open Space Management Plan is to provide a framework for the management of alien and invasive plant species during the construction and operation of the Ummbila Emoyeni Wind Energy Facility. The broad objectives of the plan include the following:

» Ensure alien plants do not become dominant in parts of the site, or the whole site, through the control and management of alien and invasive species presence, dispersal and encroachment.
» Develop and implement a monitoring and eradication programme for alien and invasive plant species.
» Promote the natural re-establishment and planting of indigenous species in order to retard erosion and alien plant invasion.

This plan should be updated throughout the life-cycle of the project, as required in order to ensure that appropriate measures are in place to manage and control the establishment of alien and invasive plant species and to ensure compliance with relevant legislation. This plan should be implemented with specific focus on sensitive areas.

## 2. LEGISLATIVE CONTEXT

*Conservation of Agricultural Resources Act (Act No. 43 of 1983)*

In terms of the amendments to the regulations under the Conservation of Agricultural Resources Act (Act No. 43 of 1983), all declared alien plant species must be effectively controlled. Landowners are legally responsible for the control of invasive alien plants on their properties. In terms of this Act alien invasive plant species are ascribed to one of the following categories:

» Category 1: Prohibited and must be controlled.
» Category 2 (commercially used plants): May be grown in demarcated areas provided that there is a permit and that steps are taken to prevent their spread.
» Category 3 (ornamentally used plants): May no longer be planted. Existing plants may be retained as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.

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

The National Environmental Management: Biodiversity Act (NEM:BA) regulates all invasive organisms in South Africa, including a wide range of fauna and flora. Regulations have been published in Government Notices R.506, R.507, R.508 and R.509 of 2013 under NEM:BA. According to this Act and the regulations, any species designated under Section 70 cannot be propagated, grown, bought or sold without a permit. Below is an explanation of the three categories:

» Category 1a: Invasive species requiring compulsory control. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.

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

Plants listed under the categories above are detailed within the Alien and Invasive Species published in GNR1003 of 18 September 2020. The following guide is a useful starting point for the identification of alien species: Bromilow, C. 2010. Problem Plants and Alien Weeds of South Africa. Briza, Pretoria.

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

## 3. ALIEN PLANT MANAGEMENT PRINCIPLES

### 3.1. Prevention and early eradication

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

Monitoring plans should be developed which are designed to identify Invasive Alien Plant Species already on site, as well as those that are introduced to the site by the construction activities. Keeping up to date on which weeds are an immediate threat to the site is important, but efforts should be planned to update this information on a regular basis. When additional Invasive Alien Plant Species are recorded on site, an immediate response of locating the site for future monitoring and either hand-pulling the weeds or an application of a suitable herbicide (where permissible only) should be planned. It is, however, better to monitor regularly and act swiftly than to allow invasive alien plants to become established on site.

### 3.2. Containment and control

If any alien invasive plants are found to become established on site, action plans for their control should be developed, depending on the size of the infestations, budgets, manpower considerations and time. Separate plans of control actions should be developed for each location and/or each species. Appropriate registered chemicals and other possible control agents should be considered in the action plans for each site/species. The uses of chemicals are not recommended for any wetland areas. Herbicides should be applied directly to the plant and not to the soil. The key is to ensure that no invasions get out of control. Effective containment and control will ensure that the least amount of energy and resources are required to maintain this status over the long-term. This will also be an indicator that natural systems are impacted to the smallest degree possible.

## 3.3. General Clearing and Guiding Principles

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

### i. Clearing Methods

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

Fire should not be used for alien species control or vegetation management at the site. The best-practice clearing method for each species identified should be used.

» Mechanical control

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

» Chemical Control

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

* Area contamination must be minimised by careful, accurate application with a minimum amount of herbicide to achieve good control.
* All care must be taken to prevent contamination of any water bodies. This includes due care in storage, application, cleaning equipment and disposal of containers, product and spray mixtures.
* Equipment should be washed where there is no danger of contaminating water sources and washings carefully disposed of at a suitable site.
* To avoid damage to indigenous or other desirable vegetation, products should be selected that will have the least effect on non-target vegetation.
* Coarse droplet nozzles should be fitted to avoid drift onto neighbouring vegetation.
* The appropriate health and safety procedures should also be followed regarding the storage, handling and disposal of herbicides.
* The use of chemicals is not recommended for wetland areas.

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

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

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

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

» Biological control

Biological weed control consists of the use of natural enemies to reduce the vigour or reproductive potential of an invasive alien plant. Biological control agents include insects, mites, and micro-organisms such as fungi or bacteria. They usually attack specific parts of the plant, either the reproductive organs directly (flower buds, flowers or fruit) or the seeds after they have dropped. The stress caused by the biological control agent may kill a plant outright or it might impact on the plant's reproductive capacity. In certain instances, the reproductive capacity is reduced to zero and the population is effectively sterilised. All of these outcomes will help to reduce the spread of the species.

To obtain biocontrol agents, provincial representatives of the Working for Water Programme or the Directorate: Land Use and Soil Management (LUSM), Department of Agriculture, Forestry and Fisheries (DAFF) can be contacted.

## 3.4. General management practices

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

» Establish an on-going monitoring programme for the construction phase to detect and quantify any alien species that may become established.
» Alien vegetation regrowth on areas disturbed by construction must be immediately controlled.
» Care must be taken to avoid the introduction of alien invasive plant species to the site. Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment. Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.
» Cleared areas that have become invaded by alien species can be sprayed with appropriate herbicides provided that these herbicides break down on contact with the soil. Residual herbicides should not be used.
» The effectiveness of vegetation control varies seasonally and this is also likely to impact alien species. Control early in the wet season will allow species to re-grow, and follow-up control is likely to be required. It is tempting to leave control until late in the wet season to avoid follow-up control. However, this may allow alien species to set seed before control, and hence will not contribute towards reducing alien species abundance. Therefore, vegetation control should be aimed at the

middle of the wet season, with a follow-up event towards the end of the wet season. There are no exact dates that can be specified here as each season is unique and management must therefore respond according to the state and progression of the vegetation.

» Alien plant management is an iterative process and it may require repeated control efforts to significantly reduce the abundance of a species. This is often due to the presence of large and persistent seed banks. However, repeated control usually results in rapid decline once seed banks become depleted.
» Some alien species are best individually pulled by hand. Regular vegetation control to reduce plant biomass within the site should be conducted. This should be timed so as to coincide with the critical growth phases of the most important alien species on site. This will significantly reduce the cost of alien plant management as this should contribute towards the control of the dominant alien species and additional targeted control will be required only for a limited number of species.
» No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used.
» During operation, surveys for alien species should be conducted regularly. It is recommended that this be undertaken every 6 months for the first two years after construction and annually thereafter. All alien plants identified should be cleared using appropriate means.

## 3.5. Monitoring

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

In general, the following principles apply for monitoring:

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

The following monitoring should be implemented to ensure management of alien invasive plant species.

<u>Construction Phase</u>

| Monitoring Action | Indicator | Timeframe |
|---|---|---|
| Document alien species present at the site | List of alien plant species | Preconstruction<br>Monthly during Summer and Autumn (Middle November to end of March)<br>3 Monthly during Winter and Spring |
| Document alien plant distribution | Alien plant distribution map within priority areas | 3 Monthly |
| Document & record alien plant control measures implemented | Record of clearing activities | 3 Monthly |

## Operation Phase

| Monitoring Action | Indicator | Timeframe |
|---|---|---|
| Document alien plant species distribution and abundance over time at the site | Alien plant distribution map | Biannually |
| Document alien plant control measures implemented & success rate achieved | Records of control measures and their success rate.<br>A decline in alien distribution and cover over time at the site | Biannually |
| Document rehabilitation measures implemented and success achieved in problem areas | Decline in vulnerable bare areas over time | Biannually |

APPENDIX 11: PLANT RESCUE AND PROTECTION PLAN

# SEARCH AND RESCUE AND PROTECTION PLAN

## 1. PURPOSE

The purpose of the Search and Rescue and Protection Plan is to implement avoidance and mitigation measures, in addition to the mitigations included in the EMPr to reduce the impact of the wind energy facility's establishment on listed and protected plant species and their habitats during construction and operation. This subplan is required in order to ensure compliance with national and provincial legislation for vegetation clearing and any required destruction or translocation of provincially and nationally protected species within the development footprint.

The Plan first provides some legislative background on the regulations relevant to listed and protected species, under the TOPS, The Mpumalanga Nature Conservation Act, No. 10 of 1998and National List of Protected Tree Species. This is followed by an identification of protected species present within the development area and actions that should be implemented to minimise impact on these species and comply with legislative requirements.

## 2. IDENTIFICATION OF SPECIES OF CONSERVATION CONCERN

Plant species are protected at the national level as well as the provincial level and different permits may be required for different species depending on their protection level. At the national level, protected trees are listed by the Department of Forestry, Fisheries and Environment (DFFE) under the National List of Protected Trees, which is updated on a regular basis. Any clearing of nationally protected trees requires a permit from DFFE. At the provincial level, all species red-listed under the Red List of South African plants (http://redlist.sanbi.org/) as well as species listed under the the Mpumalanga Nature Conservation Act, No. 10 of 1998 protected and require provincial permits.

Protected fauna species red-listed under the Red List of South African plants (http://redlist.sanbi.org/) as well as species listed under the Mpumalanga Nature Conservation Act, No. 10 of 1998 are protected and require provincial permits.

## 3. IDENTIFICATION OF LISTED SPECIES

A total of 102 SoCC, namely 19 Red List and 88 protected species (note that some of the Red List species are also protected; thus some overlap occurs between these numbers) (Table 1). The protected species are listed under Schedule 11 (Protected Plants) of the Mpumalanga Nature Conservation Act, no. 10 of 1998. The initial screening report also revealed the potential presence of an additional three Medium Sensitive species, namely species 851, 691, and 1252 (for their protection, the identities of these species will not made public). No protected tree species were identified within the project site.

Table 1: Species of Conservation Concern that have been recorded within the broader region surrounding the study area, as per the SANBI POSA online database.

| Family | Species | IUCN | Protection Schedule |
|---|---|---|---|
| Apocynaceae | *Schizoglossum peglerae* | EN | |
| Asparagaceae | *Asparagus fractiflexus* | EN | |

| Family | Species | IUCN | Protection Schedule |
|---|---|---|---|
| Aizoaceae | *Khadia carolinensis* | VU | |
| Amaryllidaceae | *Nerine gracilis* | VU | |
| Apocynaceae | *Aspidoglossum xanthosphaerum* | VU | |
| Apocynaceae | *Miraglossum davyi* | VU | |
| Apocynaceae | *Pachycarpus suaveolens* | VU | |
| Asphodelaceae | *Aloe hlangapies* | VU | 11 |
| Iridaceae | *Gladiolus paludosus* | VU | 11 |
| Apocynaceae | *Stenostelma umbelluliferum* | NT | |
| Asphodelaceae | *Kniphofia typhoides* | NT | 11 |
| Asteraceae | *Cineraria austrotransvaalensis* | NT | |
| Fabaceae | *Argyrolobium campicola* | NT | |
| Hyacinthaceae | *Merwilla plumbea* | NT | |
| Iridaceae | *Gladiolus robertsoniae* | NT | 11 |
| Orchidaceae | *Habenaria barbertoni* | NT | 11 |
| Euphorbiaceae | *Acalypha caperonioides var. caperonioides* | DD | |
| Hyacinthaceae | *Drimia elata* | DD | |
| Iridaceae | *Hesperantha rupestris* | DD | |
| Agapanthaceae | *Agapanthus inapertus subsp. intermedius* | LC | 11 |
| Amaryllidaceae | *Boophone disticha* | LC | 11 |
| Amaryllidaceae | *Brunsvigia natalensis* | LC | 11 |
| Amaryllidaceae | *Brunsvigia radulosa* | LC | 11 |
| Amaryllidaceae | *Crinum bulbispermum* | LC | 11 |
| Amaryllidaceae | *Crinum graminicola* | LC | 11 |
| Amaryllidaceae | *Cyrtanthus breviflorus* | LC | 11 |
| Amaryllidaceae | *Cyrtanthus stenanthus* | LC | 11 |
| Amaryllidaceae | *Cyrtanthus tuckii* | LC | 11 |
| Amaryllidaceae | *Haemanthus humilis subsp. hirsutus* | LC | 11 |
| Amaryllidaceae | *Haemanthus montanus* | LC | 11 |
| Amaryllidaceae | *Scadoxus puniceus* | LC | 11 |
| Araceae | *Zantedeschia albomaculata subsp. albomaculata* | LC | 11 |
| Araceae | *Zantedeschia albomaculata subsp. macrocarpa* | LC | 11 |
| Araceae | *Zantedeschia rehmannii* | LC | 11 |
| Asphodelaceae | *Aloe boylei* | LC | 11 |
| Asphodelaceae | *Aloe davyana* | LC | 11 |
| Asphodelaceae | *Aloe ecklonis* | LC | 11 |
| Asphodelaceae | *Aloe graciliflora* | LC | 11 |
| Asphodelaceae | *Aloe jeppeae* | LC | 11 |
| Asphodelaceae | *Aloe maculata subsp. maculata* | LC | 11 |
| Asphodelaceae | *Kniphofia albescens* | LC | 11 |
| Asphodelaceae | *Kniphofia porphyrantha* | LC | 11 |
| Dioscoreaceae | *Dioscorea dregeana* | LC | 11 |
| Hyacinthaceae | *Eucomis montana* | LC | 11 |
| Hyacinthaceae | *Eucomis pallidiflora subsp. pallidiflora* | LC | 11 |
| Iridaceae | *Gladiolus crassifolius* | LC | 11 |
| Iridaceae | *Gladiolus dalenii subsp. dalenii* | LC | 11 |

| Family | Species | IUCN | Protection Schedule |
|---|---|---|---|
| Iridaceae | *Gladiolus ecklonii* | LC | 11 |
| Iridaceae | *Gladiolus elliotii* | LC | 11 |
| Iridaceae | *Gladiolus longicollis subsp. longicollis* | LC | 11 |
| Iridaceae | *Gladiolus longicollis subsp. platypetalus* | LC | 11 |
| Iridaceae | *Gladiolus papilio* | LC | 11 |
| Iridaceae | *Gladiolus sericeovillosus subsp. calvatus* | LC | 11 |
| Iridaceae | *Gladiolus sericeovillosus subsp. sericeovillosus* | LC | 11 |
| Iridaceae | *Gladiolus vinosomaculatus* | LC | 11 |
| Iridaceae | *Gladiolus woodii* | LC | 11 |
| Iridaceae | *Hesperantha coccinea* | LC | 11 |
| Iridaceae | *Watsonia bella* | LC | 11 |
| Iridaceae | *Watsonia pulchra* | LC | 11 |
| Orchidaceae | *Brachycorythis ovata subsp. ovata* | LC | 11 |
| Orchidaceae | *Brachycorythis pubescens* | LC | 11 |
| Orchidaceae | *Brownleea parviflora* | LC | 11 |
| Orchidaceae | *Disa aconitoides subsp. aconitoides* | LC | 11 |
| Orchidaceae | *Disa cooperi* | LC | 11 |
| Orchidaceae | *Disa nervosa* | LC | 11 |
| Orchidaceae | *Disa patula var. transvaalensis* | LC | 11 |
| Orchidaceae | *Disa stachyoides* | LC | 11 |
| Orchidaceae | *Disa versicolor* | LC | 11 |
| Orchidaceae | *Disperis cooperi* | LC | 11 |
| Orchidaceae | *Disperis fanniniae* | LC | 11 |
| Orchidaceae | *Eulophia cooperi* | LC | 11 |
| Orchidaceae | *Eulophia hians var. hians* | LC | 11 |
| Orchidaceae | *Eulophia hians var. inaequalis* | LC | 11 |
| Orchidaceae | *Eulophia hians var. nutans* | LC | 11 |
| Orchidaceae | *Eulophia ovalis var. bainesii* | LC | 11 |
| Orchidaceae | *Eulophia ovalis var. ovalis* | LC | 11 |
| Orchidaceae | *Eulophia parvilabris* | LC | 11 |
| Orchidaceae | *Habenaria clavata* | LC | 11 |
| Orchidaceae | *Habenaria dives* | LC | 11 |
| Orchidaceae | *Habenaria epipactidea* | LC | 11 |
| Orchidaceae | *Habenaria falcicornis subsp. caffra* | LC | 11 |
| Orchidaceae | *Habenaria lithophila* | LC | 11 |
| Orchidaceae | *Neobolusia tysonii* | LC | 11 |
| Orchidaceae | *Orthochilus foliosus* | LC | 11 |
| Orchidaceae | *Orthochilus leontoglossus* | LC | 11 |
| Orchidaceae | *Orthochilus welwitschii* | LC | 11 |
| Orchidaceae | *Pterygodium dracomontanum* | LC | 11 |
| Orchidaceae | *Pterygodium nigrescens* | LC | 11 |
| Orchidaceae | *Satyrium hallackii subsp. ocellatum* | LC | 11 |
| Orchidaceae | *Satyrium neglectum subsp. neglectum var. neglectum* | LC | 11 |
| Orchidaceae | *Satyrium parviflorum* | LC | 11 |
| Orchidaceae | *Satyrium trinerve* | LC | 11 |

| Family | Species | IUCN | Protection Schedule |
|---|---|---|---|
| Orchidaceae | *Schizochilus zeyheri* | LC | 11 |
| Proteaceae | *Protea roupelliae subsp. roupelliae* | LC | 11 |
| Hyacinthaceae | *Eucomis autumnalis subsp. clavata* | NE | 11 |
| Orchidaceae | *Satyrium longicauda var. longicauda* | NE | 11 |
| Apocynaceae | *Ceropegia breviflora* | | 11 |
| Apocynaceae | *Ceropegia rehmannii* | | 11 |
| Iridaceae | *Gladiolus sp.* | | 11 |
| Orchidaceae | *Eulophia sp.* | | 11 |
| Orchidaceae | *Orthochilus sp.* | | 11 |
| Orchidaceae | *Orthochilus vinosus* | | 11 |

## 4. MITIGATION & AVOIDANCE OPTIONS

The primary mitigation and avoidance measure that must be implemented at the pre-construction phase is the Pre-construction Walk-Through of the development footprint. This defines which and how many individuals of listed and protected species are found within the development footprint. This information is required for the DFFE and The Mpumalanga Nature Conservation Act, No. 10 of 1998 permits which must be obtained before construction can commence.

Where listed species fall within the development footprint and avoidance is not possible, then it may be possible to translocate the affected individuals outside of the development footprint. However, not all species are suitable for translocation as only certain types of plants are able to survive the disturbance. Suitable candidates for translocation include most geophytes and succulents. Although there are exceptions, the majority of woody species do not survive translocation well and it is generally not recommended to try and attempt to translocate such species. Recommendations in this regard would be made following the walk-through of the facility footprint before construction, where all listed and protected species within the development footprint will be identified and located.

## 5. RESCUE AND PROTECTION PLAN

### 5.1. Pre-construction

» Identification of all listed species which may occur within the site, based on the SANBI POSA database as well as the specialist studies for the site and any other relevant literature.
» Before construction commences at the site, the following actions should be taken:
  - A walk-through of the final development footprint by a suitably qualified botanist/ecologist to locate and identify all listed and protected species which fall within the development footprint. This should happen during the flowering season at the site which, depending on rainfall, is likely to be during spring to early summer (August-October).
  - A walk-through report following the walk-through which identifies areas where minor deviations to roads and other infrastructure can be made to avoid sensitive areas and important populations of listed species must be compiled. The report should also contain a full list of localities where listed species occur within the development footprint and the number of affected individuals in each instance, so that this information can be used to comply with the permit conditions required by the relevant legislation. Those species suitable for search as rescue should be identified in the walk-through report.

- A permit to clear the site and relocate species of concern is required from the Mpumalanga provincial conservation authority before construction commences.
- A tree clearing permit is also required from DFFE to clear protected trees from the site (if recorded).
- Once the permits have been issued, there should be a search and rescue operation of all listed species that cannot be avoided, which have been identified in the walk-through report as being suitable for search and rescue within the development footprint. Affected individuals should be translocated to a similar habitat outside of the development footprint and marked for monitoring purposes.

## 5.2. Construction

» Vegetation clearing should take place in a phased manner, so that large cleared areas are not left standing with no activity for long periods of time and pose a wind and water erosion risk. This will require coordination between the contractor and EO, to ensure that the EO is able to monitor activities appropriately.

» All cleared material should be handled according to the Revegetation and Rehabilitation Plan and used to encourage the recovery of disturbed areas.

» The EO shouldmonitor vegetation clearing at the site. Any deviations from the plans that may be required should first be checked for listed species by the EO and any listed species present which are able to survive translocation should be translocated to a safe site.

» All areas to be cleared should be demarcated with construction tape, survey markers or similar. All construction vehicles should work only within the designated area.

» Plants suitable for translocation or for use in rehabilitation of already cleared areas should be identified and relocated before general clearing takes place.

» Any listed species observed within the development footprint that were missed during the pre-construction plant sweeps should be translocated to a safe site before clearing commences.

» Many listed species are also sought after for traditional medicine or by collectors and so the EO and ECO should ensure that all staff attend environmental induction training in which the legal and conservation aspects of harvesting plants from the wild are discussed.

» The EO should monitor construction activities in sensitive habitats such as in dune areas carefully to ensure that impacts to these areas are minimised.

## 5.3. Operation

» Access to the site should be strictly controlled and all personnel entering or leaving the site should be required to sign in and out with the security officers.

» The collecting of plants or their parts should be strictly forbidden and signs stating so should be placed at the entrance gates to the site.

# 6. MONITORING & REPORTING REQUIREMENTS

The following reporting and monitoring requirements are recommended as part of the plant rescue and protection plan:

» Pre-construction walk-through report detailing the location and distribution of all listed and protected species must be compiled. This should include a walk-through of all infrastructure including all new access roads, cables, buildings and substations. The report should include recommendations of route adjustments where necessary, as well as provide a full account of how many individuals of each listed species will be impacted by the development. Details of plants suitable for search and rescue must also be included.

» Permit applications to DEA&DP and DFFE. This requires the walk-through report as well as the identification and quantification of all listed and protected species within the development footprint. The permit is required before any search and rescue or vegetation clearance can take place. Where large numbers of listed species are affected, a site inspection and additional requirements may be imposed by DEA&DP and DFFE as part of the permit conditions. All documentation associated with this process needs to be retained and the final clearing permit should be kept at the site.
» Active daily monitoring of clearing during construction by the EO must be undertaken to ensure that listed species and sensitive habitats are avoided. All incidents should be recorded along with the remedial measures implemented.
» Post construction monitoring of plants translocated during search and rescue to evaluate the success of the intervention. Monitoring for a year post-transplant should be sufficient to gauge success.

APPENDIX 12: TRAFFIC AND TRANSPORTATION MANAGEMENT PLAN

# PRINCIPLES FOR TRAFFIC MANAGEMENT

## 1. PURPOSE

The purpose of this Traffic Management Plan (TMP) is to address regulatory compliance, traffic management practices, and protection measures to help reduce impacts related to transportation and the construction of temporary and long-term access within the vicinity of the Compton Solar PV Facility project site. The objectives of this plan include the following:

- » To ensure compliance with all legislation regulating traffic and transportation within South Africa (National, Provincial, Local & associated guidelines).
- » To avoid incidents and accidents while vehicles are being driven and while transporting personnel, materials, and equipment to and from the project site.
- » To raise greater safety awareness in each driver and to ensure the compliance of all safe driving provisions for all the vehicles.
- » To raise awareness to ensure drivers respect and follow traffic regulations.
- » To avoid the deterioration of access roads and the pollution that can be created due to noise and emissions produced by equipment, machinery, and vehicles.

## 2. TRAFFIC AND TRANSPORTATION MANAGEMENT PRINCIPLES

- » Prior to the commencement of construction the contractor must develop their own detailed Transport Management Plan (TMP) based on traffic volumes and road carry capacity outlines in this plan
- » The transport contractor must ensure that all required permits for the transportation of abnormal loads are in place prior to the transportation of equipment and project components to the site. Specific abnormal load routes must be developed with environmental factors taken into consideration.
- » Before construction commences, authorised access routes must be clearly marked in the field with signs or flagging. The Construction Contractor must review the location of designated access and will be responsible for ensuring construction travel is limited to designated routes. The entrance of the main access road must not be constructed before a blind rise or on a bend of the public road.
- » All employees must attend an environmental training program (e.g. toolbox talks) by the Environmental Officer (EO). Through this program, employees will be instructed to use only approved access roads, drive within the delineated road limits, and obey jurisdictional and posted speed limits to minimise potential impacts to the environment and other road users.
- » The contractor will be responsible for making sure that their suppliers, vendors, and subcontractors strictly comply with the principles of this TMP and the contractor's TMP.
- » Adjacent landowners must be notified of the construction schedule.
- » Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users.
- » Signs must be posted in the project area to notify landowners and others of the construction activity.
- » Flagging must be provided at access points to the site and must be maintained until construction is completed on the site.
- » Speed limits must be established prior to commencement of construction and enforced over all construction traffic.
- » Speed controls and implementation of appropriate dust suppression measures must be enforced to minimise dust pollution.

- Throughout construction the contractor will be responsible for monitoring the condition of roads used by project traffic and for ensuring that roads are maintained in a condition that is comparable to the condition they were in before the construction began.
- Drivers must have an appropriate valid driver's license and other operation licences required by applicable legislation.
- All vehicles must be maintained in good mechanical, electrical, and electronic condition, including but not limited to the brake systems, steering, tires, windshield wipers, side mirrors and rear view mirror, safety belts, signal indicators, and lenses.
- Any traffic delays attributable to construction traffic must be co-ordinated with the appropriate authorities.
- No deviation from approved transportation routes must be allowed, unless roads are closed for reasons outside the control of the contractor.
- Impacts on local communities must be minimised. Consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.

## 3. MONITORING

- The principal contractor must ensure that all vehicles adhere to the speed limits.
- A speeding register must be kept with details of the offending driver.
- Repeat offenders must be penalised.
- Where traffic signs are not being adhered to, engineering structures must be used to ensure speeds are reduced.

## 4. SITE-SPECIFIC TRANSPORTATION MANAGEMENT (TRAFFIC IMPACT ASSESSMENT)

# EIA REPORT:

# UMMBILA EMOYENI RENEWABLE ENERGY FACILITY: WIND ENERGY FACILITY, MPUMALANGA PROVINCE

## TRANSPORT STUDY

**September 2022**
**Second Issue**


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**SYNOPSIS**

Preparation of a Transport Study for the proposed Ummbila Emoyeni Renewable Wind Energy facility near Bethal in the Mpumalanga Province, pertaining to all relevant traffic and transportation engineering aspects.

**KEY WORDS:**

EIA Report, Wind Energy Facility, Wind Farm, Renewable Energy Facility, Transport Study



**QUALITY VERIFICATION**

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO 9001: 2015 which has been independently certified by DEKRA Certification.

| Verification | Capacity | Name | Signature | Date |
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# PROPOSED UMMBILA EMOYENI RENEWABLE ENERGY WIND FACILITY, MPUMALANGA PROVINCE

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# PROPOSED UMMBILA EMOYENI RENEWABLE ENERGY WIND FACILITY, MPUMALANGA PROVINCE

## 1 INTRODUCTION AND METHODOLOGY

### 1.1 Scope and Objectives

Emoyeni Renewable Energy Farm (Pty) Ltd is proposing the development of a commercial Wind Energy Facility (WEF), named Ummbila Emoyeni Wind Energy Facility, consisting of a commercial wind farm and associated infrastructure, located approximately 6km southeast of Bethal in the Mpumalanga Province of South Africa. The project is located across the Govan Mbeki Lekwa and Msukaligwa Local Municipalities within the Gert Sibande District (see **Figure 1-1**).

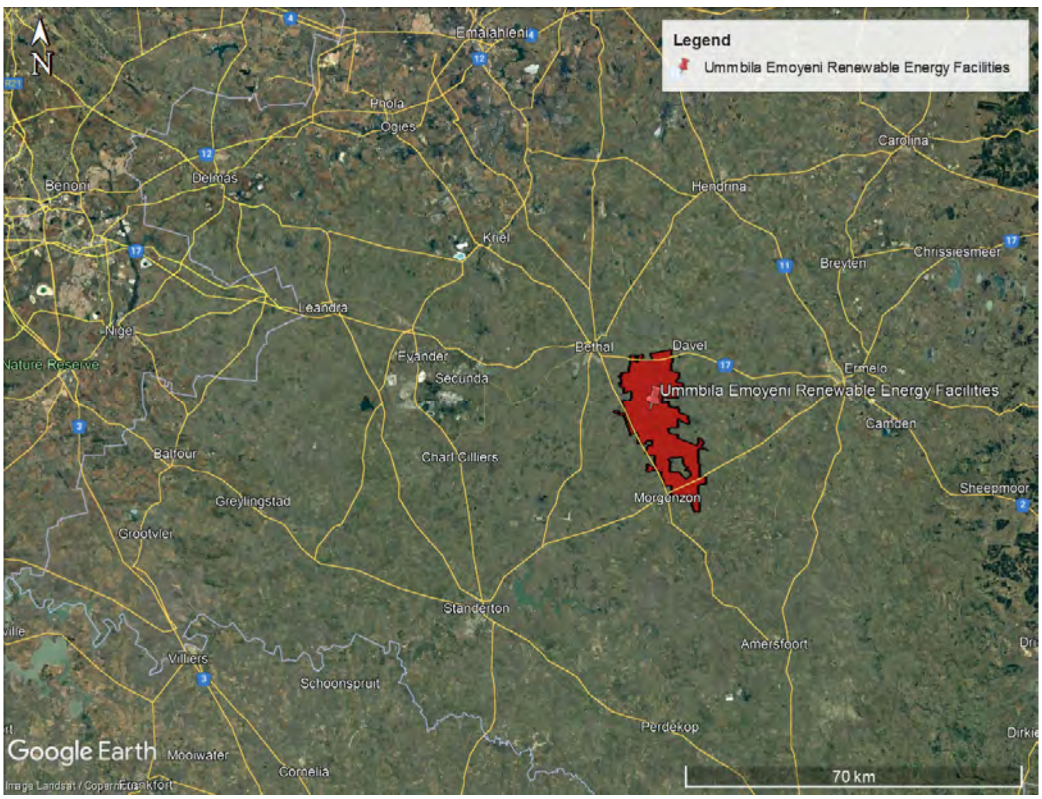

*Figure 1-1: Aerial View of location of the site for the Ummbila Renewable Wind Energy Facility*

As part of the Environmental Impact Assessment (EIA) process undertaken, the services of a Transportation Specialist are required to conduct a Transport Study and JG Afrika (Pty) Ltd was consequently appointed to conduct the Traffic Impact Assessment for the commercial wind farm.

The following two main transportation activities will be investigated:

- Abnormal load vehicles transporting components to the site.
- The transportation of construction materials, equipment, and people to and from the site/facility.

The transport study will aim to provide the following objectives:

- Assess activities related to traffic movement for the construction and operation (maintenance) phases of the facility.
- Recommend a preliminary route for the transportation of the components to the proposed site.
- Recommend a preliminary transportation route for the transportation of materials, equipment, and people to site.
- Recommend alternative or secondary routes where possible.

## 1.2 Terms of Reference

General:

A specialist report prepared in terms of the Regulations must contain the following:

(a) details of-
  (i) the specialist who prepared the report; and
  (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;
(c) an indication of the scope of, and the purpose for which, the report was prepared;
  (cA) an indication of the quality and age of base data used for the specialist report
  (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
(d) the duration date and season of the site investigation and the relevance of the season to the outcome of the assessment;
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
(g) an identification of any areas to be avoided, including buffers;
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;
(k) any mitigation measures for inclusion in the EMPr;
(I) any conditions for inclusion in the environmental authorisation;
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
(n) a reasoned opinion-
  (i) whether the proposed activity, activities or portions thereof should be authorised; and (considering impacts and expected cumulative impacts).

(iA) regarding the acceptability of the proposed activity or activities, and
(ii) if the opinion is that the proposed activity, activities, or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;

(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
(q) any other information requested by the competent authority.

Specific:

- Extent of the transport study and study area;
- The proposed development;
- Trip generation for the facility during construction and operation;
- Traffic impact on external road network;
- Accessibility and turning requirements;
- National and local haulage routes;
- Assessment of internal roads and site accesses;
- Assessment of freight requirements and permitting needed for abnormal loads; and
- Traffic accommodation during construction.

## 1.3 Approach and Methodology

The report deals with the traffic impact on the surrounding road network in the vicinity of the proposed sites:

- during the construction of the access roads;
- construction of the facility; and
- operation and maintenance during the operational phase.

This transport study was informed by the following:

Project Assessment

- Overview of project background information including location maps, component specs and any possible resulting abnormal loads to be transported.
- Research of all available documentation and information relevant to the proposed facility.

The transport study considered and assessed the following:

Traffic and Haul Route Assessment

- Estimation of trip generation;
- Discussion on potential traffic impacts;
- Assessment of possible haul routes; and
- Construction and operational (maintenance) vehicle trips.

Site layout, Access Points, and Internal Roads Assessment per Site

- Description of the surrounding road network;

- Description of site layout; and
- Assessment of the proposed access points.

## 1.4 Assumptions and Limitations

The following assumptions and limitations apply:

- This study is based on the project information provided by Savannah Environmental (Pty) Ltd.
- According to the Eskom Specifications for Power Transformers (Eskom Power Series, Volume 5: Theory, Design, Maintenance and Life Management of Power Transformers), the following dimensional limitations need to be kept when transporting the transformer – total maximum height 5 000mm, total maximum width 4 300mm and total maximum length 10 500mm.
- Maximum vertical height clearances along the haulage route are 5.2m for abnormal loads.
- Imported elements will be transported from the most feasible port of entry, which is deemed to be the Port of Richard's Bay.
- All haulage trips will occur on either surfaced national and provincial roads or existing gravel roads.
- Construction materials will be sourced locally as far as possible.
- Approximately 30 full-time employees will be stationed at each of the four sites during the operational phase.

## 1.5 Source of Information

Information used in a transport study includes:

- Project Information provided by the Client;
- Google Earth.kmz provided by the Client;
- Google Earth Satellite Imagery;
- Road Traffic Act, 1996 (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads; and
- Project research of all available information.

# 2 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO THE TRANSPORT STUDY

## 2.1 Port of Entry

It is assumed that if components are imported to South Africa, it will be via the Port of Richard's Bay, which is located in KwaZulu-Natal. The Port is located approximately 460km from the proposed site. The Port of Richard's Bay is a deep-sea water port boasting 13 berths. The terminals handle abnormal loads and among others dry bulk ores, minerals, and break-bulk consignments. The terminal exports over 30 varied commodities from magnetite to ferrochrome, woodchips to aluminium and steel. A large percentage of dry bulk commodities are handled via a computer-controlled network of conveyor belts extending 40 km to seven harbour bound industries. The Richards Bay Port is operated by Transnet Port Terminal.

Alternatively, components can be imported via the Port of East London, located approximately 1130km from the proposed site, or from the Port of Ngqura, approximately 1200km from the proposed site, both being located in the province of the Eastern Cape. Please note that shorter routes exist between the Port of East London and the proposed site, but the poor condition of these roads aren't suitable for transport with heavy and/or abnormal vehicles.

## 2.2 Selected Candidate Turbine

The possible range of wind turbines varies largely with various wind turbine manufacturers operating worldwide. The project information states that a turbine with a hub height of up to 200m and a tip height of up to 300m is to be considered.

In general, each turbine unit consists of a tower, a Nacelle (final weight dependent on the supplier and whether the nacelle has gears or not) and rotor blades.

## 2.3 Transportation requirements

### 2.3.1 Abnormal Load Considerations

Abnormal permits are required for vehicles exceeding the following permissible maximum dimensions on road freight transport in terms of the Road Safety Act (Act No. 93 of 1996) and the National Road Traffic Regulations, 2000:

- Length: 22m for an interlink, 18.5m for truck and trailer and 13.5m for a single unit truck
- Width: 2.6m
- Height: 4.3m measured from the ground. Possible height of load – 2.7m.
- Weight: Gross vehicle mass of 56t resulting in a payload of approximately 30t
- Axle unit limitations: 18t for dual and 24t for triple-axle units
- Axle load limitation: 7.7t on the front axle and 9t on the single or rear axles

Any dimension / mass outside the above will be classified as an Abnormal Load and will necessitate an application to the Department of Transport and Public Works for a permit that will give authorisation for the conveyance of said load. A permit is required for each Province that the haulage route traverses.

### 2.3.2 Further Guideline Documentation

The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outlines the rules and conditions that apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.

The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power / mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the Road Traffic Act and the relevant regulations.

### 2.3.3 Permitting – General Rules

The limits recommended in the TRH 11 guideline document are intended to serve as a guide to the Permit Issuing Authorities. It must be noted that each Administration has the right to refuse a permit application or to modify the conditions under which a permit is granted. It is understood that:

a) A permit is issued at the sole discretion of the Issuing Authority. The permit may be refused because of the condition of the road, the culverts and bridges, the nature of other traffic on the road, abnormally heavy traffic during certain periods or for any other reason.
b) A permit can be withdrawn if the vehicle upon inspection is found in any way not fit to be operated.
c) During certain periods, such as school holidays or long weekends an embargo may be placed on the issuing of permits. Embargo lists are compiled annually and are obtainable from the Issuing Authorities.

### 2.3.4 Load Limitations

The maximum load that a road vehicle or combination of vehicles will be allowed to carry legally under permit on a public road is limited by:

- the capacity of the vehicles as rated by the manufacturer;
- the load which may be carried by the tyres;
- the damaging effect on pavements;
- the structural capacity on bridges and culverts;
- the power of the prime mover(s);
- the load imposed by the driving axles; and
- the load imposed by the steering axles.

### 2.3.5 Dimensional Limitations

A load of abnormal dimensions may cause an obstruction and danger to other traffic. For this reason, all loads must, as far as possible, conform to the legal dimensions. Permits will only be considered for indivisible loads, i.e., loads that cannot, without disproportionate effort, expense, or risk of damage, be divided into two or more loads for the purpose of transport on public roads. For each of the characteristics below there is a legally permissible limit and what is allowed under permit:

- Width;
- Height;
- Length;
- Front Overhang;
- Rear Overhang;
- Front Load Projection;
- Rear Load Projection;
- Wheelbase;
- Turning Radius; and
- Stability of Loaded Vehicles.

### 2.3.6 Transporting Wind Turbine Components

Wind turbine components can be transported in a number of ways with different truck / trailer combinations and configurations, which will be decided upon at a later stage by the transporting contractor and the plant hire companies, when applying for the necessary permits from the Permit Issuing Authorities. All required permits will need to be obtained prior to the commencement of construction.

#### *2.3.6.1 Nacelle*

The heaviest component of a wind turbine is the nacelle (approximately 100 tons depending on manufacturer and design of the unit). Combined with road-based transport, it has a total average vehicle mass of approximately 145 000kg for a 100-ton unit. For larger turbines, the maximum weight can even increase to around 180 tons. Route clearances and permits will therefore be required for transporting the nacelle by road-based transport. The unit will require a minimum height clearance of 5.2m.

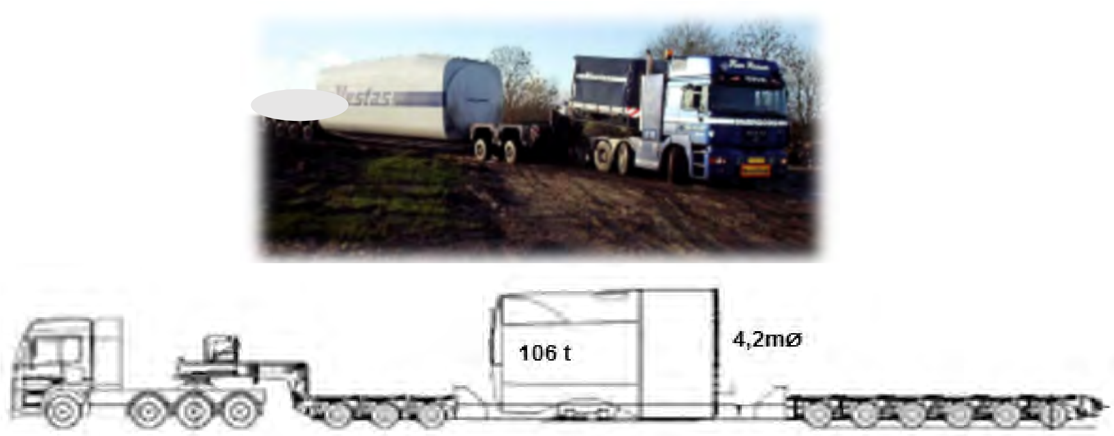


*Figure 2-1: Example - Transporting the Nacelle*

### *2.3.6.2 Blades*

These are the longest and possibly most vulnerable components of a wind turbine and hence need to be transported with utmost care. The blades need to be transported on an extendible blade transport trailer or in a rigid container with rear steerable dollies. The blades can generally be transported individually, in pairs or in three's; although different manufacturers have different methods of packaging and transporting the blades. It should be noted that larger blades are transported individually. The transport vehicle exceeds the dimensional limitation (length) of 22 m and will only be allowed under permit, provided the trailer is fitted with steerable rear axles or dollies.

For the candidate turbines of this study, the blades will need to be transported individually (see example in **Figure 2.2** and **Figure 2.3**). At present, there are no suitable abnormal load trucks available within South Africa to transport such large blades and suitable trucks will therefore need to be sourced from overseas and shipped to South Africa.


*Figure 2-2: Example -Transport of Blades on extendible trailers*

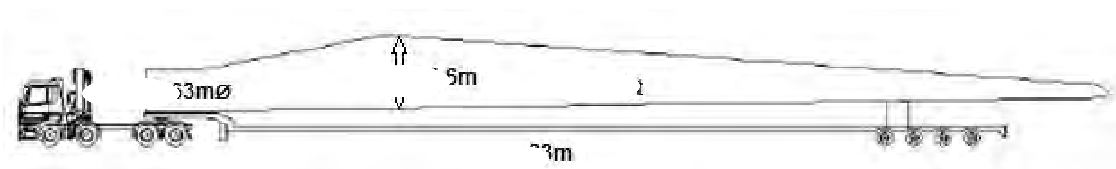


*Figure 2-3: Example of Blade Transport*

Due to the abnormal length, special attention needs to be given to the route planning, especially to suitable turning radii and adequate sweep clearance. Vegetation or/and road signage may have to be removed before transportation commences. Once transported to site, the blades need to be carefully stored at the respective laydown area before being installed onto the rotary hub.

### *2.3.6.3 Tower Sections*

Steel towers generally consist of 20m long sections, the number of sections being dependent on the selected hub height. A hub height of 200 metres would therefore consist of approximately ten (10) tower sections. Each section is transported separately to site on a low-bed trailer. Depending on the trailer configuration and height when loaded, some of these components may not meet the dimensional limitations (height and width) but will be permitted under certain permit conditions.


*Figure 2-4: Example – Transportation of Tower Sections*

### *2.3.6.4 Turbine Hub and Rotary Units*

These components need to be transported separately, due to their significant weights – a hub unit weighs between 45 and 60 tons and the rotary unit weighs over 90 tons.

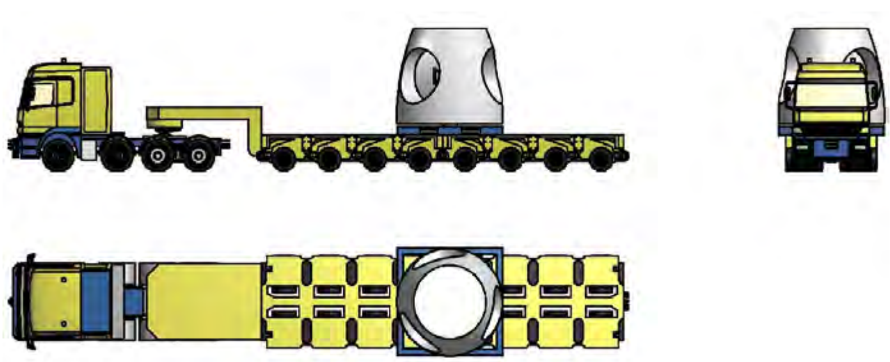

*Figure 2-5: Transporting the Hub and Rotary Units*

### *2.3.6.5 Transporting Cranes, Mobile Crane, and other Components*

One main crane and at least one supporting crane are required per wind turbine erection, with the auxiliary crane able to change position several times during the turbine erection.

This technology has developed rapidly, and several different heavy lifting options are available on the market. Costs involved to hire cranes or import suitable cranes (if necessary) vary and should therefore be compared in advance. For this assessment, possible crane options are discussed hereafter.

#### *2.3.6.6 Cranes for Assembly and Erection on Site*

Option 1: Crawler Crane & Assembly Crane

One possible option is that the main crane performing the required lifts, i.e., lifting the tower sections into position, lifting the nacelle to the hub height, and lifting the rotor and blades into place, needs to be similar to the Liebherr Crawler Crane LR1750 with a SL8HS (Main Boom and Auxiliary Jib) configuration. A smaller 200-ton Liebherr Mobile Crane LTM 1200- 5.1 is also required to lift the components and assist in the assembly of the crawler crane at each turbine location.

- *Crawler Crane LR1750 with the SL8HS boom system (Main Lifting Crane):*

The Crawler Crane will be transported to site in sections and the heaviest load will be the superstructure and crawler centre section (83 tons). The gross combination mass (truck, trailer, and load) will be approximately 133 000 kg. The boom sections, counterweights and other equipment will be transported on conventional tri-axle trailers and assembled on site. It will require a number of truckloads of components to be delivered for assembly of the Crawler Crane before it can be mobilised to perform the heavy lifts.

- *Mobile Crane LTM 1200-5.1 (Assembly Crane):*

The Liebherr LTM 1200-5.1 crane is a 5-axle vehicle with rubber tyres, which will travel to site on its own. However, the counterweights will be transported on conventional tri-axle trailers and then assembled on site. The assembly crane is required to assemble the main lift crane as well as assist in the installation of the wind turbine components.

Option 2: GTK 1100 Crane & Assembly Crane

The GTK 1100 hydraulic crane was used for the assembly of the single wind turbine at Coega (see example in picture below). The GTK 1100 was designed to lift ultra-heavy loads to extreme heights.

*Figure 2-6: Example - Cranes at work*

- *Mobile Crane LTM 1200-5.1 (Assembly Crane):*

A smaller 200-ton Liebherr Mobile Crane LTM 1200-5.1 is also required to lift the components and assist in the assembly of the hydraulic crane at each turbine location.

### *2.3.6.7 Cranes at Port of Entry*

Most shipping vessels importing the turbine components will be equipped with on-board cranes for safe off-loading of wind turbine components to the abnormal load transport vehicles, parked adjacent to the shipping vessels.

*Figure 2-7: Example - Cranes at Port of Entry*

The imported turbine components may be transported from the Port of Entry to the nearby turbine laydown area. Mobile cranes will be required at these turbine laydown areas to position the respective components at their temporary storage location.

#### *2.3.6.8 Transporting Other Plant, Material and Equipment*

In addition to transporting the specialised lifting equipment, the normal civil engineering construction materials, plant, and equipment will need to be brought to the site (e.g., sand, stone, cement, concrete batching plant, gravel for road building purposes, excavators, trucks, graders, compaction equipment, cement mixers, transformers in the sub-station, cabling, transmission pylons etc.). Other components, such as electrical cables, pylons, and substation transformers, will also be transported to site during construction. The transportation of these items will generally be undertaken with normal heavy load vehicles.

## 3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

### 3.1 Description of the site

The proposed Ummbila Emoyeni Renewable Wind Energy Facility will be located approximately 6km southeast of Bethal in the Mpumalanga Province, as shown in **Figure 3-1**. The proposed site is bounded by the N17 to the north, the R39 to the east and south and the R35 to the west.

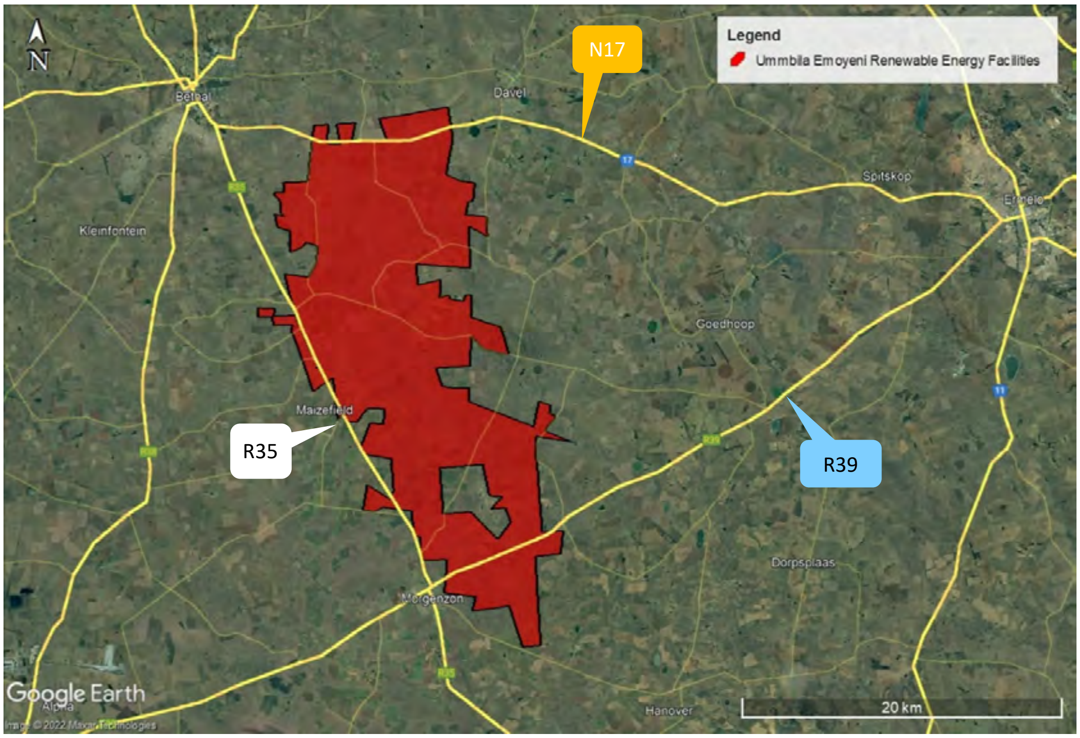

*Figure 3-1: Aerial View of the proposed Ummbila Emoyeni Renewable Energy Facility*

A preferred project focus area with an extent of 27 819ha been identified by Emoyeni Renewable Energy Farm (Pty) Ltd as a technically suitable area for the development of the Ummbila Emoyeni Renewable Wind Energy Farm with a contracted capacity of up to 666MW. The proposed solar facility of 150MW has been addressed in a separate transport report.

The project site comprises the following farm portions:

*Table 3-1: Farm Portions comprising the project site*

| 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 |
| 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 |

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 cabling to connect the wind turbines to the onsite collector substations, to be laid underground where practical.
- 3 x 33kV/132kV onsite collector substation (IPP Portion), each being 5ha.
- Battery Energy Storage System (BESS).
- Cabling between turbines, to be laid underground where practical.
- Construction compounds including site office (approximately 300m x 300m in total but split into 3ha each of 150m x 200m):
  - Batching plant of up to 4ha to 7ha.
  - 3 x O&M office of approximately 1.5ha each adjacent to each collector SS.
  - 3 x construction compound / laydown area, including site office of 3ha each (150m x 200m each).
- Laydown and crane hardstand areas (approximately 75m x 120m).
- Access roads of 12 -13m wide, with 12m at turning circles.

The grid connection infrastructure will include a 400/132kV Main Transmission Substation (MTS), to be located between Camden and SOL Substations, which will be looped in and out of the existing Camden-Sol 400kV transmission line; on-site switching stations (132kV in capacity) at each renewable energy facility (Eskom Portion); and 132kV power lines from the switching stations at each renewable energy facility to the new 400/132kV MTS. The grid connection infrastructure will be assessed as part of a separate Environmental Impact Assessment process in support of an application for Environmental Authorisation.

It is anticipated that the power generated by the project will be bid into the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme and/or into private off take opportunities.

An aerial view of the proposed turbine locations and internal roads to the turbines is shown in **Figure 3-2**.

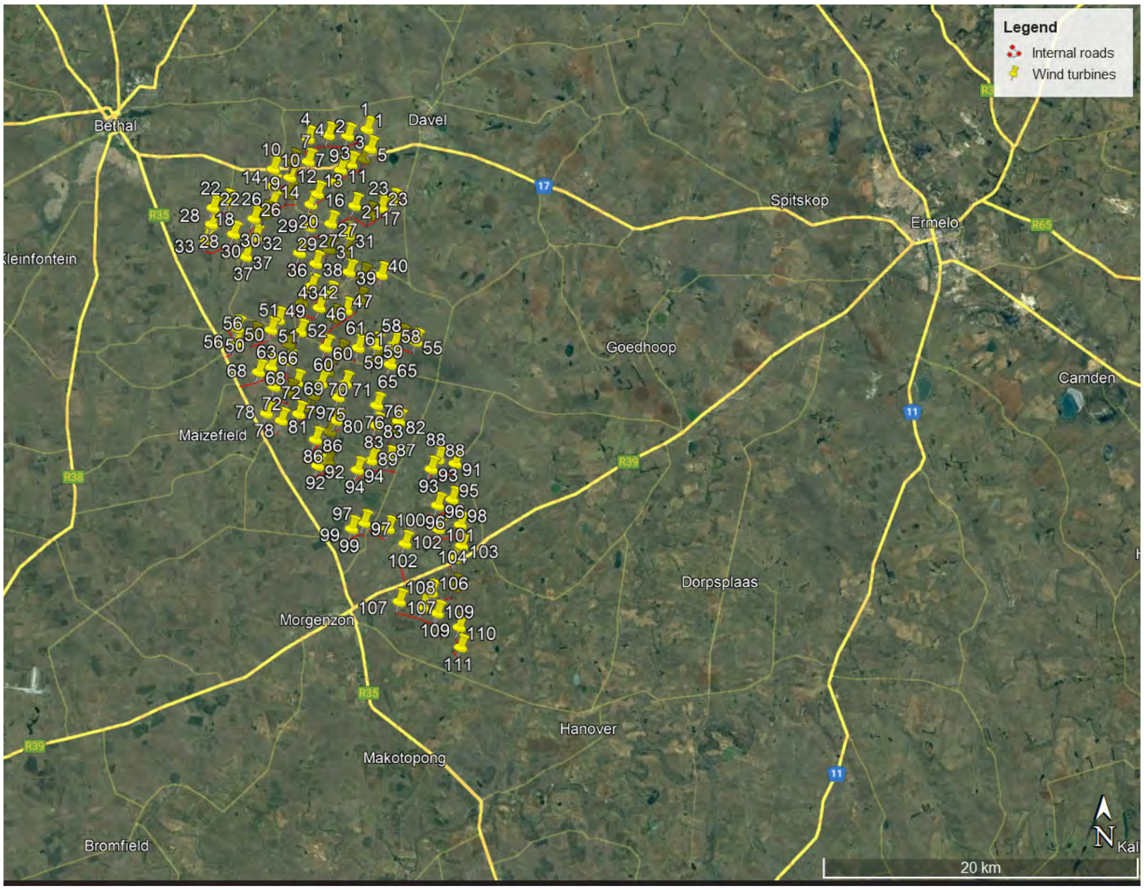


*Figure 3-2: Aerial View of Turbines*

## 3.2 National Route to Site for Imported Components

There are three viable options for the port of entry for imported components - the Port of Richard's Bay in KwaZulu-Natal, and the ports of East London and Ngqura in the Eastern Cape.

The Port of Richard's Bay is located approximately 460km travel distance from the proposed site whilst the Port of East London and Ngqura is respectively located approximately 1130km and 1200km travel distance from the proposed site. The Port of Richard's Bay is the preferred port of entry, however, the Ports of East London and Ngqura can be used as alternatives should the Port of Richard's Bay not be available.

The preferred route from the Port of Richard's Bay is shown in yellow in **Figure 3-3** below. The route is approximately 460km and follows the N2 north, passing through Pongola and

Piet Retief before turning off on to the N17 in Ermelo that leads to an unnumbered gravel road towards the proposed site.

The alternative route from the Port of East London, shown in green in **Figure 3-3**, will follow the N6 north-west to Bloemfontein before taking the N1 north-east to Johannesburg. Vehicles will head east on the N12 and N17, passing through Bethal before turning off onto an unnumbered gravel road that leads to the proposed site.

The Port of Ngqura can also be considered as an alternative and the route is shown in blue in **Figure 3-3**. The route is approximately 1200km long and follows the N10 north up to Cradock before taking the R390 further north, passing through the town of Steynsburg and turning onto the N1 at Gariep. The route will continue north-east along the N1, through Bloemfontein, up to Johannesburg. Vehicles will head east on the N12 and N17, passing through Bethal before turning off onto an unnumbered gravel road that leads to the proposed site.

It should be noted that, although shorter routes exist, travel on national routes are proposed as the condition of some of the roads on the shorter routes are poor and not deemed suitable for hauling with heavy vehicles. There are also a number of toll plazas located on the national routes, but alternative roads can be considered in order to bypass these toll roads. This can however only be done at a later stage when more information is available regarding the type of heavy/abnormal vehicles, number of trips, etc.

*Figure 3-3: Preferred and Alternative Routes*

It is critical to ensure that the abnormal load vehicle will be able to move safely and without obstruction along the preferred route. The preferred route should be surveyed prior to construction to identify any problem areas, e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, which may require modification. After the road modifications have been implemented, it is recommended to undertake a “dry-run” with the largest abnormal load vehicle, prior to the transportation of any components, to ensure that the delivery will occur without disruptions.

It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.

### 3.3 Proposed main access road and access points to the Proposed Development

The proposed site is bounded by the N17 in the north, the R39 in the south and the east and the R35 in the west, as shown in **Figure 3-4**.. Access to the proposed site can be obtained from any of these three roads, depending on the traffic volumes of each road. The road carrying the least traffic will be considered as the best option. However, the N17 is a toll route and should be avoided as main access if other alternatives exist along either the R39 or the R35.

There is also an existing network of unnumbered gravel roads that might be suitable as a main access road to the proposed site as shown in pink and blue in **Figure 3-4**. Once the site layout and project capacity has been reduced as a result of the environmental constraints identified during the EIA and Scoping process, the options for a main access road and assess points can be further investigated.

The proposed main access road should link to the site access road, and possible access points are shown in **Figure 3-5.**

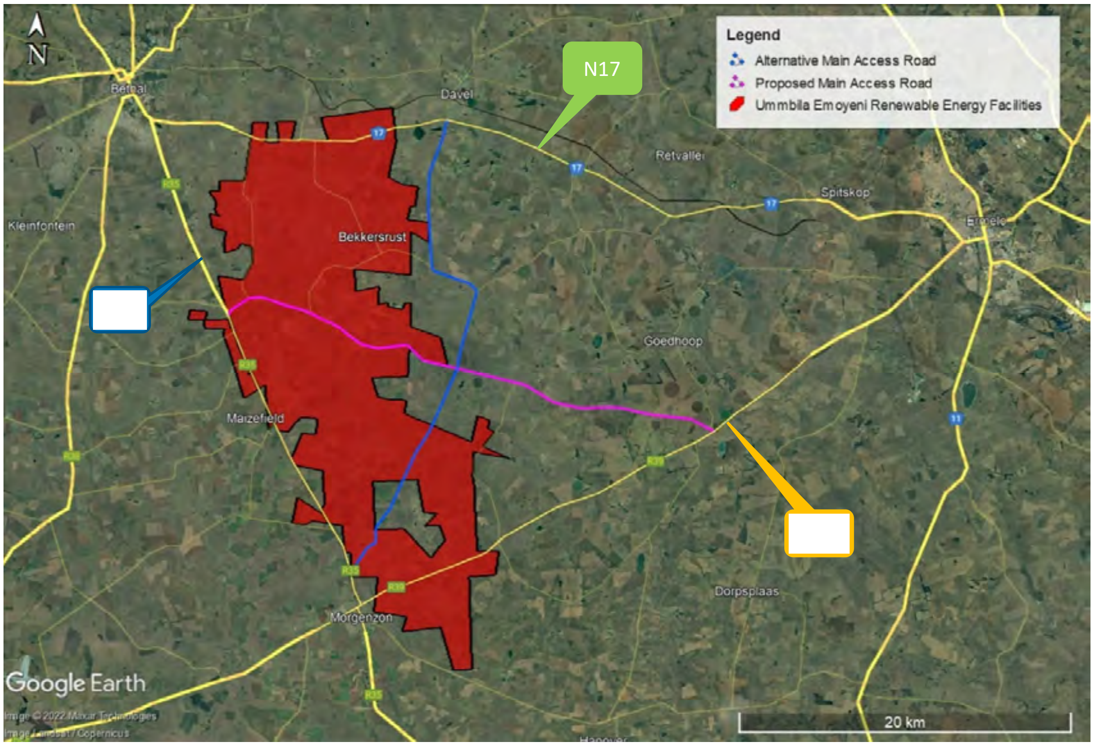


*Figure 3-4: Proposed Main Access Roads and alternatives*

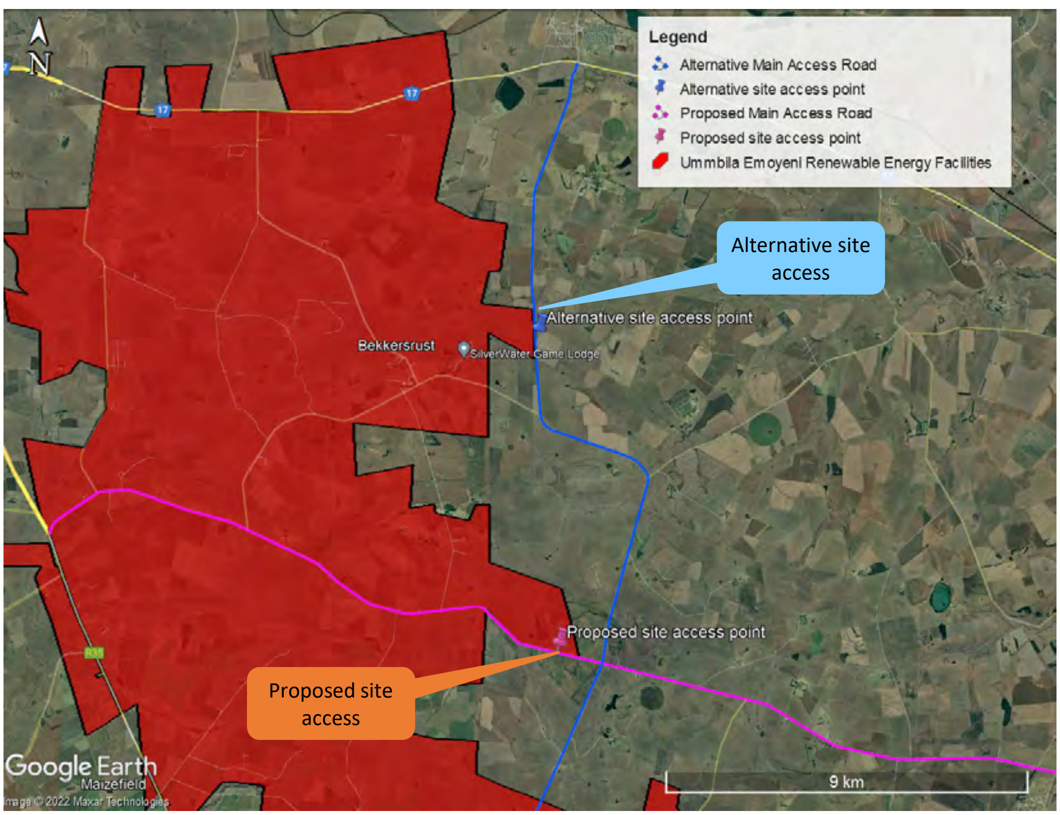


*Figure 3-5: Proposed site access points*

Other alternative site access roads and points can be investigated at a later stage once the project area has been more clearly defined. All options should, however, conform to the requirements of access spacing and sufficient shoulder sight distances at these locations.

## 3.4 Main Route for the Transportation of Materials, Plant and People to the proposed site

The nearest towns in relation to the proposed development site are Standerton, Secunda, Bethal and Kriel. It is envisaged that most materials, water, plant, services, and people can be procured within an 60km radius of the proposed facility. However, this would be informed by the REIPPPP requirements. The nearest city, Johannesburg, is located approximately 180km from the proposed development site.

Concrete batch plants and quarries in the vicinity could be contracted to supply materials and concrete during the construction phase, which would reduce the impact on traffic on the surrounding road network. Alternatively, mobile concrete batch plants and temporary construction material stockpile yards could be commissioned on vacant land near the proposed site. Delivery of materials to the mobile batch plant and the stockpile yard could be staggered to minimise traffic disruptions.

# 4 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

Key legal requirements pertaining to the transport requirements for the proposed development are:

- Abnormal load permits, (Section 81 of the National Road Traffic Act)
- Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act No. 12 of 2005), and
- Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections.

# 5 IDENTIFICATION OF KEY ISSUES

## 5.1 Identification of Potential Impacts

The potential transport related impacts are described below.

### 5.1.1 Construction Phase

*Potential impact*

- Construction related traffic
- The construction traffic would also lead to noise and dust pollution.
- This phase also includes the construction of roads, excavations, trenching for electrical cables and other ancillary construction works that will temporarily generate the most traffic.

### 5.1.2 Operational Phase

During operation, it is expected that staff and security will periodically visit the facility. It is assumed that approximately 30 full-time employees will be stationed on the site. The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.

### 5.1.3 Cumulative Impacts

- Traffic congestion/delays on the surrounding road network.
- Noise and dust pollution

## 6 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

### 6.1 Potential Impact (Construction Phase)

*Nature of the impact*

- Potential traffic congestion and delays on the surrounding road network and associated noise, dust, and exhaust pollution.

*Significance of impact without mitigation measures*

- Traffic generated by the construction of the facility will have a significant impact on the surrounding road network. The exact number of trips generated during construction will be determined by the contractor and the haulage company transporting the components to site, the staff requirements and where equipment is sourced from.

It is expected that the delivery of the components to the site during the construction phase will not result in a significant increase in traffic.

For the transportation of the turbines to the proposed site, it was assumed that the turbine blades will be transported to site individually. Steel or concrete towers can be utilised at the site. Alternatively, the towers can be of a hybrid nature, comprising concrete towers with top steel sections.

As a general assumption, for each wind turbine three (3) abnormal loads will be required for the blades, nine (9) abnormal loads for the tower sections and one (1) abnormal load for the nacelle. All further components can be transported with normal limitation haulage vehicles. With approximately thirteen (13) abnormal loads trips (3 trips for blades, 9 trips for tower sections and 1 trip for the nacelle), the total trips to deliver the components of 111 turbines to the proposed site will be around 1 443 trips (13 trips x 111 turbines). This would amount to 2.73 vehicle trips per day (1 443 trips / 24 months / 22 working days per month) for a construction period of 24 months. Should the turbines be delivered during an 18-month period, the vehicle trips would amount to 3.64 vehicle trips per day.

Several normal haulage vehicles will be required to transport materials, equipment, plant, and staff to the site. The construction of roads and concrete footings will also have an impact on the surrounding road network as vehicles deliver materials to the site. A concrete footing (approximately 600 $m^3$) adds around 100 trips by concrete trucks to the surrounding road network. It is therefore advised to have concrete batching plants on site or in close vicinity to reduce trips.

The significance of the transport impact without mitigation measures during the construction and decommissioning phases can be rated as medium to high. However, considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level of low to medium significance.

- *Proposed mitigation measures*
    - The delivery of wind turbine components to the site must be staggered and trips must be scheduled to occur outside of peak traffic periods.
    - Dust suppression of gravel roads during the construction and decommissioning phases, as required.

- Regular maintenance of gravel roads by the Contractor during the construction and decommissioning phases.
- The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- Any low hanging overhead lines (lower than 5.1 m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.
- The preferred route should be surveyed to identify problem areas e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, which may require modification. After the road modifications have been implemented, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, prior to the transportation of any turbine components, to ensure that the delivery of the turbines will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.
- Design and maintenance of internal roads. The internal gravel roads will require grading with a road grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional. The road designer should take cognizance that roads need to be designed with smooth, relatively flat gradients to allow an abnormal load vehicle to ascend to the top of a hill.

- *Significance of impact with mitigation measures*
  The proposed mitigation measures for the construction traffic will result in a minor reduction of the impact on the surrounding road network, but the impact on the local traffic will remain low as the existing traffic volumes are deemed to be low. The dust suppression, however, significantly reduces the impact.

## 6.2 Potential Impact (Operational Phase)

The operational phase will not generate any significant traffic volumes. During operation, it is expected that maintenance and security staff will periodically visit the facility. It is assumed that approximately 30 full-time employees will be stationed on site (subject to change). Based on experience with similar projects, the number of full-time employees is generally low and consequently, the associated trips are negligible. The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.

## 6.3 Potential Impact (Decommissioning Phase)

The decommissioning phase will result in the same impact as the construction phase as similar trips are expected. The potential traffic impact will be of medium significance before mitigation measures during the construction and decommissioning phases. However, considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level of low significance.

## 7 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed development of the Ummbila Renewable Wind Energy Facility does not proceed. This would mean that there will be no negative environmental impacts and no traffic impact on the surrounding network during the construction and decommissioning phases of the facility. However, this would also mean that there would be no socio-economic benefits to the surrounding communities, and it will not assist government in meeting its' targets for renewable energy. **Hence, the no-go alternative is not a preferred alternative.**

## 8 IMPACT ASSESSMENT SUMMARY

The assessment of impacts and recommendation of mitigation measures as discussed above are collated in the tables below. The assessment methodology is attached as **Annexure C.**

### 8.1 Construction Phase

*Table 8-1: Impact Rating - Construction Phase – Traffic Congestion*

| | | | |
|---|---|---|---|
| ***Nature:***<br>**Traffic congestion during the construction phase** | | | |
| **Impact description:** The impact will occur due to added pressure on the road network due to the increase in traffic associated with the transport of equipment, material, and staff to site during the construction phase. Traffic congestion possible along the N17, R39 and R35, depending on the main access route selected. | | | |
| | **Rating** | **Motivation** | **Significance** |
| ***Prior to Mitigation*** | | | |
| **Duration** | Short-term (2) | The construction period will last between 1 – 2 years. | **Medium Negative (40)** |
| **Extent** | Local (2) | Pressure will only be added on the local road network. | |
| **Magnitude** | Moderate (6) | The increase in traffic will have a moderate impact on traffic operations. | |
| **Probability** | Highly Probable (4) | The possibility of the impact on the traffic operations is highly probable. | |
| ***Mitigation/Enhancement Measures*** | | | |
| ***Mitigation:***<br>• Stagger component delivery to site<br>• Reduce the construction period<br>• The use of mobile batch plants and quarries in close proximity to the site<br>• Staff and general trips should occur outside of peak traffic periods.<br>• Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase.<br>• It its recommended to avoid staggered intersections on the main access road. Intersections should rather be consolidated or realigned as far as possible. | | | |
| ***Post Mitigation/Enhancement Measures*** | | | |
| **Duration** | Short-term (2) | The construction period will last between 1 – 2 years. | **Low Negative (18)** |
| **Extent** | Local (2) | Pressure will only be added on the local road network. | |
| **Magnitude** | Low (2) | The increase in traffic will have a low impact on traffic operations. | |
| **Probability** | Probable (3) | The possibility of the impact on the traffic operations is probable. | |
| ***Cumulative impacts:***<br>The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable. | | | |
| ***Residual Risks:***<br>Traffic will return to normal levels after construction is completed. | | | |

## 9 CUMULATIVE IMPACTS

To assess the cumulative impact, it was assumed that all renewable energy projects within 50km currently proposed and authorized, would be constructed at the same time. This is the precautionary approach as in reality; these projects would be subject to a highly competitive bidding process. Only a handful of projects would be selected to enter into a power purchase agreement with Eskom, and construction is likely to be staggered depending on project-specific issues.

The construction and decommissioning phases are the only significant traffic generators for renewable energy projects. The duration of these phases is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). <u>Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.</u>

The assessments of cumulative impacts are collated in the table below.

*Table 9-1: Cumulative Impact rating*

| | | |
|---|---|---|
| **Nature:** *Traffic generated by the proposed development and the associated noise and dust pollution.* Traffic congestion and associated noise and dust pollution possible along the N17, R35, R39 and the existing gravel road network, depending on the main access route selected. | | |
| | **Overall impact of the proposed project considered in isolation (Post mitigation)** | **Cumulative impact of the project and other projects in the area** |
| ***Extent*** | medium (2) | High (5) |
| ***Duration*** | Short term (2) | medium term (3) |
| ***Magnitude*** | minor (2) | High (8) |
| ***Probability*** | Probable (3) | Improbable (2) |
| ***Significance*** | **Low (18)** | **Medium (32)** |
| ***Status (positive/negative)*** | Negative | Negative |
| ***Reversibility*** | High | High |
| ***Loss of resources?*** | No | No |
| ***Can impacts be mitigated?*** | Yes | Yes |
| ***Confidence in findings:*** High. | | |
| ***Mitigation:***<br>• *Stagger component delivery to site*<br>• *Dust suppression*<br>• *Reduce the construction period*<br>• *The use of mobile batch plants and quarries in close proximity to the site*<br>• *Staff and general trips should occur outside of peak traffic periods* | | |
| **Description of expected significance of impact**<br>The significance of the transport impact can be rated as high. *The increase in traffic cannot be completely mitigated but mitigation measures will significantly reduce the impact.* *Noise and dust pollution is limited to the construction and decommissioning periods.*<br>*It should be noted that even if all the facilities are constructed and decommissioned at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.* | | |

## 10 ENVIRONMENTAL MANAGEMENT PROGRAM INPUTS

OBJECTIVE: It is recommended that dust suppression and maintenance of gravel roads form part of the EMPr. This would be required during the Construction phase where an increase in vehicle trips can be expected. No traffic related mitigation measures are envisaged during the operational phase due to the negligible traffic volume generated during this phase.

| | |
|---|---|
| **Project component/s** | Construction Phase traffic |
| **Potential Impact** | Dust and noise pollution due to increase in traffic volume |
| **Activity/risk source** | Transportation of material, components, equipment, and staff to site |
| **Mitigation: Target/Objective** | Minimize impacts on road network and surrounding communities |

| **Mitigation: Action/control** | **Responsibility** | **Timeframe** |
|---|---|---|
| • Stagger component delivery to site<br>• The use of mobile batch plants and quarries near the site would decrease the impact on the surrounding road network<br>• Dust suppression<br>• Reduce the construction period as far as possible<br>• Maintenance of gravel roads<br>• Apply for abnormal load permits prior to commencement of delivery via abnormal loads<br>• Assess the preferred route and undertake a 'dry run' to test<br>• Staff and general trips should occur outside of peak traffic periods as far as possible.<br>• Any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles, if required | • Holder of the EA | • Before construction commences and regularly during construction phase |

| | |
|---|---|
| **Performance Indicator** | Staggering or reducing the construction trips will reduce the impact of dust and noise pollution. |
| **Monitoring** | • Regular monitoring of road surface quality.<br>• Monitoring congestion levels (increase in vehicle trips)<br>• Apply for required permits prior to commencement of construction |

## 11 CONCLUSION AND RECOMMENDATIONS

This scoping report addressed key issues and alternatives to be considered for the proposed Ummbila Emoyeni Wind Energy Facility:

- The preferred Port of Entry for imported components is the Port of Richard's Bay.
- Several access points are feasible for this project, which have been discussed in this report.
- Alternative route should be determined where needed to avoid toll routes where abnormal and heavy vehicles cannot be accommodated, or to avoid excessive toll costs.
- It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will hence need to be maintained during the additional loading of the construction phase and then reinstated after construction is completed. The gravel roads will require grading with a grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage.
- The construction phase traffic, although significant, will be temporary and can be mitigated to an acceptable level.
- During operation, it is expected that staff and security will periodically visit the facility. It is assumed that approximately 30 full-time employees will be stationed on the site. The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.
- The construction and decommissioning phases of the development is the only significant traffic generator and therefore noise and dust pollution will be higher during this phase. The duration of this phase is short term i.e., the impact of the traffic on the surrounding road network is temporary and wind energy facilities, when operational, do not add any significant traffic to the road network.
- The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be negative and of medium significance before and of low significance after mitigation.

The potential mitigation measures mentioned in the construction and decommissioning phases are:

- Dust suppression
- Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- The use of mobile batching plants and quarries near the site would decrease the impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods.
- A "dry run" of the preferred route.
- Design and maintenance of internal roads.
- Any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved or raised to accommodate the abnormal load vehicles.

The construction and decommissioning phases of a wind farm are the only significant traffic generators and therefore noise, dust and exhaust pollution will be higher during these phases. The duration of these phases is short term i.e., the impact of the Wind Farm on traffic on the surrounding road network is temporary.

The access point to the proposed site has been assessed and was found to be acceptable from a transport perspective.

The development is supported from a transport perspective provided that the recommendations and mitigations contained in this report are adhered to.

## 12 REFERENCES


- Google Earth Pro
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- Road Traffic Act (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- The Technical Recommendations for Highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads

# *Annexure A – SPECIALIST EXPERTISE*

# IRIS SIGRID WINK

| | |
|---|---|
| **Profession** | Civil Engineer (Traffic & Transportation) |
| **Position in Firm** | Associate |
| **Area of Specialisation** | Manager: Traffic & Transportation Engineering |
| **Qualifications** | PrEng, MSc Eng (Civil & Transportation) |
| **Years of Experience** | 20 Years |
| **Years with Firm** | 10 Years |

## SUMMARY OF EXPERIENCE

Iris is a Professional Engineer registered with ECSA (20110156). She joined JG Afrika (Pty) Ltd. in 2012. Iris obtained a Master of Science degree in Civil Engineering in Germany and has more than 19 years of experience in a wide field of traffic and transport engineering projects. Iris left Germany in 2003 and has worked as a traffic and transport engineer in South Africa and Germany. She has technical and professional skills in traffic impact studies, public transport planning, non- motorised transport planning and design, design and development of transport systems, project planning and implementation for residential, commercial, and industrial projects and providing conceptual designs for the abovementioned. She has also been involved with transport assessments for renewable energy projects and traffic safety audits.

Iris is registered with the International Road Federation as a Global Road Safety Audit Team Leader.

**PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS**

**PrEng** - Registered with the Engineering Council of South Africa No. 20110156
Registered Mentor with ECSA for the Cape Town Office of JG Afrika
**MSAICE** - Member of the South African Institution of Civil Engineers
**ITSSA** - Member of ITS SA (Intelligent Transport Systems South Africa)
**SAWEA** - Member of the South African Wind Energy Association
**SARF** - South African Road Federation: Committee Member of Council
**SARF WR** - South African Road Federation Western Region Committee Member
**SARF RSC**- South African Road Federation National Road Safety Committee
**IRF** - Global Road Safety Audit Team Leader

**EDUCATION**

**1996 - Matric** – Matric (Abitur) – Carl Friedrich Gauss Schule, Hemmingen, Germany
**1998 - Diploma** as Draughtsperson – Lower Saxonian State Office for Road and Bridge Engineering
**2003 - MSc Eng** (Civil and Transportation) – Leibniz Technical University of Hanover, Germany

**SPECIFIC EXPERIENCE (Selection)**

**JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)**
**2016 – Date**
**Position –** Associate

- **Transport Impact Assessments and Management Plan** - Euronotus Wind&Solar Energy Cluster in the Western Cape, Client: WSP on behalf of G7 Energies
- **Transport Impact Assessment for De Aar Solarfarm** - Client: Mulilo
- **Transport Impact Assessments for the Mpumalanga Windfarms** - Client: Enertrag
- **Transport Impact Assessment for the Hyperion Thermal Plant** - Client: Red Rocket
- **Transport Impact Assessment for the Richards Bay Gas to Power Facility** - Client: Savannah
- **Transport Impact Assessment for the Pienaarspoort Wind Energy Facility** - Client: Savannah
- **Transport Impact Assessment for Oya Black Mountain Solar Farm** - Client: G7 Energies
- **Traffic Impact Assessment for the Nooiensfontein Housing Development** - Client: City of Cape Town
- **Kudusberg Windfarm** – Transport study for the proposed Kudusberg Windfarm near Sutherland, Northern Cape – Client: G7 Renewable Energies
- **Kuruman Windfarm –** Transport study for the proposed Kuruman Windfarm in Kuruman, Northern Cape – Client: Mulilo Renewable Project Developments
- **Coega West Windfarm** – Transportation and Traffic Management Plan for the proposed Coega Windfarm in Coega, Port Elizabeth – Client: Electrawinds Coega
- **Traffic and Parking Audits** for the Suburb of Groenvallei in Cape Town – Client: City of Cape Town Department of Property Management.
- **Road Safety Audit** for the Upgrade of N1 Section 4 Monument River – Client: Aurecon on behalf of SANRAL
- **Sonop Windfarm** – Traffic Impact Assessment for the proposed Sonop Windfarm, Coega, Port Elizabeth – Client: Founders Engineering
- **Universal Windfarm** - Traffic Impact Assessment for the proposed Universal Windfarm, Coega, Port Elizabeth – Client: Founders Engineering
- **Road Safety Audit** for the Upgrade of N2 Section 8 Knysna to Wittedrift – Client: SMEC on behalf of SANRAL
- **Road Safety Audit** for the Upgrade of N1 Section 16 Zandkraal to Winburg South – Client: SMEC on behalf of SANRAL
- **Traffic and Road Safety Studies** for the Improvement of N7 Section 2 and Section 3 (Rooidraai and Piekenierskloof Pass) – Client: SANRAL
- **Road Safety Appraisal**s for Northern Region of Cape Town – Client: Aurecon on behalf of City of Cape Town (TCT)
- **Traffic Engineering Services** for the Enkanini Informal Settlement, Kayamandi - Client: Stellenbosch Municipality
- **Lead Traffic Engineer** for the Upgrade of a 150km Section of the National Route N2 from Kangela to Pongola in KwaZulu-Natal, Client: SANRAL
- **Traffic Engineering Services** for the Kosovo Informal Settlement (which is part of the Southern Corridor Upgrade Programme), Client: Western Cape Government

- **Traffic and Road Safety Studies** for the proposed Kosovo Informal Housing Development (part of the Southern Corridor Upgrade Program), Client: Western Cape Government.
- **Road Safety Audit** Stage 3 – Upgrade of the R573 Section 2 between Mpumalanga/Gauteng and Mpumalanga/Limpopo, Client: AECOM on behalf of SANRAL
- **Road Safety Audit** Stage 1 and 3 – Upgrade of the N2 Section 5 between Lizmore and Heidelberg, Client: Aurecon on behalf of SANRAL
- **Traffic Safety Studies** for Roads Upgrades in Cofimvaba, Eastern Cape – Client: Cofimvaba Municipality
- **Road Safety Audit** Stage 1 and 3 – Improvement of Intersections between Olifantshoek and Kathu, Northern Cape, Client: Nadeson/Gibb on behalf of SANRAL
- **Road Safety Audit** Stage 3 – Upgrade of the Beacon Way Intersection on the N2 at Plettenberg Bay, Client: AECOM on behalf of SANRAL
- **Traffic Impact Assessment** for a proposed Primary School at Die Bos in Strand, Somerset West, Client: Edifice Consulting Engineers
- **Road Safety Audit** Stage 1 and 3 – Improvement of R75 between Port Elizabeth and Uitenhage, Eastern Cape, Client: SMEC on behalf of SANRAL

# *Annexure B – ASSESSMENT METHODOLOGY*

***Assessment of Impacts***

Direct, indirect, and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase must be assessed in terms of the following criteria:

- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - medium-term (5–15 years) – assigned a score of 3;
  - long term (> 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5;
- The **magnitude**, quantified on a scale from0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment
  - 2 is minor and will not result in an impact on processes
  - 4 is low and will cause a slight impact on processes
  - 6 is moderate and will result in processes continuing but in a modified way
  - 8 is high (processes are altered to the extent that they temporarily cease)
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring.
  Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium, or high; and
- The **status**, which will be described as either positive, negative, or neutral.
- The degree to which the impact can be reversed.
- The degree to which the impact may cause irreplaceable loss of resources.
- The *degree* to which the impact can be *mitigated.*

The **significance** is calculated by combining the criteria in the following formula:

S=(E+D+M)P

S = Significance weighting

E = Extent

D = Duration

M =Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

» < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),

» 30-60 points: Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),

» > 60 points: High (i.e., where the impact must have an influence on the decision process to develop in the area).

APPENDIX 13: WASTE MANAGEMENT PLAN

# WASTE MANAGEMENT PLAN

## 1. PURPOSE

A Waste Management Plan (WMP) plays a key role in achieving sustainable waste management throughout all phases of the project. The plan prescribes measures for the collection, temporary storage and safe disposal of the various waste streams associated with the project and includes provisions for the recovery, re-use and recycling of waste. The purpose of this plan is therefore to ensure that effective procedures are implemented for the handling, storage, transportation and disposal of waste generated from the project activities on site.

This WMP has been compiled as part of the project EMPr and is based on waste stream information available at the time of compilation. Construction and operation activities must be assessed on an ongoing basis in order to determine the efficacy of the plan and whether further revision of the plan is required. This plan should be updated should further detail regarding waste quantities and categorisation become available, during the construction and/or operation stages.

## 2. RELEVANT ASPECTS OF THE SITE

It is expected that the development of the Ummbila Emoyeni Wind Energy Facility will generate construction solid waste, general waste and hazardous waste during the lifetime of the wind farm.

Waste generated on site, originates from various sources, including but not limited to:

» Concrete waste generated from spoil and excess concrete.
» Contaminated water, soil, rocks and vegetation due to hydrocarbon spills.
» Hazardous waste from vehicle, equipment and machinery parts and servicing, fluorescent tubes, used hydrocarbon containers, and waste ink cartridges.
» Recyclable waste in the form of paper, glass, steel, aluminium, wood/ wood pallets, plastic (PET bottles, PVC, LDPE) and cardboard.
» Organic waste from food waste as well as alien and endemic vegetation removal.
» Sewage from portable toilets and septic tanks.
» Inert waste from spoil material from site clearance and trenching works.

## 3. LEGISLATIVE REQUIREMENTS

Waste in South Africa is currently governed by several regulations, including:

» National Environmental Management: Waste Act (NEM:WA), 2008 (Act 59 of 2008);
» National Environmental Management: Waste Amendment Act, 2014 (Act 26 of 2014);
» The South African Constitution (Act 108 of 1996);
» Hazardous Substances Act (Act 5 of 1973);
» Health Act (Act 63 of 1977);
» Environment Conservation Act (Act 73 of 1989);
» Occupational Health and Safety Act (Act 85 of 1993);
» National Water Act (Act 36 of 1998);
» The National Environmental Management Act (Act 107 of 1998) (as amended);

- Municipal Structures Act (Act 117 of 1998);
- Municipal Systems Act (Act 32 of 2000);
- Mineral and Petroleum Resources Development Act (Act 28 of 2002); and
- Air Quality Act (Act 39 of 2004).

Storage of waste must be conducted in accordance with the National Norms and Standards for the Storage of Waste, published in GNR 926.

## 4. WASTE MANAGEMENT PRINCIPLES

An integrated approach to waste management is needed on site. Such an approach is illustrated in Figure 1.

It is important to ensure that waste is managed with the following objectives in mind during all phases of the project:

- Reducing volumes of waste is the greatest priority;
- If reduction is not feasible, the maximum amount of waste is to be recycled; and
- Waste that cannot be recycled is to be disposed of in the most environmentally responsible manner.

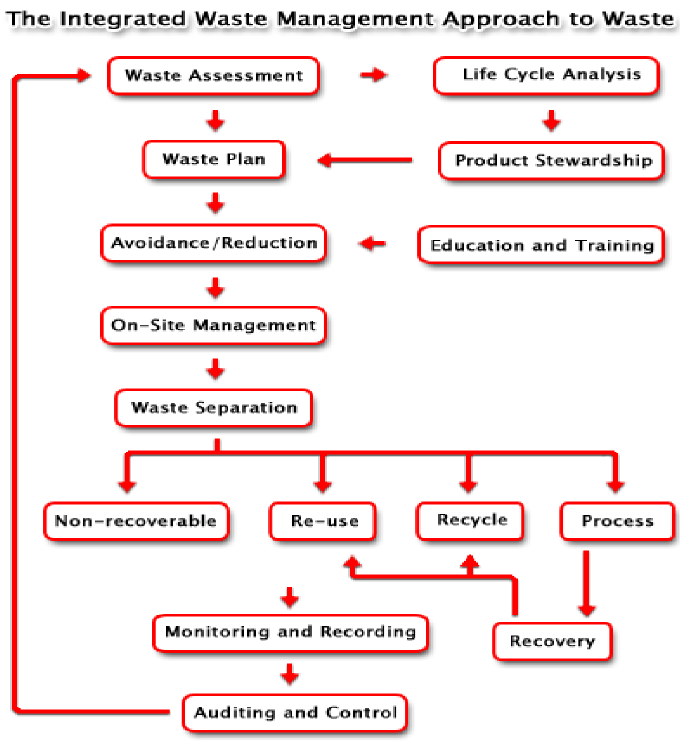


Figure 1: Integrated Waste Management Flow Diagram
(Source: http://www.enviroserv.co.za/pages/content.asp?SectionId=496)

## 4.1. Construction phase

A plan for the management of waste during the construction phase is detailed below. A Method Statement detailing specific waste management practices during construction should be prepared by the Contractor prior to the commencement of construction, for approval by the Resident Engineer and/or ECO.

### *4.1.1. Waste Assessment / Inventory*

» The Environmental Officer (EO), or designated staff member, must develop, implement and maintain a waste inventory reflecting all waste generated during construction for both general and hazardous waste streams.
» Construction methods and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities, to be pro-actively implemented.
» Once a waste inventory has been established, targets for the recovery of waste (minimisation, re-use, recycling) should be set.
» The EO must conduct waste classification and rating in terms of SANS 10288 and Government Notice 634 published under the NEM: WA.

### *4.1.2. Waste collection, handling and storage*

» It is the responsibility of the EO to ensure that each subcontractor implements their own waste recycling system, i.e. separate bins for food waste, plastics, paper, wood, glass cardboard, metals, etc. Such practises must be made contractually binding upon appointment of the subcontractors.
» Waste manifests and waste acceptance approvals (i.e. receipts) from designated waste facilities must be kept on file at the site office, in order to record and prove continual compliance for future auditing.
» Septic tanks and portable toilets must be monitored by the EO or responsible subcontractor and maintained regularly. Below ground storage of septic tanks must withstand the external forces of the surrounding environment. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from moving around in the surrounding area.
» Waste collection bins and hazardous waste containers must be provided by the principal contractor and subcontractors and placed at strategic locations around the site for the storage of organic, recyclable and hazardous waste.
» A dedicated waste area must be established on site for the storage of all waste streams before removal from site. The storage period must not trigger listed waste activities as per the NEMWA, GN 921 of November 2013.
» Signage/ colour coding must be used to differentiate disposal areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass etc.).
» Hazardous waste must be stored within a bunded area constructed according to SABS requirements, and must ensure complete containment of the spilled material in the event of a breach. As such, appropriate bunding material, design, capacity and type must be utilised to ensure that no contamination of the surrounding environment will occur despite a containment breach. The net capacity of a bunded compound in a storage facility should be at least 120% of the net capacity of the largest tank.
» Take into consideration the capacity displaced by other tanks within the same bunded area and any foundations.
» Treat interconnected tanks as a single tank of equivalent total volume for the purposes of the bund design criteria

- The location of all temporary waste storage areas must aim to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control, while being reasonably placed in terms of centrality and accessibility on site. Where required, an additional temporary waste storage area may be designated, provided identical controls are exercised for these locations.
- Waste storage shall be in accordance with all Regulations and best-practice guidelines and under no circumstances may waste be burnt on site.
- A dedicated waste management team must be appointed by the principal contractors' SHE Officer, who will be responsible for ensuring the continuous sorting of waste and maintenance of the area. The waste management team must be trained in all areas of waste management and monitored by the SHE Officer.
- All waste removed from site must be done by a registered/ licensed subcontractor, who must supply information regarding how waste recycling/ disposal will be achieved. The registered subcontractor must provide waste manifests for all removals at least once a month or for every disposal made, records of which must be kept on file at the site camp for the duration of the construction period.

#### *4.1.3. Management of waste storage areas*

- The position of all waste storage areas must be located so as to ensure minimal degradation to the environment. The main waste storage area must have a suitable stormwater system separating clean and contaminated stormwater.
- Collection bins placed around the site and at subcontractors' camps (if at a different location than the main site camp) must be maintained and emptied on a regular basis by the principal contractor to avoid overflowing receptacles.
- Inspections and maintenance of the main waste storage area must be undertaken daily. Skips and storage containers must be clearly marked or colour coded and well-maintained. Monitor for rodents and take corrective action if they become a problem.
- Waste must be stored in designated containers and not on the ground.
- Inspections and maintenance of bunds must be undertaken regularly. Bunds must be inspected for leaks or cracks in the foundation and walls.
- It is assumed that any rainwater collected inside the bund is contaminated and must be treated by oil/water separation (or similar method) prior to dewatering, or removed and stored as hazardous waste, and not released into the environment.
- If any leaks occur in the bund, these must be removed immediately.
- Bund systems must be designed to avoid dewatering of contaminated water, but to rather separate oil and hydrocarbons from water prior to dewatering.
- Following rainfall event bunds must always be dewatered in order to maintain a sufficient storage capacity in the event of a breach.
- No mixing of hazardous and general waste is allowed.

#### *4.1.4. Disposal*

- Waste generated on site must be removed on a regular basis. This frequency may change during construction depending on waste volumes generated at different stages of the construction process, however removal must occur prior to the storage capacity being reached to avoid overflow of containers and poor waste storage.

» Waste must be removed by a suitably qualified contractor and disposed of at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor to the EO and ECO.

#### *4.1.5. Record keeping*

The success of the Waste Management Plan is determined by measuring criteria such as waste volumes, cost recovery from recycling and cost of disposal. Recorded data can indicate the effect of training and education, or the need for education. It will provide trends and benchmarks for setting goals and standards. It will provide clear evidence of the success or otherwise of the plan.

» Documentation (waste manifest, certificate of issue or safe disposal) must be kept detailing the quantity, nature, and fate of any regulated waste for audit purposes.
» Waste management must form part of the monthly reporting requirements in terms of volumes generated, types, storage and final disposal.

#### *4.1.6. Training*

Training and awareness regarding waste management shall be provided to all employees and contractors as part of the toolbox talks or on-site awareness sessions with the EO and at the frequency as set out by the ECO.

### 4.2. Operation phase

It is expected that the operation phase will result in the production of limited amounts of general waste consisting mostly of cardboard, paper, plastic, tins, metals and a variety of synthetic compounds. Hazardous wastes (including grease, oils) will also be generated. All waste generated will be required to be temporarily stored at the facility in appropriate sealed containers prior to disposal at a permitted landfill site or other facilities.

The following waste management principles apply during the operation phase:

» The SHE Manager must develop, implement and maintain a waste inventory reflecting all waste generated during operation for both general and hazardous waste streams.
» Adequate waste collection bins at site must be supplied. Separate bins should be provided for general and hazardous waste.
» Recyclable waste must be removed from the waste stream and stored separately.
» All waste must be stored in appropriate temporary storage containers (separated between different operation wastes, and contaminated or wet waste).
» Waste storage shall be in accordance with all best-practice guidelines and under no circumstances may waste be burnt on site.
» Waste generated on site must be removed on a regular basis throughout the operation phase.
» Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor and kept on site.

## 5. Monitoring of Waste Management Activities

Records must be kept of the volumes/ mass of the different waste streams that are collected from the site throughout the life of the project. The appointed waste contractor is to provide monthly reports to the operator containing the following information:

» Monthly volumes/ mass of the different waste streams collected;
» Monthly volumes/ mass of the waste that is disposed of at a landfill site;
» Monthly volumes/ mass of the waste that is recycled;
» Data illustrating progress compared to previous months.

This report will aid in monitoring the progress and relevance of the waste management procedures that are in place. If it is found that the implemented procedures are not as effective as required, this WMP is to be reviewed and amended accordingly. This report must from part of the EO's reports to the ECO on a monthly basis.

APPENDIX 14: EMERGENCY PREPAREDNESS, RESPONSE AND FIRE MANAGEMENT PLAN

# EMERGENCY PREPAREDNESS, RESPONSE AND FIRE MANAGEMENT PLAN

## 1. PURPOSE

The purpose of the Emergency Preparedness and Response Plan is:

» To assist contractor personnel to prepare for and respond quickly and safely to emergency incidents, and to establish a state of readiness which will enable prompt and effective responses to possible events.
» To control or limit any effect that an emergency or potential emergency may have on site or on neighbouring areas.
» To facilitate emergency responses and to provide such assistance on the site as is appropriate to the occasion.
» To ensure communication of all vital information as soon as possible.
» To facilitate the reorganisation and reconstruction activities so that normal operations can be resumed.
» To provide for training so that a high level of preparedness can be continually maintained.

This plan outlines response actions for potential incidents of any size. It details response procedures that will minimise potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to an emergency event. The plan will enable an effective, comprehensive response to prevent injury or damage to the construction personnel, public, and environment during the project. Contractors are expected to comply with all procedures described in this document. A Method Statement should be prepared at the commencement of the construction phase detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation. The method statement must also reflect conditions of the IFC Performance Standard 1 and include the following:

» Identification of areas where accidents and emergency situations may occur;
» Communities and individuals that may be impacted;
» Response procedure;
» Provisions of equipment and resources;
» Designation of responsibilities;
» Communication; and
» Periodic training to ensure effective response to potentially affected communities.

## 2. PROJECT-SPECIFIC DETAILS

The project site has been identified by the applicant as a technically feasible site which has the potential for the development of 100 MW Compton Photovoltaic Solar Energy Facility, Battery Energy Storage System (BESS) and associated infrastructure located near Ceres in the Cape Winelands District Municipality, Western Cape Province of South Africa.

The project site has been identified as a technically feasible site which has the potential for the development of a wind facility, including a Battery Energy Storage System (BESS) through the consideration of a number of technical factors. A development area of approximately ~390ha has been identified within the project site by the proponent for the development.

Due to the scale and nature of this development, it is anticipated that the following risks could potentially arises during the construction and operation phases:

» Fires;
» Leakage of hazardous substances;
» Storage of flammable materials and substances;
» Flood events;
» Accidents; and
» Natural disasters.

## 3. EMERGENCY RESPONSE PLAN

There are three levels of emergency as follows:

» Local Emergency: An alert confined to a specific locality.
» Site Emergency: An alert that cannot be localised and which presents danger to other areas within the site boundary or outside the site boundary.
» Evacuation: An alert when all personnel are required to leave the affected area and assemble in a safe location.

If there is any doubt as to whether any hazardous situation constitutes an emergency, then it must be treated as an Evacuation.

Every effort must be made to control, reduce or stop the cause of any emergency provided it is safe to do so. For example, in the event of a fire, isolate the fuel supply and limit the propagation of the fire by cooling the adjacent areas. Then confine and extinguish the fire (where appropriate) making sure that re-ignition cannot occur.

### 3.1. Emergency Scenario Contingency Planning

#### *3.1.1. Scenario: Spill which would result in the contamination of land, surface or groundwater*

##### i. Spill Prevention Measures

Preventing spills must be the top priority at all operations which have the potential of endangering the environment. The responsibility to effectively prevent and mitigate any scenario lies with the Contractor and the ECO. In order to reduce the risk of spills and associated contamination, the following principles should be considered during construction and operation activities:

» All equipment refuelling, servicing and maintenance activities should only be undertaken within appropriately sealed/contained or bunded designated areas.
» All maintenance materials, oils, grease, lubricants, etc. should be stored in a designated area in an appropriate storage container.
» No refuelling, storage, servicing, or maintenance of equipment should take place within sensitive environmental resources in order to reduce the risk of contamination by spills.
» No refuelling or servicing should be undertaken without absorbent material or drip pans properly placed to contain spilled fuel.

» Any fluids drained from the machinery during servicing should be collected in leak-proof containers and taken to an appropriate disposal or recycling facility.
» If these activities result in damage or accumulation of product on the soil, the contaminated soil must be disposed of as hazardous waste. Under no circumstances shall contaminated soil be added to a spoils pile and transported to a regular disposal site.
» Chemical toilets used during construction must be regularly cleaned. Chemicals used in toilets are also hazardous to the environment and must be controlled. Portable chemical toilets could overflow if not pumped regularly or they could spill if dropped or overturned during moving. Care and due diligence should be taken at all times.
» Contact details of emergency services and HazMat Response Contractors are to be clearly displayed on the site. All staff are to be made aware of these details and must be familiar with the procedures for notification in the event of an emergency.

ii. Procedures

The following action plan is proposed in the event of a spill:

1. Spill or release identified.
2. Assess person safety, safety of others and environment.
3. Stop the spill if safely possible.
4. Contain the spill to limit entering surrounding areas.
5. Identify the substance spilled.
6. Quantify the spill (under or over guideline/threshold levels).
7. Notify the Site Manager and emergency response crew and authorities (in the event of major spill).
8. Inform users (and downstream users) of the potential risk.
9. Clean up of the spill using spill kit or by HazMat team.
10. Record of the spill incident on company database.

*a) Procedures for containing and controlling the spill (i.e. on land or in water)*

Measures can be taken to prepare for quick and effective containment of any potential spills. Each contractor must keep sufficient supplies of spill containment equipment at the construction sites, at all times during and after the construction phase. These should include specialised spill kits or spill containment equipment. Other spill containment measures include using drip pans underneath vehicles and equipment every time refuelling, servicing, or maintenance activities are undertaken.

Specific spill containment methods for land and water contamination are outlined below.

<u>Containment of Spills on Land</u>

Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil is a natural sorbent, and therefore spills on soil are generally less serious than spills on water as contaminated soil can be more easily recovered. It is important that all measures be undertaken to avoid spills reaching open water bodies located outside of the project site. The following methods could be used:

» *Dykes* - Dykes can be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled substance. A dyke needs to be built up to a size that will ensure containment of the maximum quantity of contaminant that may reach it. A plastic tarp can be placed on and at the base of the dyke such that the contaminant can pool up and subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly, a dyke may not be necessary and sorbents can be used to soak up contaminants before they migrate away from the source of the spill.

» *Trenches* - Trenches can be dug out to contain spills. Spades, pick axes or a front-end loader can be used depending on the size of the trench required. Spilled substances can then be recovered using a pump or sorbent materials.

*b) Procedures for transferring, storing, and managing spill related wastes*

Used sorbent materials are to be placed in plastic bags for future disposal. All materials mentioned in this section are to be available in the spill kits. Following clean up, any tools or equipment used must be properly washed and decontaminated, or replaced if this is not possible.

Spilled substances and materials used for containment must be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

*c) Procedures for restoring affected areas*

Criteria that may be considered include natural biodegradation of oil, replacement of soil and revegetation. Once a spill of reportable size has been contained, the ECO and the relevant Authority must be consulted to confirm that the appropriate clean up levels are met.

*3.1.2. Scenario: Fire (and fire water handling)*

i. Action Plan

The following action plan is proposed in the event of a fire:

1. Quantify risk.
2. Assess person safety, safety of others and environment.
3. If safe – attempt to extinguish the fire using appropriate equipment.
4. If not safe to extinguish, contain fire.
5. Notify the Site Manager and emergency response crew and authorities.
6. Inform users of the potential risk of fire.
7. Record the incident on the company database or filing register.

ii. Procedures

Because large scale fires may spread very fast it is most advisable that the employee/contractor not put his/her life in danger in the case of an uncontrolled fire.

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.

Current evacuation signs and diagrams for the building or site that are compliant to relevant state legislation must be provided in a conspicuous position, on each evacuation route. Contact details for the relevant emergency services should be clearly displayed on site and all employees should be aware of procedures to follow in the case of an emergency.

*a) Procedures for initial actions*

Persons should not fight the fire if any of the following conditions exist:

» They have not been trained or instructed in the use of a fire extinguisher.
» They do not know what is burning.
» The fire is spreading rapidly.
» They do not have the proper equipment.
» They cannot do so without a means of escape.
» They may inhale toxic smoke.

*b) Reporting procedures*

In terms of the requirements of NEMA, the responsible person must, within 14 days of the incident, report to the Director General, provincial head of department and municipality.

» Report fire immediately to the site manager, who will determine if it is to be reported to the relevant emergency services and authorities.
» The site manager must have copies of the Report form to be completed.

» SUMMARY: RESPONSE PROCEDURE

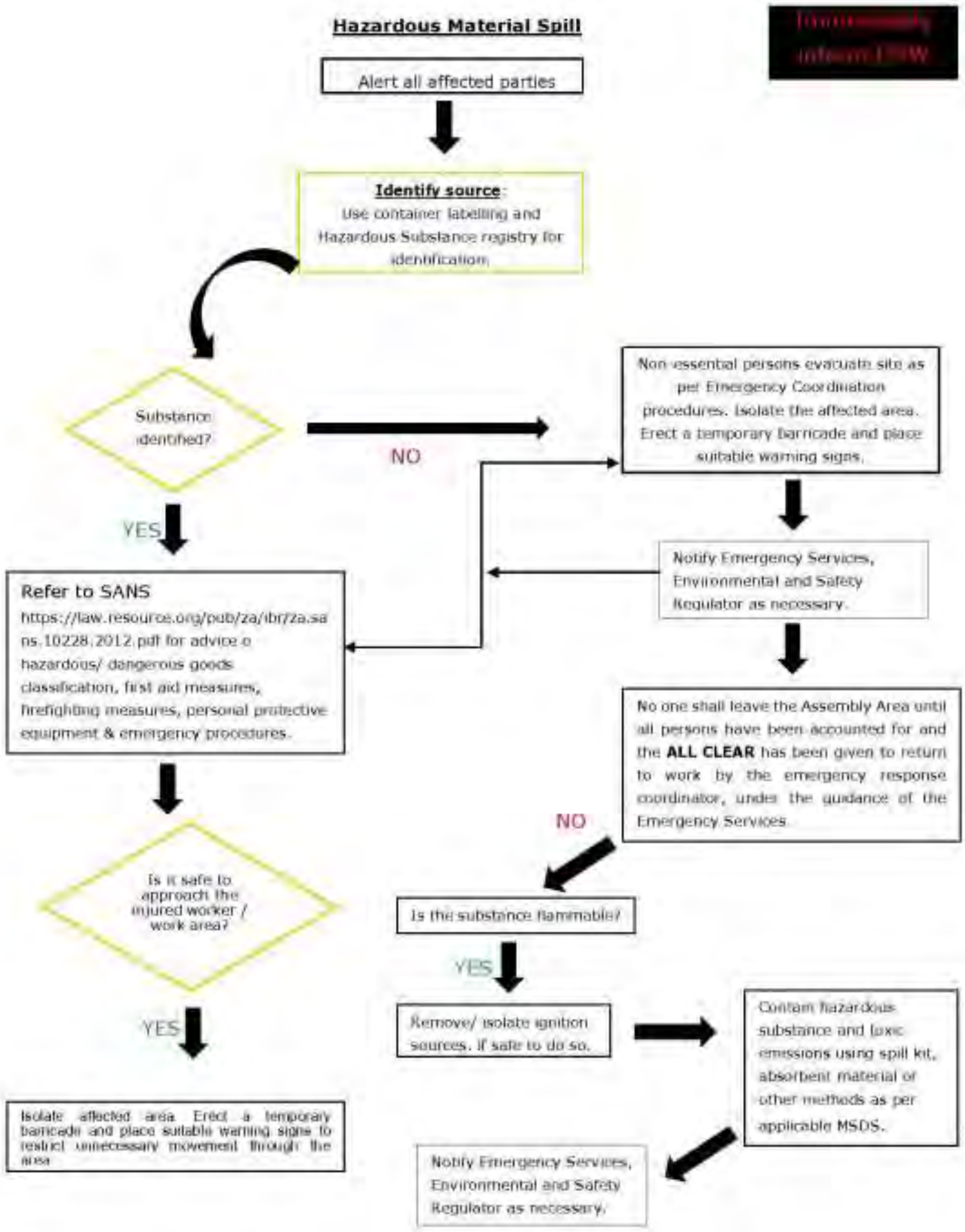


Figure 1: Hazardous Material Spill

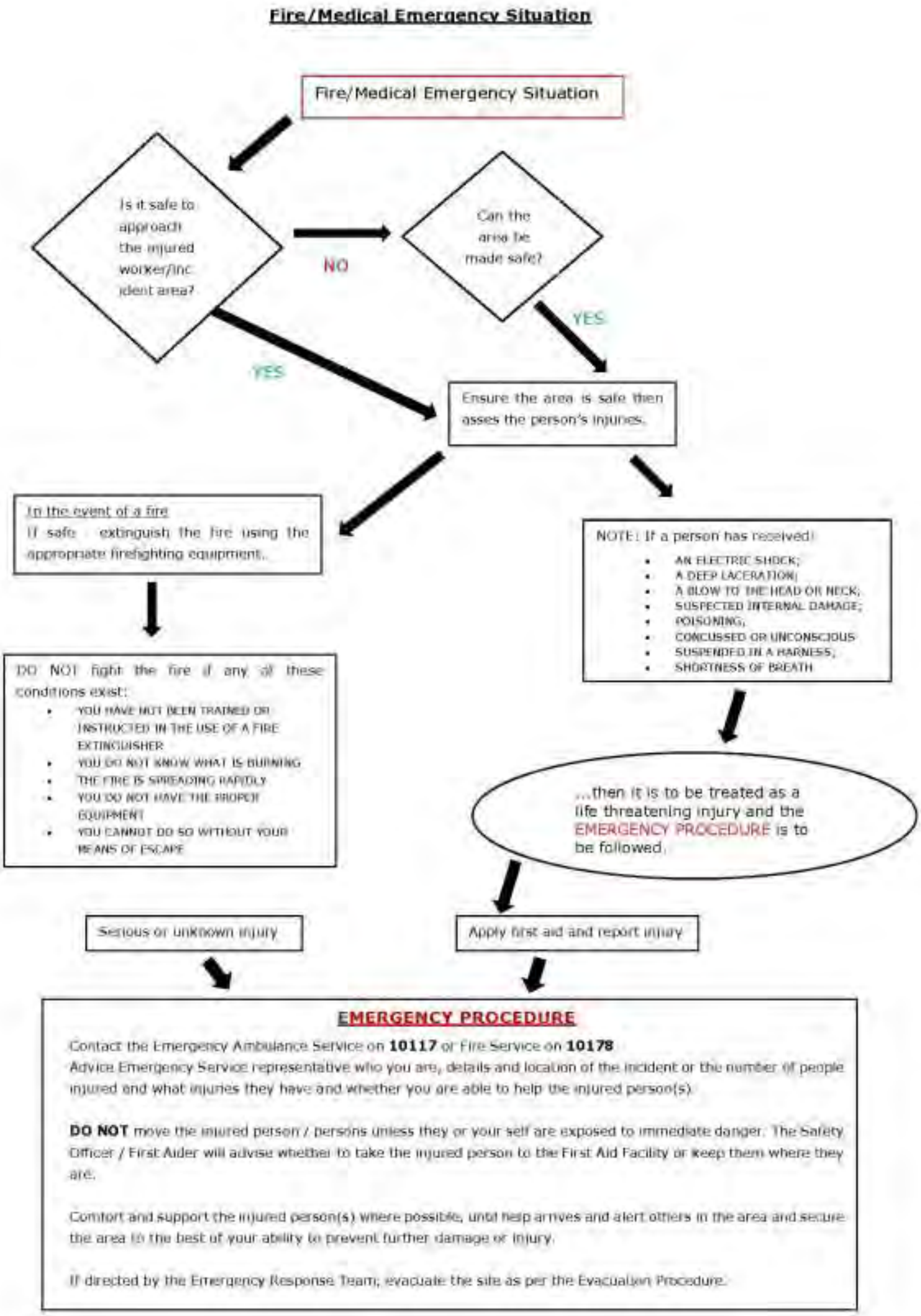


Figure 2: Emergency Fire/Medical

## 4. PROCEDURE RESPONSIBILITY

The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this Plan, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues.

The local authorities will provide their assistance when deemed necessary, or when it has been requested and/or indicated in Section 30 (8) of NEMA. The provincial authority will provide assistance and guidance where required and conduct awareness programmes.