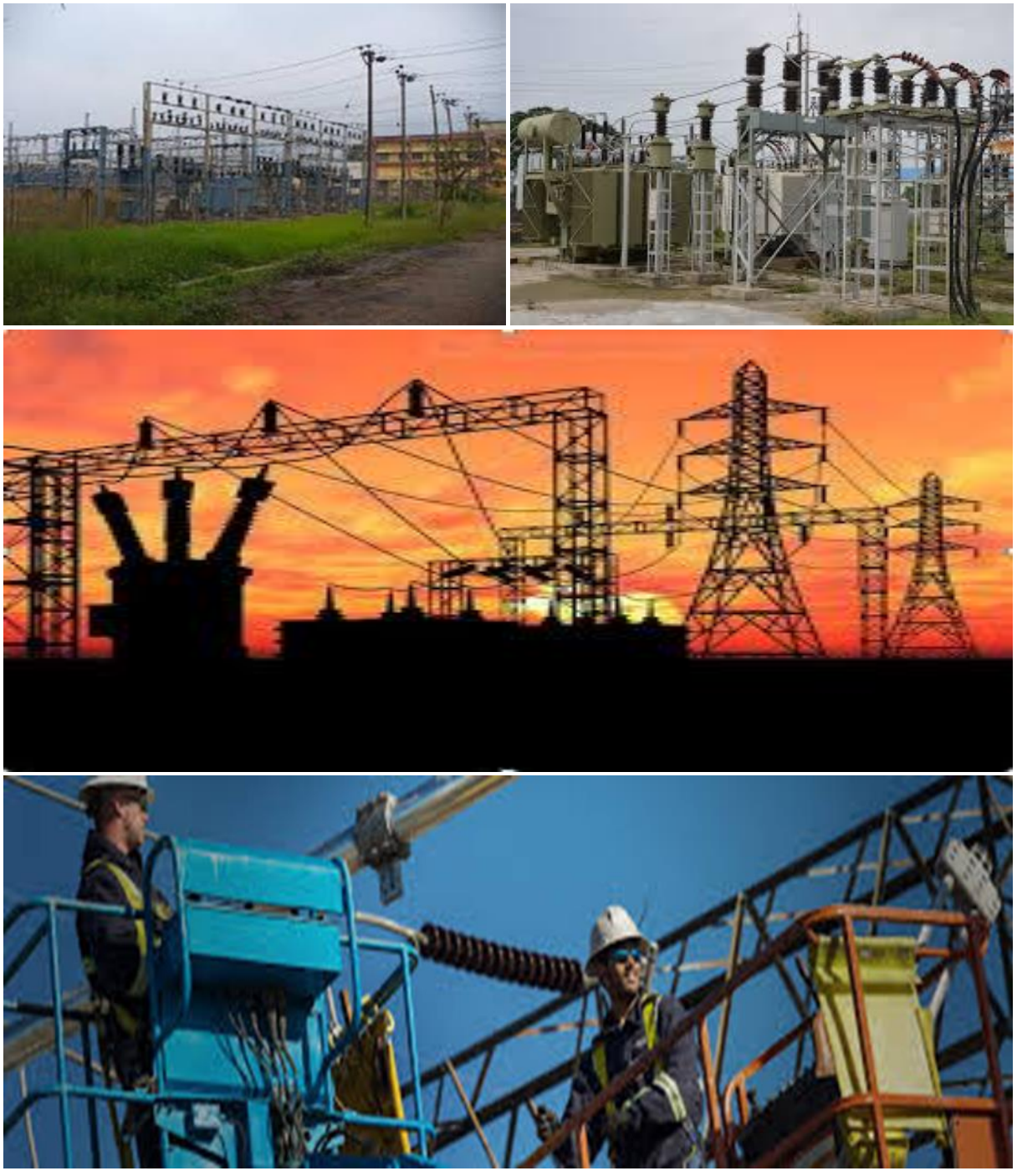
GENERIC ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr) FOR THE DEVELOPMENT AND EXPANSION OF SUBSTATION INFRASTRUCTURE FOR THE TRANSMISSION AND DISTRIBUTION OF ELECTRICITY



environmental affairs
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TABLE OF CONTENTS

List of tables

INTRODUCTION

1. Background

The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) requires that an environmental management programme (EMPr) be submitted where an environmental impact assessment (EIA) has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation (EA). The content of an EMPr must either contain the information set out in Appendix 4 of the Environmental Impact Assessment Regulations, 2014, as amended (EIA Regulations) or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a government notice. Once the Minister has identified, through a government notice that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including but not limited to the applicant and the competent authority (CA).

2. Purpose

This document constitutes a generic EMPr relevant to applications for the development or expansion of substation infrastructure for the transmission and distribution of electricity, and all listed and specified activities necessary for the realisation of such infrastructure.

3. Objective

The objective of this generic EMPr is to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of substation infrastructure for the transmission and distribution of electricity. The use of a generic EMPr is intended to reduce the need to prepare and review individual EMPrs for applications of a similar nature.

4. Scope

The scope of this generic EMPr applies to the development or expansion of substation infrastructure for the transmission and distribution of electricity requiring EA in terms of NEMA. This generic EMPr applies to activities requiring EA, mainly activity 11 and 47 of the Environmental Impact Assessment Regulations Listing Notice 1 of 2014, as amended, and activity 9 of the Environmental Impact Assessment Regulations Listing Notice 2 of 2014, as amended, and all associated listed or specified activities necessary for the realization of such infrastructure.

5. Structure of this document

This document is structured in three parts with an Appendix as indicated in the table below:

Part	Section	Heading	Content
A		Provides general guidance and information and is **not legally binding**	Definitions, acronyms, roles & responsibilities and documentation and reporting.
B	1	Pre-approved generic EMPr template	Contains generally accepted impact management outcomes and impact management actions required for the avoidance, management and mitigation of impacts and risks associated with the development or expansion of substation infrastructure for the transmission and distribution of electricity, which are presented in the form of a template that has been pre-approved. The template in this section is to be completed by the contractor, with each completed page signed and dated by the holder of the EA prior to commencement of the activity. Where an impact management outcome is not relevant, the words "not applicable" can be inserted in the template under the "responsible persons" column. Once completed and signed, the template represents the EMPr for the activity approved by the CA and is legally binding. The template **is not required** to be submitted to the CA as once the generic EMPr is gazetted for implementation, it has been approved by the CA. To allow interested and affected parties access to the pre-approved EMPr template for consideration through the decision-making process, the EAP on behalf of the applicant /proponent must make the hard copy of this EMPr available at a public location and where the applicant has a website, the EMPr should also be made available on such publicly accessible website.
	2	Site specific information	Contains preliminary infrastructure layout and a declaration that the applicant/holder of the EA

Part	Section	Heading	Content
			will comply with the pre-approved generic EMPr template contained in Part B: Section 1, and understands that the impact management outcomes and impact management actions are **legally binding**. The preliminary infrastructure layout must be finalized to inform the final EMPr that is to be submitted with the basic assessment report (BAR) or environmental impact assessment report (EIAR), ensuring that all impact management outcomes and impact management actions have been either pre-approved or approved in terms of Part C. This section **must be** submitted to the CA together with the final BAR or EIAR. The information submitted to the CA will be considered to be incomplete should a signed copy of Part B: section 2 not be submitted. Once approved, this Section forms part of the EMPr for the development and is legally binding.
C		Site specific sensitivities/ attributes	If any specific environmental sensitivities/ attributes are present on the site which require site specific impact management outcomes and impact management actions, not included in the pre-approved generic EMPr, to manage impacts, these specific impact management outcomes and impact management actions must be included in this section. These specific environmental attributes must be referenced spatially and impact management outcomes and impact management actions must be provided. These specific impact management outcomes and impact management actions must be presented in the format of the pre-approved EMPr template (Part B: section 1) This section will not be required should the site contain no specific environmental sensitivities or attributes. However, if Part C is applicable to the site, it **is required** to be submitted together with the BAR or EIAR, for consideration of, and decision on, the application for EA. The information in this section must be prepared by an EAP and must contain his/her name and expertise including a curriculum vitae. Once

Part	Section	Heading	Content
			approved, Part C forms part of the EMPr for the site and is legally binding. This section applies only **to additional** impact management outcomes and impact management actions that are necessary for the avoidance, management and mitigation of impacts and risks associated with the specific development or expansion and which are not already included in Part B: section 1.
Appendix 1			Contains the method statements to be prepared prior to commencement of the activity. The method statements are **not required** to be submitted to the competent authority.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

PART A – GENERAL INFORMATION

1. DEFINITIONS

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

"clearing" means the clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified;

"construction camp" is the area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management;

"contractor" - The Contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the Environmental Management Programme and that Method Statements are implemented as described.

"**hazardous substance**" is a substance governed by the Hazardous Substances Act, 1973 (Act No. 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995;

"method statement" means a written submission by the Contractor to the Project Manager in response to this EMPr or a request by the Project Manager and ECO. The method statement must set out the equipment, materials, labour and method(s) the Contractor proposes using to carry out an activity identified by the Project Manager when requesting the Method Statement. This must be done in such detail that the Project Manager and ECO is able to assess whether the Contractor's proposal is in accordance with this specification and/or will produce results in accordance with this specification;

The method statement must cover as a minimum applicable details with regard to:

(i) Construction procedures;
(ii) Plant, materials and equipment to be used;
(iii) Transporting the equipment to and from site;
(iv) How the plant/ material/ equipment will be moved while on site;
(v) How and where the plant/ material/ equipment will be stored;
(vi) The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
(vii) Timing and location of activities;
(viii) Compliance/ non-compliance; and
(ix) Any other information deemed necessary by the Project Manager.

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

"solid waste" means all solid waste, including construction debris, hazardous waste, excess cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers);

"spoil" means excavated material which is unsuitable for use as material in the construction works or is material which is surplus to the requirements of the construction works;

"topsoil" means a varying depth (up to 300 mm) of the soil profile irrespective of the fertility, appearance, structure, agricultural potential, fertility and composition of the soil;

"works" means the works to be executed in terms of the Contract

2. ACRONYMS and ABBREVIATIONS

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

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

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

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

Responsible Person(s)	**Role and Responsibilities**
Developer's Project Manager (DPM)	<u>Role</u> The Project Developer is accountable for ensuring compliance with the EMPr and any conditions of approval from the competent authority (CA). Where required, an environmental control officer (ECO) must be contracted by the Project Developer to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the environmental authorisation (EA). The Project Developer is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and he must ensure that the ECO is integrated as part of the project team while remaining independent. <u>Responsibilities</u> - Be fully conversant with the conditions of the EA; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Developer and its Contractor(s); - Issuing of site instructions to the Contractor for corrective actions required; - Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; and - Ensure that periodic environmental performance audits are undertaken on the project implementation.

Responsible Person(s)	Role and Responsibilities
Developer Site Supervisor (DSS)	Role The DSS reports directly to the DPM, oversees site works, liaises with the contractor(s) and the ECO. The DSS is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. Responsibilities - Ensure that all contractors identify a contractor's Environmental Officer (cEO); - Must be fully conversant with the conditions of the EA. Oversees site works, liaison with Contractor, DPM and ECO; - Must ensure that all landowners have the relevant contact details of the site staff, ECO and cEO; - Issuing of site instructions to the Contractor for corrective actions required; - Will issue all non-compliances to contractors; and - Ratify the Monthly Environmental Report.
Environmental Control Officer (ECO)	Role The ECO should have appropriate training and experience in the implementation of environmental management specifications. The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. The ECO is also required to conduct compliance audits, verifying the monitoring reports submitted by the cEO. The ECO provides feedback to the DSS and Project Manager regarding all environmental matters. The Contractor, cEO and dEO are answerable to the Environmental Control Officer for non-compliance with the Performance Specifications as set out in the EA and EMPr. The ECO provides feedback to the DSS and Project Manager, who in turn reports back to the Contractor and potential and Registered Interested &Affected Parties' (RI&AP's), as required. Issues of non-compliance raised by the ECO must be taken up by the Project Manager, and resolved with the Contractor as per the conditions of his contract. Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the

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

Responsible Person(s)	Role and Responsibilities
	- Assisting in the resolution of conflicts; - Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the Contractor; - In case of non-compliances, the ECO must first communicate this to the Senior Site Supervisor, who has the power to ensure this matter is addressed. Should no action or insufficient action be taken, the ECO may report this matter to the authorities as non-compliance; - Maintenance, update and review of the EMPr; - Communication of all modifications to the EMPr to the relevant stakeholders.
developer Environmental Officer (dEO)	<u>Role</u> The dEOs will report to the Project Manager and are responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the Project Manager and Contractor's Manager, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities. <u>Responsibilities</u> - Be fully conversant with the EMPr; - Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures; - Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) - Confine the development site to the demarcated area; - Conduct environmental internal audits with regards to EMPr and authorisation compliance (on cEO); - Assist the contractors in addressing environmental challenges on site; - Assist in incident management: - Reporting environmental incidents to developer and ensuring that corrective action is taken, and lessons learnt shared; - Assist the contractor in investigating environmental incidents and compile investigation reports; - Follow-up on pre-warnings, defects, non-conformance reports; - Measure and communicate environmental performance to the Contractor;

Responsible Person(s)	Role and Responsibilities
	- Conduct environmental awareness training on site together with ECO and cEO; - Ensure that the necessary legal permits and / or licenses are in place and up to date; - Acting as Developer's Environmental Representative on site and work together with the ECO and contractor;
Contractor	Role 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. Responsibilities - project delivery and quality control for the development services as per appointment; - employ a suitably qualified person to monitor and report to the Project Developer's appointed person on the daily activities on-site during the construction period; - ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; - attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; - ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in EMPr, to the satisfaction of the ECO.
contractor Environmental Officer (cEO)	Role 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

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

4. ENVIRONMENTAL DOCUMENTATION REPORTING AND COMPLIANCE

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

4.1 Document control/Filing system

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

4.2 Documentation to be available

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

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

4.3 Weekly Environmental Checklist

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

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

4.4 Environmental site meetings

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

4.5 Required Method Statements

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

The method statement must cover applicable details with regard to:

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

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

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

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

4.6 Environmental Incident Log (Diary)

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

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

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

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

The Environmental Incident Log will be captured in the EAR.

4.7 Non-compliance

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

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

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

4.8 Corrective action records

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

4.9 Photographic record

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

The Contractor shall:

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

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

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

4.10 Complaints register

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

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

4.11 Claims for damages

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

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

4.12 Interactions with affected parties

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

The ECOs shall:

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

4.13 Environmental audits

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

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

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

4.14 Final environmental audits

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

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

5. IMPACT MANAGEMENT OUTCOMES AND IMPACT MANAGEMENT ACTIONS

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

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

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

5.1 Environmental awareness training

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All staff must receive environmental awareness training prior to commencement of the activities; – The Contractor must allow for sufficient sessions to train all personnel with no more than 20 personnel attending each course; – Refresher environmental awareness training is available as and when required; – All staff are aware of the conditions and controls linked to the EA and within the EMPr and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr; – The Contractor must erect and maintain information posters at key locations on site, and the posters must include the following information as a minimum: a) Safety notifications; and b) No littering. – Environmental awareness training must include as a minimum the following: a) Description of significant environmental impacts, actual or potential, related to their work activities;	**ECO and cEO**	**Environmental Induction training; Toolbox talks; other pertinent training aids**	**Initially prior to construction commencing ECO to induct Construction Management and cEO, and thereafter repeated for all new employees and yearly. Toolbox talks to be presented weekly**	**ECO**	**Monthly**	**Signed induction and toolbox talk, or training registers**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
b) Mitigation measures to be implemented when carrying out specific activities; c) Emergency preparedness and response procedures; d) Emergency procedures; e) Procedures to be followed when working near or within sensitive areas; f) Wastewater management procedures; g) Water usage and conservation; h) Solid waste management procedures; i) Sanitation procedures; j) Fire prevention; and k) Disease prevention. – A record of all environmental awareness training courses undertaken as part of the EMPr must be available; – Educate workers on the dangers of open and/or unattended fires; – A staff attendance register of all staff to have received environmental awareness training must be available. – Course material must be available and presented in appropriate languages that all staff can understand.						

5.2 Site Establishment development

Impact management outcome: Impacts on the environment are minimised during site establishment and the development footprint are kept to demarcated development area.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– A method statement must be provided by the contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management; – Location of camps must be within approved area to ensure that the site does not impact on sensitive areas identified in the environmental assessment or site walk through; – Sites must be located where possible on previously disturbed areas; – The camp must be fenced in accordance with ***Section 5.5: Fencing and gate installation***; and	**Contractor**	**Method Statement compilation and communication of Method Statements to employees. Use of EIA and Specialist Studies to locate site camps**	**Prior to construction**	**ECO**	**Monthly**	**Signed Method Statements; signed proof of communication register; Liaison with ECO regarding site camp placement**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The use of existing accommodation for contractor staff, where possible, is encouraged.						

5.3 Access restricted areas

Impact management outcome: Access to restricted areas prevented.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identification of access restricted areas is to be informed by the environmental assessment, site walk through and any additional areas identified during development; – Erect, demarcate and maintain a temporary barrier with clear signage around the perimeter of any access restricted area, colour coding could be used if appropriate; and – Unauthorised access and development related activity inside access restricted areas is prohibited.	**Contractor**	**Use of EIA/BA and Specialist Studies to locate sensitive areas and 'no-go' areas**	**Prior to construction in new areas**	**ECO**	**Monthly**	**Contractor compliance with sensitive areas and 'no-go' areas identified in EIA/BA and Specialist Studies**

5.4 Access roads

Impact management outcome: Minimise impact to the environment through the planned and restricted movement of vehicles on site.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– An access agreement must be formalised and signed by the DPM, Contractor and landowner before commencing with the activities; – All private roads used for access to the servitude must be maintained and upon completion of the works, be left in at least the original condition – All contractors must be made aware of all these access routes. – Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the contractor's expense; – Maximum use of both existing servitudes and existing roads must be made to minimize further disturbance through the development of new roads; – In circumstances where private roads must be used, the condition of the said roads must be recorded in accordance with ***section 4.9: photographic record***; prior to use and the condition thereof agreed by the landowner, the DPM, and the contractor; – Access roads in flattish areas must follow fence lines and tree belts to avoid fragmentation of vegetated areas or croplands – Access roads must only be developed on a pre-planned and approved roads.	**Contractor**	**Implementation of mitigation measures**	**Ongoing.**	**ECO**	**Monthly**	**Signed access agreements and maintenance of access roads**

5.5 Fencing and Gate installation

Impact management outcome: Minimise impact to the environment and ensure safe and controlled access to the site through the erection of fencing and gates where required.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Use existing gates provided to gain access to all parts of the area authorised for development, where possible; – Existing and new gates to be recorded and documented in accordance with **section *4.9: photographic record***; – All gates must be fitted with locks and be kept locked at all times during the development phase, unless otherwise agreed with the landowner; – At points where the line crosses a fence in which there is no suitable gate within the extent of the line servitude, on the instruction of the DPM, a gate must be installed at the approval of the landowner; – Care must be taken that the gates must be so erected that there is a gap of no more than 100 mm between the bottom of the gate and the ground; – Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill must be provided beneath the gate; – Original tension must be maintained in the fence wires; – All gates installed in electrified fencing must be re-electrified; – All demarcation fencing and barriers must be maintained in good working order for the duration of the development activities;	**Contractor and Applicant**	**Implementation of the mitigation measures**	**Ongoing.**	**ECO**	**Monthly**	**Site observation; public complaints register**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Fencing must be erected around the camp, batching plants, hazardous storage areas, and all designated access restricted areas, where applicable; – Any temporary fencing to restrict the movement of life-stock must only be erected with the permission of the land owner. – All fencing must be developed of high quality material bearing the SABS mark; – The use of razor wire as fencing must be avoided; – Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff is away from site. Site security will be required at all times; – On completion of the development phase all temporary fences are to be removed; – The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.						

5.6 Water Supply Management

Impact management outcome: Undertake responsible water usage.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All abstraction points or bore holes must be registered with the DWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis; – The Contractor must ensure the following: a. The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river; b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and c. All reasonable measures to limit pollution or sedimentation of the downstream watercourse are implemented. – Ensure water conservation is being practiced by: a. Minimising water use during cleaning of equipment; b. Undertaking regular audits of water systems; and c. Including a discussion on water usage and conservation during environmental awareness training. d. The use of grey water is encouraged.	**Contractor and Applicant**	**Application to DWS where applicable. Implementation of mitigation measures**	**Construction**	**ECO**	**Monthly**	**Proof of water source used; submission of above proof to DWS**

5.7 Storm and waste water management

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Runoff from the cement/ concrete batching areas must be strictly controlled, and contaminated water must be collected, stored and either treated or disposed of off-site, at a location approved by the project manager; – All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material and the used absorbent material disposed of at an appropriate waste disposal facility; – Natural storm water runoff not contaminated during the development and clean water can be discharged directly to watercourses and water bodies, subject to the Project Manager's approval and support by the ECO; – Water that has been contaminated with suspended solids, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the Project Manager's approval and support by the ECO.	**Contractor**	**Employ methods to prevent water pollution**	**Construction**	**ECO**	**Weekly**	**Inspection of areas where construction takes place near watercourses**

5.8 Solid and hazardous waste management

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All measures regarding waste management must be undertaken using an integrated waste management approach; – Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided; – A suitably positioned and clearly demarcated waste collection site must be identified and provided; – The waste collection site must be maintained in a clean and orderly manner; – Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal; – Staff must be trained in waste segregation; – Bins must be emptied regularly; – General waste produced onsite must be disposed of at registered waste disposal sites/ recycling company; – Hazardous waste must be disposed of at a registered waste disposal site; – Certificates of safe disposal for general, hazardous and recycled waste must be maintained.	**Contractor**	**Following good waste management practices outlined in approved method statement**	**Construction**	**ECO**	**Weekly**	**Waste safe disposal slips; Service Level Agreements**

5.9 Protection of watercourses and estuaries

Impact management outcome: Pollution and contamination of the watercourse environment and or estuary erosion are prevented.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All watercourses must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities; – In the event of a spill, prompt action must be taken to clear the polluted or affected areas; – Where possible, no development equipment must traverse any seasonal or permanent wetland – No return flow into the estuaries must be allowed and no disturbance of the Estuarine functional Zone should occur; – Development of permanent watercourse or estuary crossing must only be undertaken where no alternative access to tower position is available; – There must not be any impact on the long term morphological dynamics of watercourses or estuaries; – Existing crossing points must be favored over the creation of new crossings (including temporary access) – When working in or near any watercourse or estuary, the following environmental controls and consideration must be taken: a) Water levels during the period of construction;	**Contractor**	**Method statements; Stormwater Management Plan**	**Construction**	**ECO**	**Weekly**	**Method Statement compliance**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
No altering of the bed, banks, course or characteristics of a watercourse b) During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; c) Where earthwork is being undertaken in close proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and d) Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as development allows.						

5.10 Vegetation clearing

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
General: – Indigenous vegetation which does not interfere with the development must be left undisturbed; – Protected or endangered species may occur on or near the development site. Special care should be taken not to damage such species; – Search, rescue and replanting of all protected and endangered species likely to be damaged during project development must be identified by the relevant specialist and completed prior to any development or clearing; – 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; – The Environmental Audit Report must confirm that all identified species have been rescued and replanted and that the location of replanting is compliant with conditions of approvals; – Trees felled due to construction must be documented and form part of the Environmental Audit Report; – Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris;	**Contractor and Applicant**	**Specialist recommendations; Method statement; Search and Rescue Plan; Alien vegetation removal Plan (approved plans and strategies used by Eskom), site awareness**	**Pre-Construction and Construction and Operation**	**ECO**	**Pre-Construction and weekly during construction**	**Compliance to method statements and Search and Rescue Plan; Alien vegetation removal Plan. Approved plans and strategies used by Eskom.**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator, supervision of a registered pest control operator or is appropriately trained; – A daily register must be kept of all relevant details of herbicide usage; – No herbicides must be used in estuaries; – All protected species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance to ***Section 5.3: Access restricted areas***. Alien invasive vegetation must be removed and disposed of at a licensed waste management facility.						

5.11 Protection of fauna

Impact management outcome: Disturbance to fauna is minimised.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– No interference with livestock must occur without the landowner's written consent and with the landowner or a person representing the landowner being present;	**Contractor**	**Method statement and adherence to**	**Construction**	**ECO**	**Weekly**	**Public complaints register;**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The breeding sites of raptors and other wild birds species must be taken into consideration during the planning of the development programme; – 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; – Special recommendations of the avian specialist must be adhered to at all times to prevent unnecessary disturbance of birds; – No poaching must be tolerated under any circumstances. All animal dens in close proximity to the works areas must be marked as Access restricted areas; – No deliberate or intentional killing of fauna is allowed; – In areas where snakes are abundant, snake deterrents to be deployed on the pylons to prevent snakes climbing up, being electrocuted and causing power outages; and – No Threatened or Protected species (ToPs) and/or protected fauna as listed according NEMBA (Act No. 10 of 2004) and relevant provincial ordinances may be removed and/or relocated without appropriate authorisations/permits.		**exclusion/no-go zones; site awareness**				**adherence to exclusion/no-go zones and method statements**

5.12 Protection of heritage resources

Impact management outcome: Impact to heritage resources is minimised.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No-Go procedure in ***Section 5.3: Access restricted areas***; – Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance; – All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/ palaeontologist (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before development recommences.	**Contractor**	**Method Statement; Heritage management plan**	**Pre-construction and construction**	**ECO**	**Weekly and daily for zones highlighted by Heritage Specialist where potsherds were found**	**Monitoring of construction areas, adherence to management plan if change finds found.**

5.13 Safety of the public

Impact management outcome: All precautions are taken to minimise the risk of injury, harm or complaints.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc.; – All unattended open excavations must be adequately fenced or demarcated; – Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding; – Ensure structures vulnerable to high winds are secured; – Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged.	**Contractor**	**Landowner agreements; Method Statement**	**Construction**	**ECO**	**Weekly**	**Site works barricaded, safe working site maintained, public complaints register.**

5.14 Sanitation

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Mobile chemical toilets are installed onsite if no other ablution facilities are available; – The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the veld for the purposes of ablutions must be permitted under any circumstances; – Where mobile chemical toilets are required, the following must be ensured: a) Toilets are located no closer than 100 m to any watercourse or water body; b) Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; c) No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; d) Toilets have an external closing mechanism and are closed and secured from the outside when not in use to prevent toilet paper from being blown out; e) Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; f) Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards;	**Contractor**	**Service level agreement with Service provider; Method statement; site awareness**	**Construction**	**ECO**	**Weekly**	**Service level agreement with service provider, proof of safe disposal of waste**

– A copy of the waste disposal certificates must be maintained.						

5.15 Prevention of disease

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Undertake environmentally-friendly pest control in the camp area; – Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV AIDS; – The Contractor must ensure that information posters on AIDS are displayed in the Contractor Camp area; – Information and education relating to sexually transmitted diseases to be made available to both construction workers and local community, where applicable; – Free condoms must be made available to all staff on site at central points; – Medical support must be made available; – Provide access to Voluntary HIV Testing and Counselling Services.	**Contractor**	**Method statement, awareness training**	**Construction**	**ECO**	**Monthly**	**Method statement, proof of awareness training**

5.16 Emergency procedures

Impact management outcome: Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Compile an Emergency Response Action Plan (ERAP) prior to the commencement of the proposed project; – The Emergency Plan must deal with accidents, potential spillages and fires in line with relevant legislation; – All staff must be made aware of emergency procedures as part of environmental awareness training; – The relevant local authority must be made aware of a fire as soon as it starts; – In the event of emergency necessary mitigation measures to contain the spill or leak must be implemented (see ***Hazardous Substances section 5.17***).	**Contractor**	**Environmental Emergency Response Action Plan**	**Construction**	**ECO**	**Monthly**	**Adherence /compliance to ERAP**

5.17 Hazardous substances

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives substituted where possible; – All hazardous substances must be stored in suitable containers as defined in the Method Statement; – Containers must be clearly marked to indicate contents, quantities and safety requirements; – All storage areas must be bunded. The bunded area must be of sufficient capacity to contain a spill / leak from the stored containers; – Bunded areas to be suitably lined with a SABS approved liner; – An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis; – All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS); – All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet; – Employees handling hazardous substances / materials must be aware of the potential impacts and follow appropriate safety measures. Appropriate personal protective equipment must be made available;	**Contractor**	**Method Statement, OHS requirements; adequate and responsible use and storage of Hazardous Substances, Hazardous Substances storage register**	**Construction**	**ECO**	**Weekly**	**Hazardous Substance Storage Register, MSDS, Method Statement**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers; – 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 110% of the total capacity of all the storage tanks/ bowsers; – The floor of the bund must be sloped, draining to an oil separator; – Provision must be made for refueling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained; – All empty externally dirty drums must be stored on a drip tray or within a bunded area; – No unauthorised access into the hazardous substances storage areas must be permitted; – No smoking must be allowed within the vicinity of the hazardous storage areas; – Adequate fire-fighting equipment must be made available at all hazardous storage areas; – Where refueling away from the dedicated refueling station is required, a mobile refueling unit must be used. Appropriate ground protection such as drip trays must be used;						

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– An appropriately sized spill kit kept onsite relevant to the scale of the activity/s involving the use of hazardous substance must be available at all times; – The responsible operator must have the required training to make use of the spill kit in emergency situations; – An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken; – In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to ***Section 5.7*** for procedures concerning ***storm and waste water management*** and ***5.8*** for ***solid and hazardous waste management.***						

5.18 Workshop, equipment maintenance and storage

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area; – During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. The relevant local authority must be made aware of a fire as soon as it starts; – Leaking equipment must be repaired immediately or be removed from site to facilitate repair; – Workshop areas must be monitored for oil and fuel spills; – Appropriately sized spill kit kept onsite relevant to the scale of the activity taking place must be available; – The workshop area must have a bunded concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil / water separator where maintenance work on vehicles and equipment can be performed; – Water drainage from the workshop must be contained and managed in accordance Section ***5.7: Storm and waste water management***.	**Contractor**	**Method Statement, OHS requirements; Hazardous Substances storage register, vehicle daily checklist, vehicle service register**	**Construction**	**ECO**	**Weekly**	**Method Statement, Hazardous Substances storage register, vehicle daily checklist, vehicle service register**

5.19 Batching plants

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Concrete mixing must be carried out on an impermeable surface; – Batching plants areas must be fitted with a containment facility for the collection of cement laden water. – Dirty water from the batching plant must be contained to prevent soil and groundwater contamination – Bagged cement must be stored in an appropriate facility and at least 10 m away from any water courses, gullies and drains; – A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted; – Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licenced disposal facility; – Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site; – Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to ***Section 5.20: Dust emissions***) – Any excess sand, stone and cement must be removed or reused from site on completion of construction period and disposed at a registered disposal facility;	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Weekly**	**Compliance to mitigation and method statement**

– Temporary fencing must be erected around batching plants in accordance with Section ***5.5: Fencing and gate installation***.						

5.20 Dust emissions

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Take all reasonable measures to minimise the generation of dust as a result of project development activities to the satisfaction of the ECO; – Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re-vegetated or stabilised as soon as is practically possible; – Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present; – During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether working will cease altogether until the wind speed drops to an acceptable level; – Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind;	**Contractor**	**Method Statement, Vehicle Speed limit, dust suppression**	**Construction**	**ECO**	**Monthly**	**Site observations, dust suppression register**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO; – Vehicle speeds must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas; – Straw 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; – For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.						

5.21 Blasting

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

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Any blasting activity must be conducted by a suitably licensed blasting contractor; and	**Contractor**	**Relevant legislation and regulation**	**Construction**	**ECO**	**Monthly**	**Public complaints register; proof of**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Notification of surrounding landowners, emergency services site personnel of blasting activity 24 hours prior to such activity taking place on Site.						**registration of blasting contractor.**

5.22 Noise

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

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– The Contractor must keep noise level within acceptable limits, Restrict the use of sound amplification equipment for communication and emergency only; – All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained; – Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction workers; – Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. Operating hours as determined by the environmental authorisation are adhered	**Contractor**	**Restriction of site hours to working hours Monday to Friday**	**Construction**	**ECO**	**Monthly**	**Public Complaints Register**

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

5.23 Fire prevention

Impact management outcome: Prevention of uncontrollable fires.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Designate smoking areas where the fire hazard could be regarded as insignificant; – Firefighting equipment must be available on all vehicles located on site; – The local Fire Protection Agency (FPA) must be informed of construction activities; – Contact numbers for the FPA and emergency services must be communicated in environmental awareness training and displayed at a central location on site; – Two-way swop of contact details between ECO and FPA.	**Contractor**	**Emergency Response Action Plan; Method Statement**	**Construction**	**ECO**	**Monthly**	**Public complaints register; compliance to ERAP**

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; – All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods; – Topsoil stockpiles must not exceed 2 m in height; – During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.); – Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Monthly**	**Method Statement and site observations**

5.25 Civil works

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where terracing is required, topsoil must be collected and retained for the purpose of re-use later to rehabilitate disturbed areas not covered by yard stone; – Areas to be rehabilitated include terrace embankments and areas outside the high voltage yards; – Where required, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – 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; – Rehabilitation of the disturbed areas must be managed in accordance with ***Section 5.35: Landscaping and rehabilitation***; – All excess spoil generated during terracing activities must be disposed of in an appropriate manner and at a recognised landfill site; and – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes.	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Monthly**	**Site observation**

5.26 Excavation of foundation, cable trenching and drainage systems

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All excess spoil generated during foundation excavation must be disposed of in an appropriate manner and at a licensed landfill site, if not used for backfilling purposes; – Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes; – Management of equipment for excavation purposes must be undertaken in accordance with ***Section 5.18: Workshop, equipment maintenance and storage***; and – Hazardous substances spills from equipment must be managed in accordance with ***Section 5.17: Hazardous substances***.	**Contractor**	**Method Statement and Engineering Drawings**	**Construction**	**ECO**	**Weekly**	**Adherence to method statements**

5.27 Installation of foundations, cable trenching and drainage systems

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Batching of cement to be undertaken in accordance with **Section *5.19: Batching plants***; and – Residual solid waste must be disposed of in accordance with **Section *5.8: Solid waste and hazardous management***.	**Contractor**	**Method Statement**	**Construction**	**Contractor and ECO**	**Weekly**	**Method Statement and site observations**

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

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Management of dust must be conducted in accordance with Section ***5. 20: Dust emissions***; – Management of equipment used for installation must be conducted in accordance with Section ***5.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills must be conducted in accordance with Section ***5.17: Hazardous substances***; and	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Weekly**	**Method Statement and site observation**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.						

5.29 Steelwork Assembly and Erection

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

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– During assembly, care must be taken to ensure that no wasted/unused materials are left on site e.g. bolts and nuts – 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**	**Method Statement**	**Construction**	**ECO**	**Weekly**	**Site Observations**

5.2 Cabling and Stringing

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste (off cuts etc.) shall be recycled or disposed of in accordance with **Section *6.8: Solid waste and hazardous Management***; – Management of equipment used for installation shall be conducted in accordance with **Section *5.18: Workshop, equipment maintenance and storage***; – Management hazardous substances and any associated spills shall be conducted in accordance with ***Section 5.17: Hazardous substances***.	**Contractor**	**Method Statement, adherence to exclusion zones**	**Construction**	**ECO**	**Weekly**	**Site observations**

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

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

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Residual solid waste must be recycled or disposed of in accordance with ***Section 5.8: Solid waste and hazardous management***.	**Contractor**	**Method Statement**	**Construction**	**ECO**	**Weekly**	**Site observation**

5.4 Socio-economic

Impact management outcome: enhanced socio-economic development.

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Develop and implement communication strategies to facilitate public participation; – Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process; – Sustain continuous communication and liaison with neighboring owners and residents	**Contractor**	**Landowner Agreements; Issues and Complaints Register**	**Construction**	**ECO**	**Monthly**	**Landowner Agreement; Issues and Complaints Register**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Create work and training opportunities for local stakeholders; and – Where feasible, no workers, with the exception of security personnel, must be permitted to stay over-night on the site. This would reduce the risk to local farmers.						

5.5 Temporary closure of site

Impact management outcome: Minimise the risk of environmental impact during periods of site closure greater than five days.

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Bunds must be emptied (where applicable) and need to be undertaken in accordance with the impact management actions included in ***sections 5.17: Hazardous substances and 5.18: Workshop, equipment maintenance and storage***; – Hazardous storage areas must be well ventilated; – Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service; – Emergency and contact details displayed must be displayed; – Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel;	**Contractor**	**Method statement**	**Construction – when applicable**	**ECO**	**Monthly – when applicable**	**Method statement** **ECO reports**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Night hazards such as reflectors, lighting, traffic signage etc. must have been checked; – Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.; – Structures vulnerable to high winds must be secured; – Wind and dust mitigation must be implemented; – Cement and materials stores must have been secured; – Toilets must have been emptied and secured; – Refuse bins must have been emptied and secured; – Drip trays must have been emptied and secured.						

5.6 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; – Oil containing equipment must be stored to prevent leaking or be stored on drip trays;	**Contractor**	**Method statement**	**Construction and decommissioning**	**ECO**	**Monthly – when applicable**	**Site observation**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All scrap steel must be stacked neatly and any disused and broken insulators must be stored in containers; – 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; – The Contractor must also be equipped to contain and clean up any pollution causing spills; and – Disposal of unusable material must be at a licensed waste disposal site.						

5.7 Landscaping and rehabilitation

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

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All areas disturbed by construction activities must be subject to landscaping and rehabilitation; All spoil and waste must be disposed of to a registered waste site;	**Contractor**	**Method Statements; erosion protection; alien eradication plan**	**Concurrent with Construction**	**ECO**	**Monthly**	**Adequately revegetated work areas; no erosion or**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– All slopes must be assessed for contouring, and to contour only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983 – All slopes must be assessed for terracing, and to terrace only when the need is identified in accordance with the Conservation of Agricultural Resources Act, No 43 of 1983; – Berms that have been created must have a slope of 1:4 and be replanted with indigenous species and grasses that approximates the original condition; – Where new access roads have crossed cultivated farmlands, that lands must be rehabilitated by ripping which must be agreed to by the holder of the EA and the landowners; – Rehabilitation of access roads outside of farmland; – Indigenous species must be used for with species and/grasses to where it compliments or approximates the original condition; – Stockpiled topsoil must be used for rehabilitation (refer to ***Section 5.24: Stockpiling and stockpiled areas***); – Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion; – Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed; – Subsoil must be ripped before topsoil is placed; – The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment;						**invasive plant species**

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
– Where impacted through construction related activity, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled; – 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; – Spoil can be used for backfilling or landscaping as long as it is covered by a minimum of 150 mm of topsoil. – Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following: a) Annual and perennial plants are chosen; b) Pioneer species are included; c) Species chosen must be indigenous to the area with the seeds used coming from the area; d) Root systems must have a binding effect on the soil; e) The final product must not cause an ecological imbalance in the area						

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: **Pofadder Wind Facility 3 (Pty) Ltd**

Name of applicant: **Unai Urtasun Bravo**

Tel No: **082 300 6497**

Fax No: **+ 27 (0) 86 514 8184**

Postal Address**: PO Box 1730 Welgemoed Cape Town Western Cape**

Physical Address: **1501, 15th Floor, Portside Building, 4 Bree Street Cape Town 8001**

7.1.2. Details and expertise of the EAP:

Name of applicant: **SiVEST SA (Pty) Ltd**

Tel No: **+27 31 581 1500**

Fax No: **N/A**

E-mail address: **michelleg@sivest.co.za**

Expertise of the EAP (Curriculum Vitae included): **Yes, included in the EIA Application**

7.1.3. Project name:

Proposed Development of the Pofadder Wind Energy Facility (WEF) 3, Associated Infrastructure and on-site substation near Pofadder in the Northern Cape Province.

7.1.4. Description of the project:

Pofadder Wind Facility 3 (The Applicant) (Pty) Ltd is proposing to develop, construct and operate the Pofadder Wind Energy Facility (WEF) 3 and associated infrastructure approximately 35 km south east of Pofadder in the Kai !Garib Local and Z F Mgcawu District Municipalities, in the Northern Cape. (Figure 1) (DFFE Reference Number: 14/12/16/3/3/2/2152). The overall objective of the proposed development is to generate electricity by means of renewable energy technologies capturing wind energy to feed into the national grid. The proposed development will have a maximum output generation capacity of up to 248 megawatt (MW).

SiVEST Environmental Division has subsequently been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) process for the proposed construction and operation of the Pofadder WEF 3 and associated infrastructure. The proposed development requires an (Environmental Authorisation (EA) from the National Department Forestry, Fisheries and the Environment (DFFE). However, the provincial authority (i.e. the Northern Cape Department of Agriculture, Environmental Affairs, Rural Development and Land Reform) will also be consulted. The EIA for the proposed development will be conducted in terms of the EIA Regulations, 2014 (as amended) promulgated in terms of Chapter 5 of the NEMA. In terms of these regulations, a full EIA process is required for the proposed development. All relevant legislation and guidelines will be consulted during the EIA process and will be complied with at all times.

Two additional WEF's are concurrently being considered on the properties and are assessed by way of separate impact assessment processes contained in the 2014 Environmental Impact Assessment Regulations (GN No. R982, as amended) for listed activities contained Listing Notices 1, 2 and 3 (GN R983, R984 and R985, as amended). These projects are known as Pofadder Wind Energy Facility 1 (DFFE Reference Number: 14/12/16/3/3/2/2150) and Pofadder Wind Energy Facility 2 (DFFE Reference Number: 14/12/16/3/3/2/2151).

The respective WEF and grid connection infrastructure developments will require separate Environmental Authorisations (EAs) and are subject to separate Environmental Impact Assessment (EIA) and Basic Assessment (BA) processes respectively. The proposed grid connection infrastructure developments will be handed over to Eskom once constructed (Eskom grid connection works). The substations will include an Eskom portion (switching station) and an Independent Power Producer (IPP) portion (facility substation) hence the facility substations will be included in the respective WEF EIAs and the Eskom switching stations in the respective associated grid connection infrastructure BA in order to allow for handover to Eskom.

7.1.5. Project location:

The proposed development is located approximately 35 km south east of Pofadder in the Kai !Garib Local and Z F Mgcawu District Municipalities, in the Northern Cape.

The proposed development will affect the following three (3) farms / properties:

SG CODE	DESCRIPTION
C03600000000020200000	THE FARM GANNA POORT NO. 202
C03600000000015000003	PORTION 3 OF THE FARM SAND GAT NO. 150
C03600000000020100000	THE FARM LOVEDALE NO. 201

An existing alternative site access road for the WEF is located on the following property:

SG CODE	DESCRIPTION
C03600000000020000000	THE FARM QUAGGA-MAAG NO. 200

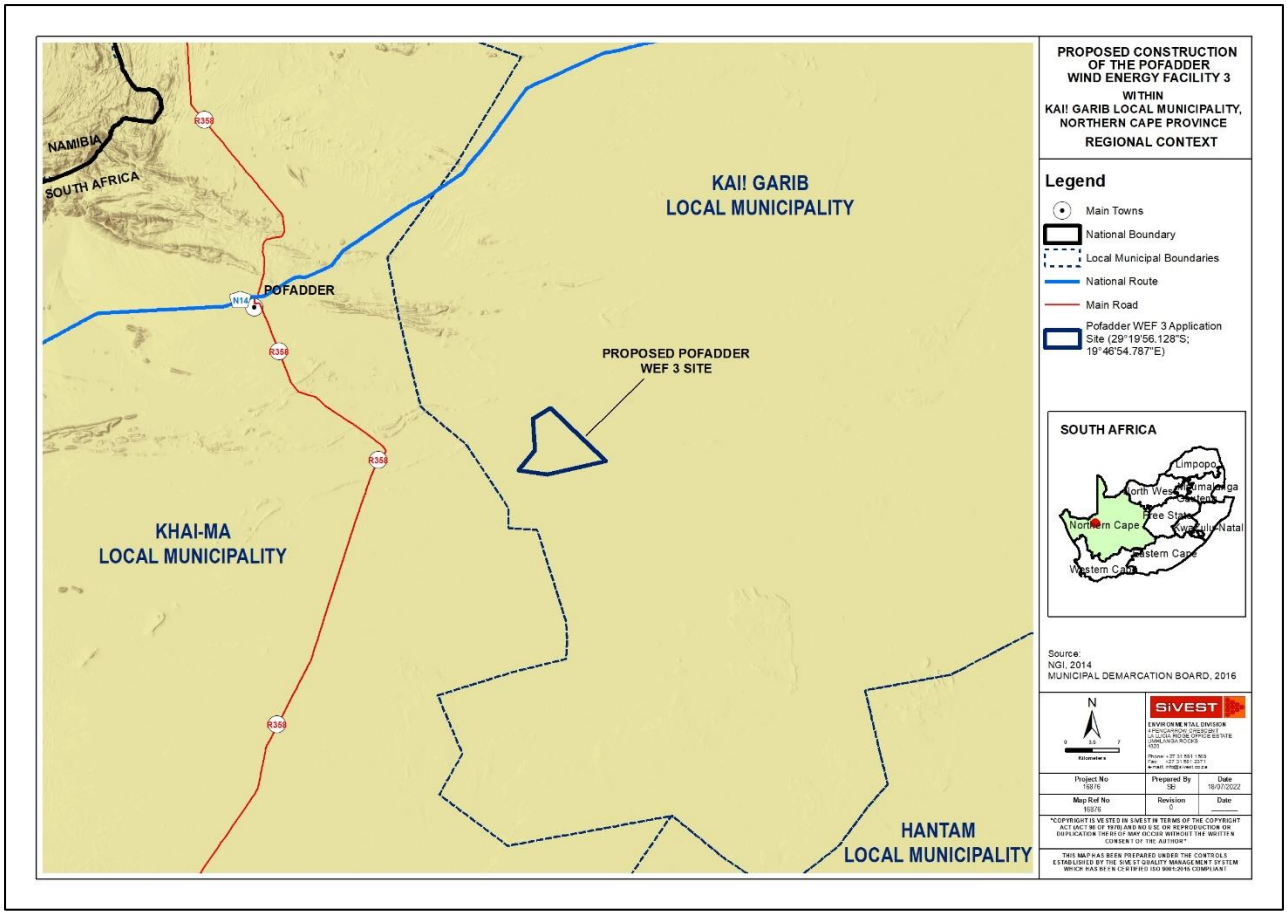


Figure 1: Regional Context

7.1 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.

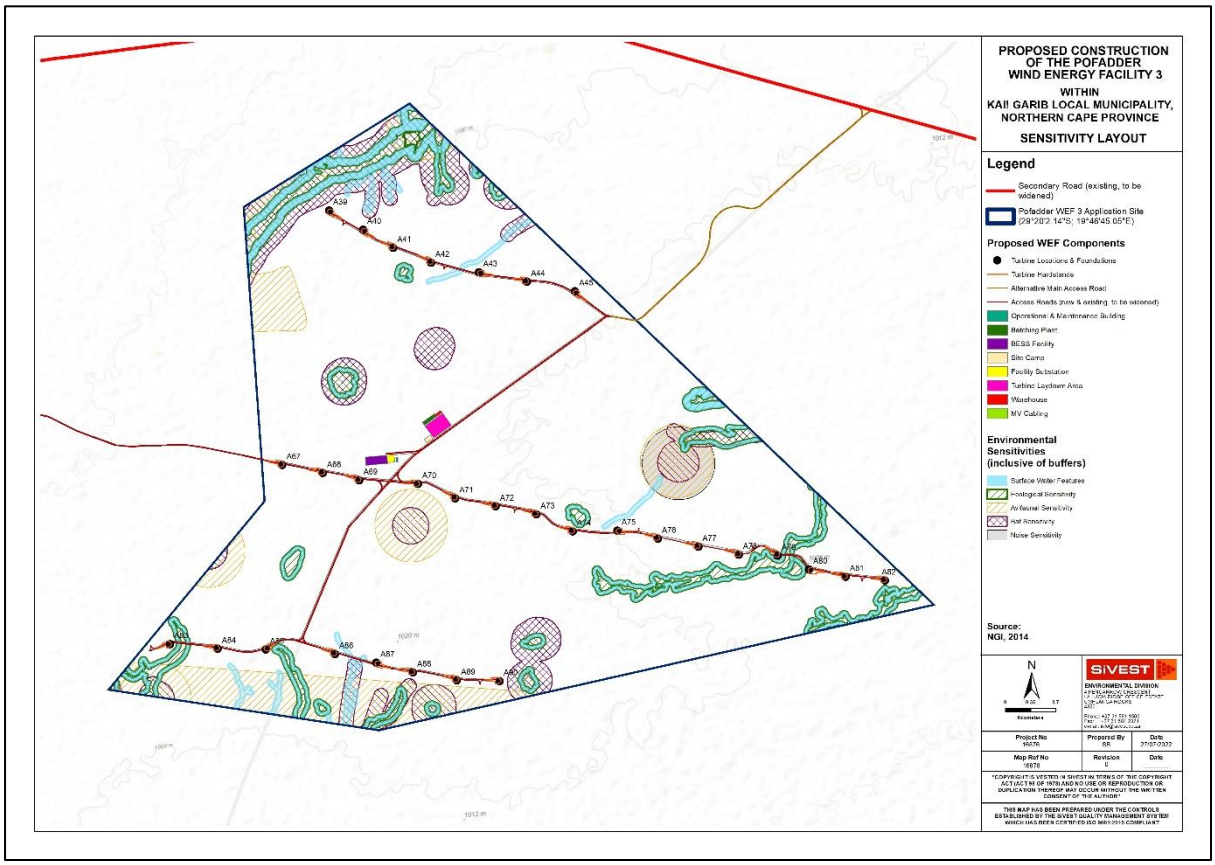


Figure 2: Environmental Sensitivity Overlay (Final)

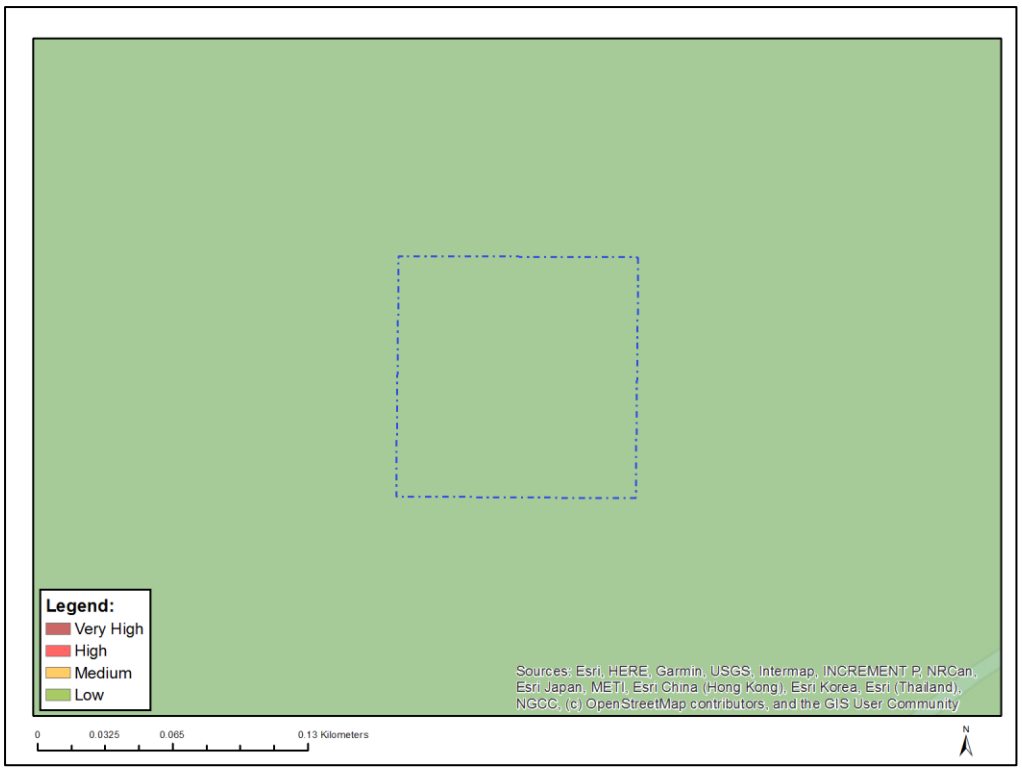


Figure 3: Map showing substation location in relation to the Agriculture Theme Sensitivity (DFFE Screening Tool)

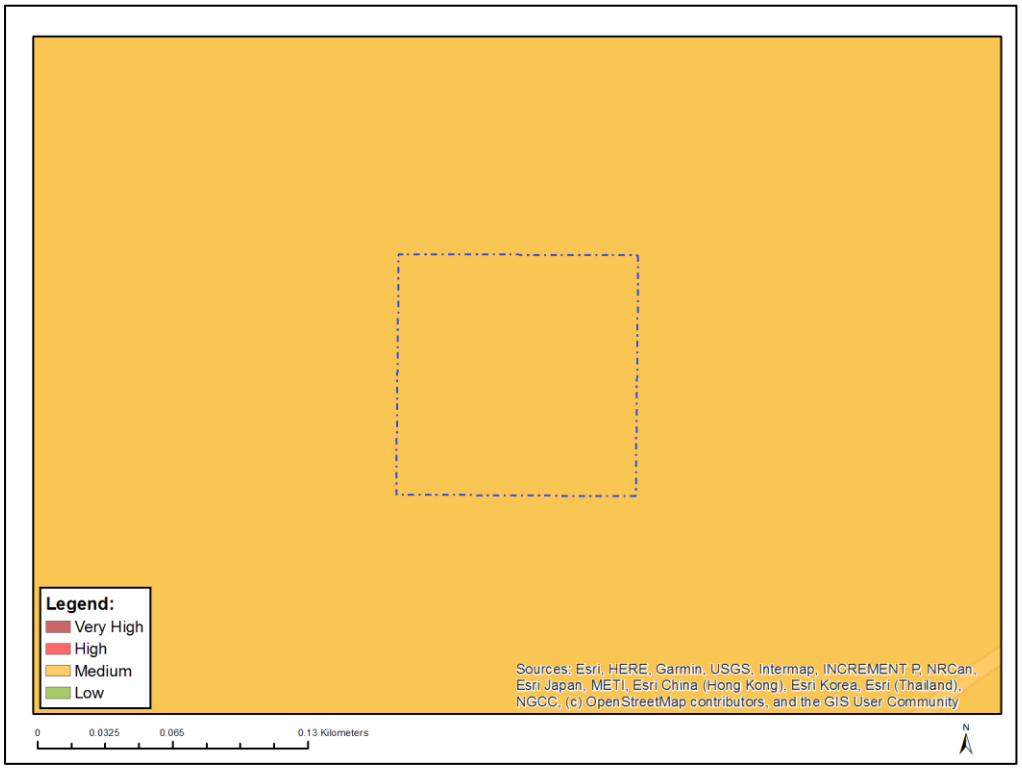


Figure 4: Map showing substation location in relation to the Animal Species Theme Sensitivity (DFFE Screening Tool)

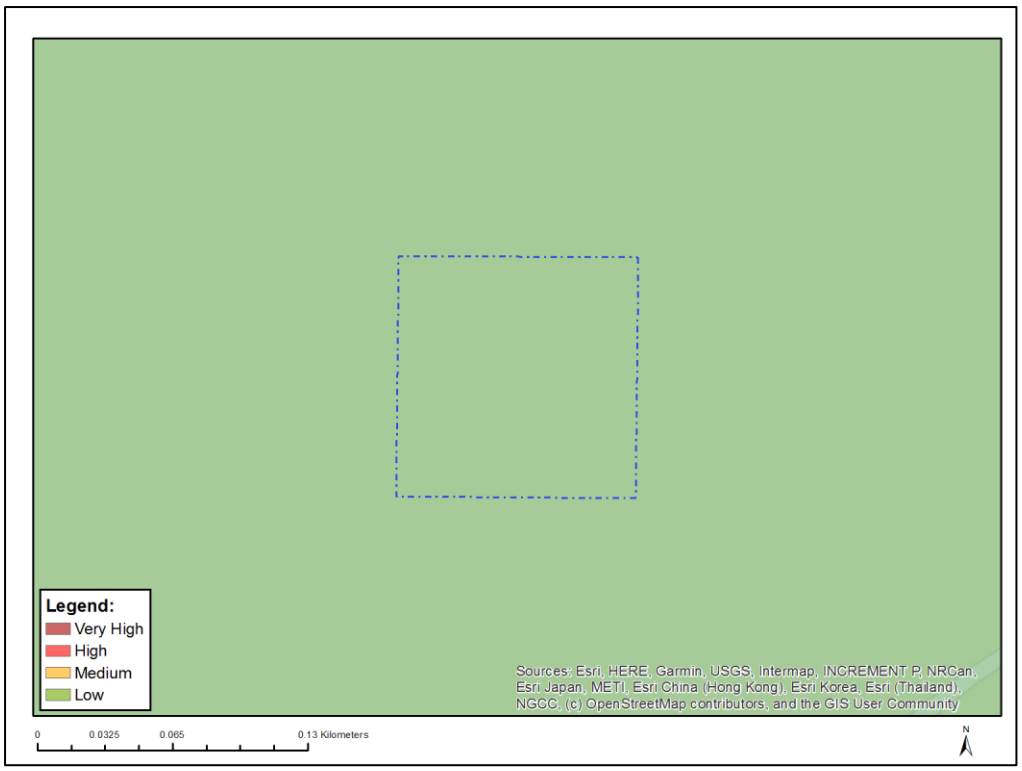


Figure 5: Map showing substation location in relation Aquatic Biodiversity Theme Sensitivity (DFFE Screening Tool)

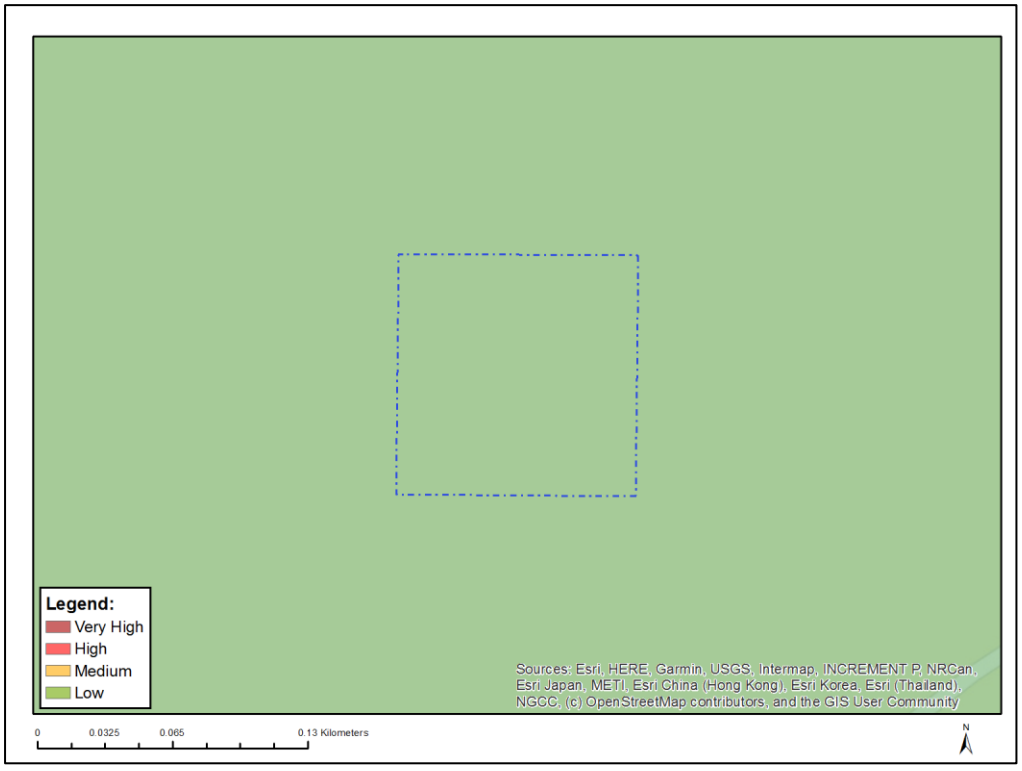


Figure 6: Map showing substation location in relation to the Archaeological and Cultural Heritage Theme Sensitivity (DFFE Screening Tool)

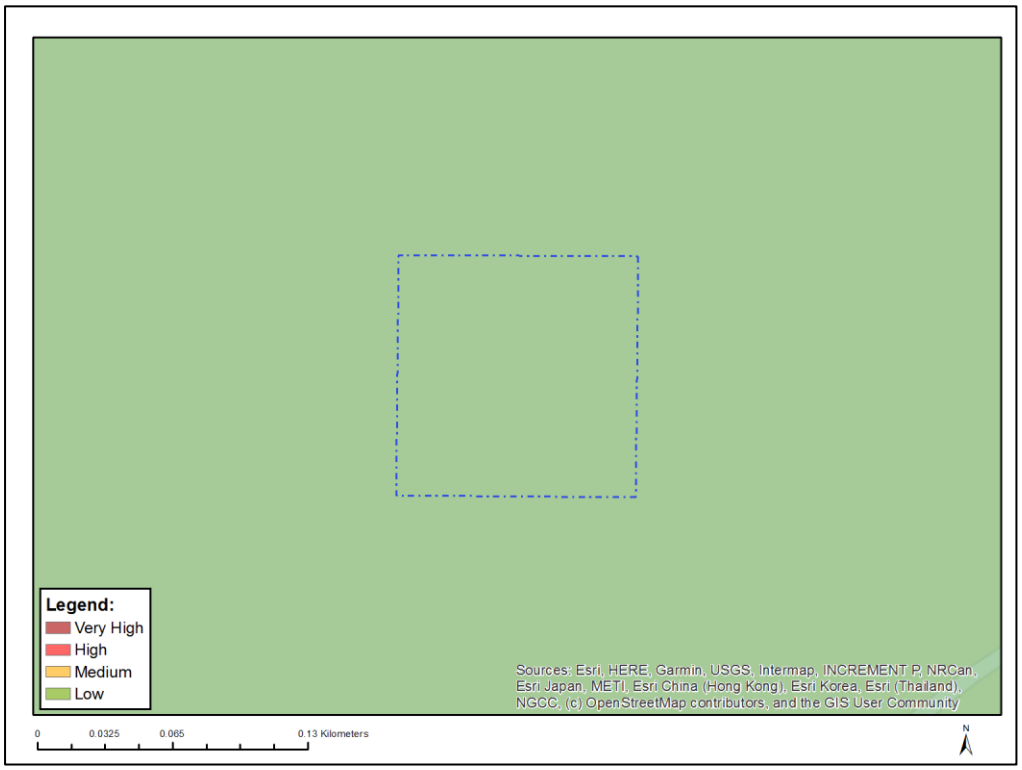


Figure 7: Map showing substation location in relation to the Civil Aviation Theme Sensitivity (DFFE Screening Tool)

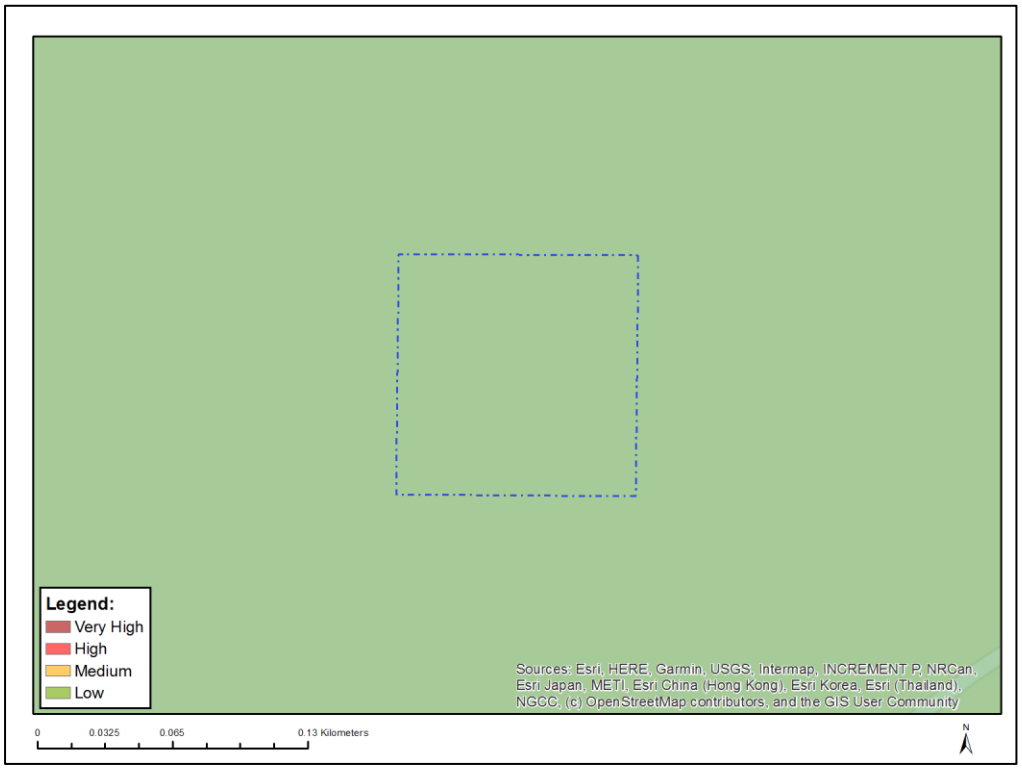


Figure 8: Map showing substation location in relation to the Defence Theme Sensitivity (DFFE Screening Tool)

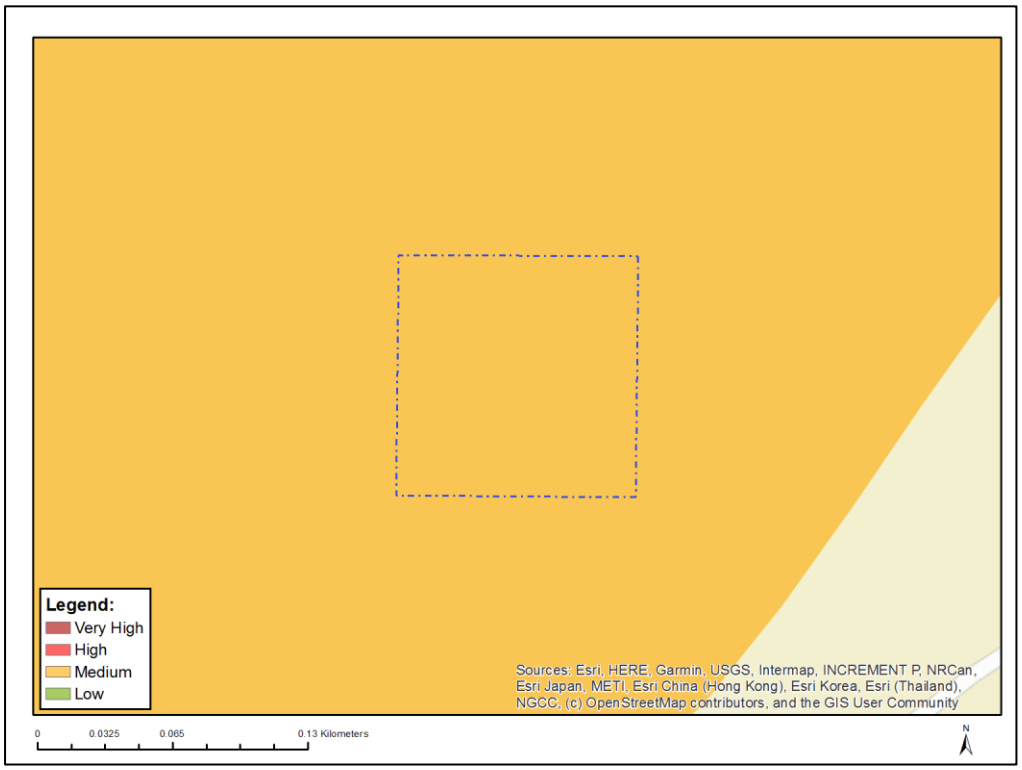


Figure 9: Map showing substation location in relation to the Palaeontology Species Theme Sensitivity (DFFE Screening Tool)

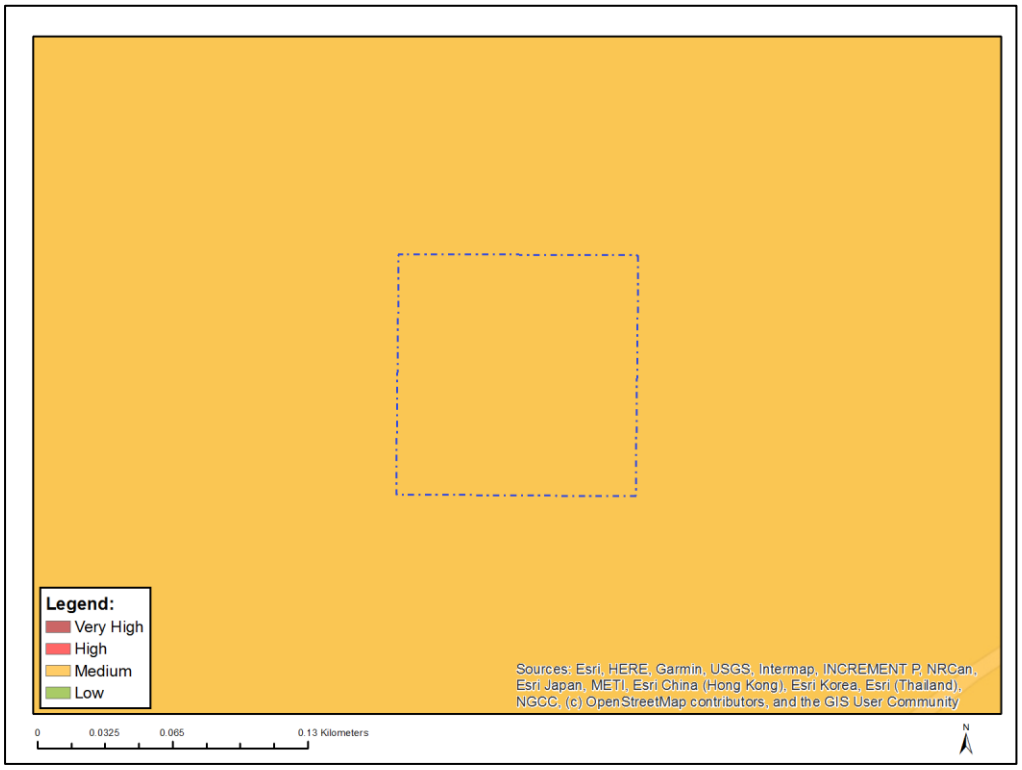


Figure 10: Map showing substation location in relation to the Plant Species Theme Sensitivity (DFFE Screening Tool)

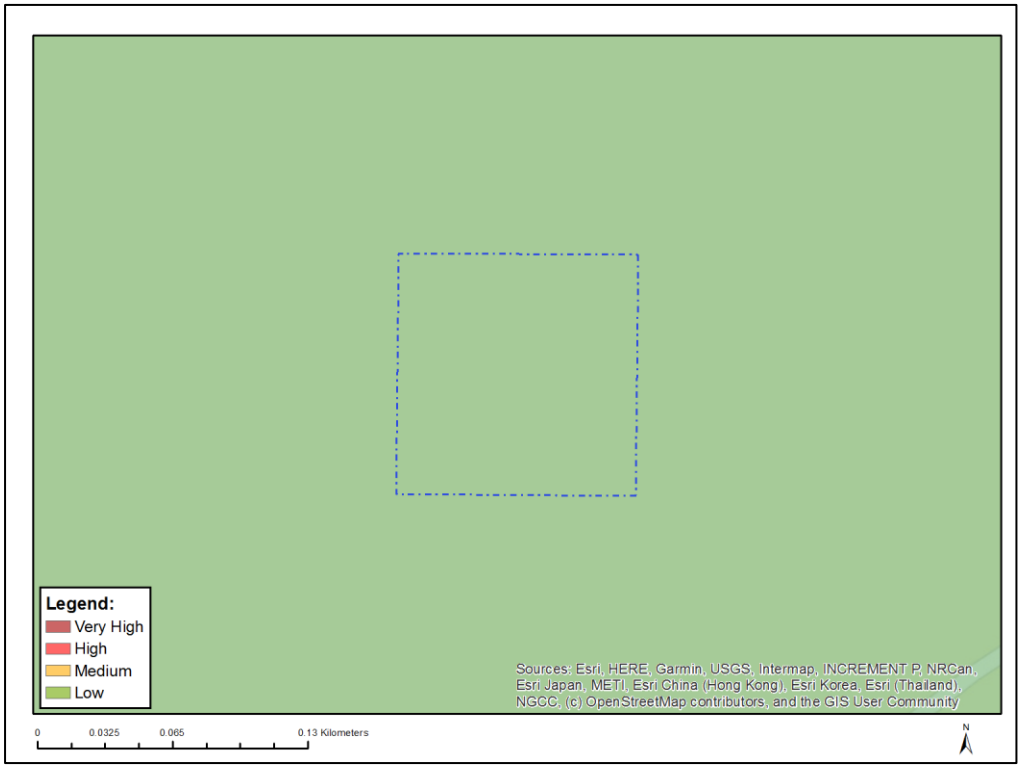
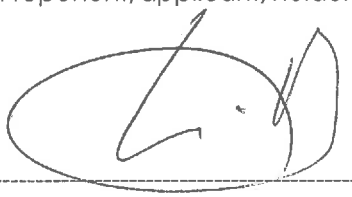


Figure 11: Map showing substation location in relation to the Terrestrial Biodiversity Theme Sensitivity (DFFE Screening Tool)

7.3 Sub-section 3: Declaration

The proponent/applicant or holder of the EA affirms that he/she will abide and comply with the prescribed impact management outcomes and impact management actions as stipulated in part B: section 1 of the generic EMPr and have the understanding that the impact management outcomes and impact management actions are legally binding. The proponent/applicant or holder of the EA affirms that he/she will provide written notice to the CA 14 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:

2022-09-20

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.

The following specialist studies were undertaken as part of this project:

- Agricultural and Soils Compliance Statement
- Avifauna Impact Assessment (incl. pre-construction monitoring);
- Bat Impact Assessment
- Biodiversity Impact Assessment;
- Heritage Impact Assessment (including Palaeontology);
- Noise Impact Assessment;
- Social-economic Impact Assessment;
- Aquatic Impact Assessment;
- Transportation Impact Assessment;
- Visual Impact Assessment; and

The mitigation measures provide by the Specialists through the Impact Assessment process are included below.

Pre-construction walk-through of the approved development footprint will be conducted to ensure that sensitive habitats and species are avoided where possible.

8.1 Pre-construction

8.1.1. Key Stakeholder Requirements

This section deals with requirements from key stakeholders.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Heritage (SAHRA)	Further additional specific conditions are provided for the development as follows: • A walkdown of any unsurveyed areas of the final layout must be conducted and a walkdown report must be submitted to SAHRA for comment prior to construction. SAHRA reserves the right to provide additional conditions for the management of heritage resources based on the results of the walkdown report; • 38(4)c(i) – If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. Non-compliance with section of the NHRA is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule; • 38(4)c(ii) – 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	Holder of the EA	Appoint archaeologist and/or or palaeontologist to conduct survey well before construction.	Avoid impacts (preferred) or locate and sample or rescue sites/burials before disturbance	During pre-construction / on-going basis should resources be discovered on site.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	is an offense in terms of section 51(1)e of the NHRA and item 5 of the Schedule; • 38(4)d – See section 51 of the NHRA regarding offences; • 38(4)e – The following conditions apply with regards to the appointment of specialists: • With reference to the mitigation work noted above, a qualified archaeologist must be appointed to undertake the work in terms of the permit applied for as noted above; • If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA;				

8.1.2. Heritage

This section deals with the issues relative to heritage during the pre-construction phase.

Table 2: Heritage

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY

Impacts to archaeology and graves: Damage or destruction of archaeological sites or graves	Pre-construction survey of unsurveyed areas, micro-siting of infrastructure. The LSA archaeological sites at waypoints 519 and 520 must be excavated with at least 25-50 m^2 sampled at each;	Holder of the EA	Appoint archaeologist to conduct survey well before construction.	Avoid impacts (preferred) or locate and sample or rescue sites/burials before disturbance	Once -off during pre-construction
Impacts to archaeology and graves: Damage or destruction of archaeological sites or graves	Reporting chance finds as early as possible, protect in situ and stop work in immediate area.	Construction Manager or Contractor / ECO	Inform staff and carry out inspections of new excavations.	Rescue information, artefacts or burials before extensive damage occurs	Ongoing basis / whenever on site (at least weekly)

8.1.3. Agriculture and Soils

This section deals with the issues relative to agriculture and soils during the pre-construction phase.

Table 3: Agriculture

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Protection of soil resources: Erosion	Design an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion. This is included in the stormwater management plan (**Appendix 2**).	Holder of the EA	Ensure that the stormwater run-off control is included in the engineering design.	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	Once-off during the design phase.

8.1.4. Avifauna

This section deals with the issues relative to avifauna during the pre-construction phase.

Table 4: Avifauna

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Avifauna: Displacement due to disturbance and habitat transformation: Displacement of priority avifauna due to disturbance and habitat transformation	• All surface water (water troughs) should be buffered by 500m (all infrastructure) to prevent displacement of Sclater's Lark breeding population due to disturbance. Alternatively, water troughs could be relocated to maintain a minimum distance of 500m from the closest turbine. • Additional Sclater's Lark breeding areas as identified during the pre-construction monitoring must be designated an all-infrastructure No-Go zone. • Placement of turbines in highly suitable Red Lark habitat to be avoided where possible.	Project Developer	• Design lay-out around the proposed buffer zones	Prevent mortality of priority avifauna	Once-off during the planning phase.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Avifauna: Mortality due to collisions with the turbines: Mortality of priority avifauna due to collisions with the wind turbines	• Based on the results of the pre-construction monitoring, a 2.8km turbine exclusion zone must be implemented around the vulture roost on the Aries – Aggeneys 1 400kV high voltage line.	Project Developer	• Design lay-out around the proposed buffer zones	Prevent mortality of priority avifauna	Once-off during the planning phase.
Avifauna: Mortality due to electrocution: Electrocution of raptors on the internal 33kV poles	• A raptor-friendly pole design must be used, and the pole design must be approved by the avifaunal specialist.	Project Developer	Design engineers to consult with avifaunal specialist on the final design of the poles.	Prevent mortality of priority avifauna	Once-off during the planning phase.

8.1.5. Bat

This section deals with the issues relative to bats during the pre-construction phase.

Table 5: Bat

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Modification of Bat Habitat and Roost Disturbance/Destruction	• Minimise clearing of vegetation - Rehabilitate all areas disturbed during construction (including aquatic habitat) • Avoid construction activities at night.	Pofadder Wind Facility 3 (Pty) Ltd	• Apply good construction abatement control practices to reduce	• No bat roosts are destroyed	During design and planning phase and throughout

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Minimise disturbance and destruction of farm buildings on site • Minimise removal of trees • Minimise blasting and removal of rocky habitat on site • Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts).		emissions and pollutants (e.g., noise, erosion, waste) • Apply appropriate vegetation rehabilitation practices. • Ensure buildings, turbines and road culverts are correctly insulated and sealed to prevent bats from roosting. • Where trees and rocky crevices will be impacted, these features should be examined for roosting bats.	• No bats colonise new project infrastructure for roosting • No infrastructure in No-Go areas (except roads) • All areas disturbed during construction are rehabilitated	construction phase and until rehabilitation is complete.
Light Pollution	• Use as little lighting as possible to avoid sky-glo	Pofadder Wind Facility 3 (Pty) Ltd	• Using hoods, low pressure sodium and warm white lights • Maximise use of motion-sensor lighting.	• No infrastructure in No-Go areas (except roads) • Use of appropriate lighting technology • Minimised light pollution	Completed during design and construction phase.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Bat Mortality	• No placement of turbines within No-Go areas • Minimum blade sweep of 35 m • Blade feathering must be used to prevent free-wheeling of turbine blades below the turbine cut-in speed • Implement post-construction fatality monitoring • Apply curtailment or deterrents if fatality thresholds are exceeded.	Pofadder Wind Facility 3 (Pty) Ltd	• Adhere to the bat constraints map for No-Go areas (Figure 5). • Select turbine with 35 m minimum blades sweep • Implement blade feathering below turbine cut-in speed • Implement best practise bat fatality monitoring according to Aronson et al. (2020). • Estimate bat fatality using GenEst (Simonis et al. 2018). • Develop bat adaptive management plan if fatality thresholds are exceeded which will include a curtailment plan and/or plan for use of acoustic deterrents.	• Bat fatalities do not exceed fatality thresholds for any species.	Turbine layout and turbine model finalised during design phase. Operational Phase fatality monitoring according to Aronson et al. (2020).

8.1.6. Aquatic

This section deals with the issues relative to aquatic during the pre-construction phase.

Table 6: Aquatic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Loss of riparian systems and disturbance of the alluvial water courses: Construction of road and MV cable watercourse crossings	• Existing crossings should be utilized/upgraded. • Where it is possible the underground MV cables should be laid within the roads in order to avoid any unnecessary disturbance to the vegetation of the watercourses. • All crossings over watercourses should be such that the flow within the channels is not impeded and should be constructed perpendicular to the river channel. • Furthermore, for all watercourse crossings, the engineering team must provide an effective means to minimise the loss of riparian vegetation (small as possible footprint). • Where possible, culvert bases must be placed as close as possible with natural levels in mind so that these don't form additional steps / barriers.	Project Company	• Design-Layout taking into account the location, nature, morphology and ecological drivers of the watercourses to be crossed.	• To ensure selection of best environmental option for positioning alignment of proposed infrastructure • To minimise direct impacts/damage to vegetation associated with freshwater resource features	Once-off during the Design Phase
Loss of riparian systems and disturbance of the alluvial water courses: Construction of road and MV cable watercourse crossings	• Vegetation rehabilitation management plan. • Minimum requirements are listed under the Construction and Operational Phase EMPr	Project Company and relevant specialist	Compilation of a Vegetation Rehabilitation plan taking into account the various vegetation units, patterns and key plant species, as identified within the terrestrial and aquatic ecological reports.	• To ensure optimal rehabilitation of temporary disturbed areas (post-construction), with a stable, natural occurring vegetation cover, resembling as far	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
				as possible the vegetation composition, patterns and structure of the surrounding vegetation cover. • To ensure optimal rehabilitation of development footprint (post-decommissioning), with a stable, natural occurring vegetation cover, resembling as far as possible the vegetation composition, patterns and structure of the surrounding vegetation cover.	
Loss of riparian systems and disturbance of the alluvial water courses: Construction of Wind Turbines and supporting infrastructure	• The recommended buffer areas between the delineated freshwater resource features and proposed project activities should be implemented. • Sites for storing, mixing, and handling topsoil piles (if necessary) or any introduced materials, including all machinery or processing implements, should be placed in	Project Company and relevant specialist	Design-Layout taking into account delineated sensitive habitat features and their ecological importance and sensitivity	• To avoid indirect damage/impacts to downslope freshwater resource features and associated vegetation.	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
(excluding roads and mv cable watercourse crossings)	an ecologically least sensitive area and at least 100 m from any drainage area. • Other components of the proposed development that may under no circumstance be located in or within 100 m of any drainage systems would include: o Man-camps and/or ablution facilities o Any form of waste/soil/overburden disposal o Any form of storage of materials or machinery o Offices, and o Substations and switching stations o Battery Energy Storage Facilities				
Increase in sedimentation and erosion: Construction of road and MV cable watercourse crossings	• Compile a comprehensive erosion control and stormwater management plan for the footprint area as part of the final design of the project	Project Company and relevant specialist	Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and morphology of the area wherein the infrastructure will be placed	• To minimise erosion of soil from site during construction. • To maintain watercourses'' RECs • To avoid downstream impacts including: o erosion; o sedimentation; o destabilisation of banks and channels.	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Increase in sedimentation and erosion: Construction of road and MV cable watercourse crossings	• Vegetation rehabilitation management plan. o Minimum requirements are listed under the Construction and Operational Phase EMPr	Project Company and relevant specialist	Compilation of a Vegetation Rehabilitation plan taking into account the various vegetation units, patterns and key plant species, as identified within the terrestrial ecological report.	• To maintain watercourses' RECs • To stabilise previously disturbed areas. • To ensure the continuation of the watercourses' functions and services. • To ensure optimal rehabilitation of development footprint.	Once-off during the Design Phase
Increase in sedimentation and erosion: Construction of road and MV cable watercourse crossings	• Where new watercourse crossings are required and/or where existing routes will have to be upgraded and widened, the engineering team must provide an effective means to minimise the potential effects of sedimentation and erosion (erosion protection). • Design and construct any necessary erosion protection works where the infrastructure intersects the channel banks in order to prevent scouring or outer-bank erosion. Protection works to be considered include gabions, reno mattresses or other stabilising structures to armour them. • Structures that cater for through flows (e.g. culverts) should not only allow for the maximum volume of flows but should	Project Company	Design-Layout taking into account the location, nature, morphology and ecological drivers of the watercourses to be crossed.	To simulate, as close as possible natural flow patterns in order to avoid erosion due to channelling, bank scouring, destabilisation of channel banks etc.	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	distribute flows naturally so not to concentrate flows downstream, which could induce erosion/scouring. • No stormwater runoff must be allowed to discharge directly into any water course along roads, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation.				
Increase in sedimentation and erosion: Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable watercourse crossings)	Compile a comprehensive erosion control and stormwater management plan for the footprint area as part of the final design of the project	Project Company and relevant specialist	Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and morphology of the area wherein the infrastructure will be placed	• Prevent upstream erosional features from spreading into the aquatic buffer areas and the resource features themselves. • To allow for natural runoff patterns into the downslope freshwater resource features. • To avoid unnatural amounts of sediments carried into the downstream freshwater resource features form their catchments.	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Increase in sedimentation and erosion: Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable watercourse crossings)	• Vegetation rehabilitation management plan and Alien Invasive Plant (AIP) Management Plan. • Minimum requirements are listed under the Construction and Operational Phase EMPr • Stormwater from hard stand areas, buildings and substation must be managed using appropriate channels and swales when located within steep areas. • No stormwater runoff must be allowed to discharge directly into the watercourses. • The runoff should rather be dissipated over a broad area covered by natural vegetation.	Project Company and relevant specialist	• Compilation of a Vegetation Rehabilitation plan taking into account the various vegetation units, patterns and key plant species, as identified within the terrestrial ecological report. • Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and morphology of the area wherein the infrastructure will be placed	• Prevent upstream erosional features from spreading into the aquatic buffer areas and the resource features themselves. • To allow for natural runoff patterns into the downslope freshwater resource features. • To avoid unnatural amounts of sediments carried into the downstream freshwater resource features form their catchments.	Once-off during the Design Phase
Potential impact on localised surface water quality: All associated infrastructure	Working protocols incorporating pollution control measures (including approved method statements by the contractor) should be clearly set out in the Construction Environmental Management Plan (CEMP) for the project and strictly enforced.	Project Company	Construction Environmental Management Plan	• To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
				• To comply with waste management legislation • To avoid environmental harm from waste disposal	
Impact on riparian systems through the possible increase in surface runoff on riparian form and function during the operation: Road and MV cable watercourse crossings	• No stormwater runoff must be allowed to discharge directly into any water course along roads, and flows should thus be allowed to dissipate over a broad area covered by natural vegetation. • For the crossing of small seasonal to ephemeral watercourses with sandy substrates and gentle gradients: o Road structures should be stabilized up to the level of the watercourse bed to allow for natural flow across the road. o It is crucial that the road surface is level within the watercourse without any flow concentration. • Where the road structure will be built up to the level of the terrestrial land adjacent to the river bed (larger seasonal watercourses with stronger flows, deeper channels and steeper embankments): o Engineering team must provide an effective means to allow/simulate natural flow patterns without the consecration/modification of flow through the culverts which must be	Project Company	Design-Layout taking into account the location, nature, morphology and ecological drivers of the watercourses to be crossed.	To simulate, as close as possible natural flow patterns in order to avoid erosion due to channelling, bank scouring, destabilisation of channel banks etc.	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	incorporated into the detailed stormwater management plans based on the final design of the Pofadder WEF 3. o Culverts should be sized to transport not only water, but other materials that might be mobilized (i.e. debris) and cause blockages to flow. o Appropriate erosion protection measures must be installed to reduce bed erosion / scour. • The base (invert) of culverts must be aligned with the natural ground level of the bed of the channel to limit risks of erosion. Where necessary, additional measures such as drop-inlets or stepped inlet weirs must be constructed to address such risks. • The underground grid line, where crossing watercourses, can be laid within the access roads (existing), or if not possible, within the shoulder or at least within 3m of the road shoulder.				

8.1.7. Terrestrial Ecology

This section deals with the issues relative to terrestrial ecology during the pre-construction phase.

Table 7: Terrestrial Ecology

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Disturbance and loss of vegetation	• 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. • The location of the construction equipment camp and other temporary use areas shall be approved by the project EO/ECO or the specialist doing the pre-commencement footprint investigation	Project Company and EO/ECO	• Design-Layout taking into account delineated habitat features and their ecological importance and sensitivity	• To ensure selection of best environmental option for positioning alignment of proposed infrastructure • Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts	Once-off during the Design Phase
Disturbance and loss of vegetation within sensitive habitats	• For watercourse crossings, where it is possible the underground cables should be laid within the roads in order to avoid any unnecessary disturbance to the vegetation of the watercourses. • Furthermore, for all watercourse crossings, the engineering team must provide an effective means to minimise the loss of riparian vegetation (small as possible footprint).	Project Company	• Design-Layout taking into account the location, nature, morphology and ecological drivers of the watercourses to be crossed.	• To ensure selection of best environmental option for positioning alignment of proposed infrastructure • Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts	Once-off during the Design Phase
Disturbance and loss of vegetation within sensitive habitats	• Sites for storing, mixing, and handling topsoil piles (if necessary) or any introduced materials, including all machinery or	Project Company	• Design-Layout taking into account delineated sensitive	• To ensure selection of best environmental	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	processing implements, should be placed in an ecologically least sensitive area and at least 100 m from any drainage area. • Other components of the proposed development that may under no circumstance be located in or within 100 m of any drainage would include: o Man-camps and/or ablution facilities o Any form of waste/soil/overburden disposal o Any form of storage of materials or machinery o Offices, and o Substations and switching stations o Battery Energy Storage Facilities		habitat features and their ecological importance and sensitivity	option for positioning alignment of proposed infrastructure • Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts	
Soil erosion and associated degradation of ecosystems	• Compile a comprehensive erosion control and stormwater management plan for the footprint area as part of the final design of the project	Project Company and relevant specialist	• Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and morphology of the area wherein the infrastructure will be placed	• To minimise impacts on the biophysical environment • To restrict any residual or cumulative impacts to the development footprint where these impacts are maintained to an absolute minimal/acceptable level.	Once-off during the Design Phase
Soil erosion and associated	• Vegetation rehabilitation management plan.	Project Company and relevant specialist	Compilation of a Vegetation Rehabilitation plan taking into account	• To ensure optimal rehabilitation of temporary disturbed	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
degradation of ecosystems	o Minimum requirements are listed under the Construction and Operational Phase EMPr		the various vegetation units, patterns and key plant species, as identified within the terrestrial ecological report.	areas (post-construction), with a stable, natural occurring vegetation cover, resembling as far as possible the vegetation composition, patterns and structure of the surrounding vegetation cover. • To ensure optimal rehabilitation of development footprint (post-decommissioning), with a stable, natural occurring vegetation cover, resembling as far as possible the vegetation composition, patterns and structure of the surrounding vegetation cover.	
Soil erosion and associated	• Where new watercourse crossings are required and/or where existing routes will have to be upgraded and widened, the	Project Company	Design-Layout taking into account the location, nature, morphology and	• To ensure selection of best environmental	Once-off during the Design Phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
degradation of ecosystems	engineering team must provide an effective means to minimise the potential effects of sedimentation and erosion (erosion protection). • Design and construct any necessary erosion protection works where the infrastructure intersects the channel banks in order to prevent scouring or outer-bank erosion. Protection works to be considered include gabions, reno mattresses or other stabilising structures to armour them. • Structures that cater for through flows (e.g. culverts) should not only allow for the maximum volume of flows but should distribute flows naturally so not to concentrate flows downstream, which could induce erosion/scouring.		ecological drivers of the watercourses to be crossed.	option for positioning alignment of proposed infrastructure • Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts	
Soil erosion and associated degradation of ecosystems	• Stormwater from hard stand areas, buildings and substation must be managed using appropriate channels and swales when located within steep areas. • No stormwater runoff must be allowed to discharge directly into the watercourses. • The runoff should rather be dissipated over a broad area covered by natural vegetation.	Project Company	Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and morphology of the area wherein the infrastructure will be placed	• To ensure selection of best environmental option for positioning alignment of proposed infrastructure • Environmental sensitivities are taken into consideration and avoided as far as possible, thereby mitigating potential impacts	Once-off during the Design Phase

8.1.8. Noise

This section deals with the issues relative to noise during the pre-construction phase.

Table 8: Noise

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Reduce construction noise	Conduct noise sensitivity training for all construction staff. No construction piling should occur at night. Piling should only occur during the hottest part of the day to take advantage of unstable atmospheric conditions	Holder of the EA	Training	Reduction in Noise and thus reduction in chance of complaints arising	Before construction commences

8.1.9. Visual

This section deals with the issues relative to visual during the pre-construction phase.

Table 9: Visual

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Aircraft Warning Lights (AWL) at night have the potential to significantly extend the project Zone of Visual Influence and can be decreased by reduced number of	Application should be made to CAA for ground shielded, strategic lighting for the total wind farm using the outer corners points for night-time AWL.	Project management and EPC	On commencement of Pre-construction planning, CAA need to be contacted by the Project Management Team to verify suitability of the AWL mitigation.	High intensity, combined AWL lighting does not create a glow in the regional landscape.	NA

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
night-time AWLs, as well as placing the AWL in shallow cups that restrict line of sight to ground areas.					
Large signage on roads, or on turbines, has the potential to create a visual nuisance.	Signage on the road should be moderated in size and use natural colours, while still providing effective directions. No large signage on the turbines (hubs or towers).	Project management and EPC	n/a	Signage is efficient but not dominating for the causal observers.	n/a
Demolition of the concrete towers has the potential to significantly extend the tower impact area and degrade local landscape resources if demolition planning is not properly implemented.	A detailed Environmental Management Plan needs to be generated to define the demolition impact area, specifying how the rubble will be managed and processed, as the expected demolition (fall area) identified, assessed for vegetation impact and suitability of extraction of the rubble to the bury pits. The plan needs to specify the rehabilitation methodology for the impacted area.	Project management and EPC with inputs from demolition and rehabilitation specialist.	To be defined	The landscape remains rural and while some small undulations take place, the effect does not detract from the local landscape character. The bury pits should not be on the rocky outcrops.	Two years prior to closure.
Un-necessary roads have the potential to create a visual disturbance long after the usage as past.	Limit road access to an efficient minimum by coordinated planning between the project management and the environmental control officer.	Project management and EPC	Clear pre-planning is carried out with clear routing identification, and consequences for off-road driving.	The surrounding landscape remains rural and agricultural in landscape and land use.	As required.
Long fencing lines has the potential to be visually dominating.	Fencing should be simple and appear transparent from a distance and located around the	Project management and EPC	Clear planning of the laydown and construction yards is carried out with	Security fencing is kept to an effective	At onset of project planning.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	construction camp and not encircle the total project area		security fencing demarcated around the core construction areas.	minimum without jeopardizing security of the project.	

8.2 Construction

8.2.1. Heritage

This section deals with the issues relative to heritage during the construction phase.

Table 10: Heritage

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Impacts to archaeology and graves: Damage or destruction of archaeological sites or graves	Reporting chance finds as early as possible, protect in situ and stop work in immediate area.	Construction Manager or Contractor / ECO	Inform staff and carry out inspections of new excavations.	Rescue information, artefacts or burials before extensive damage occurs	Ongoing basis / whenever on site (at least weekly)
Impacts to cultural landscape: Visible landscape scarring	Ensure disturbance is kept to a minimum and does not exceed project requirements. Rehabilitate areas not needed during operation.	Construction Manager or Contractor / ECO	Monitoring of surface clearance relative to approved layout	Minimise landscape scarring	Ongoing basis / as required

8.2.2. Agriculture and Soils

This section deals with the issues relative to agriculture and soils during the construction phase.

Table 11: Agriculture and Soils

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Aspect: Protection of soil resources Erosion	• Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	Engineer/Contractor	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	Every 2 months during the construction phase
Aspect: Protection of soil resources Erosion	• Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	Engineer/Contractor	Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	That vegetation clearing does not pose a high erosion risk.	Every 4 months during the construction phase
Aspect: Protection of soil	• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped	Engineer/Contractor	Record GPS positions of all occurrences of below-surface soil disturbance	That topsoil loss is minimised	As required, whenever

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
resources Topsoil loss	from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.		(e.g. excavations). Record the date of topsoil stripping and replacement. Check that topsoil covers the entire disturbed area.		areas are disturbed.

8.2.3. Avifauna

This section deals with the issues relative to avifauna during the construction phase.

Table 12: Avifauna

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Avifauna: Displacement due to disturbance: The noise and movement associated with the construction activities at the development footprint will be a source of disturbance	• A site-specific CEMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted. All contractors are to adhere to the CEMPr and should apply good environmental practice during construction. The CEMPr must specifically include the following: o No off-road driving; o Maximum use of existing roads, where possible; o Measures to control noise and dust according to latest best practice;	Contractor The ECO shall monitor	1. Implementation of the CEMPr. Oversee activities to ensure that the CEMPr is implemented and enforced via site audits and inspections. Report and record any non-compliance.	Prevent unnecessary displacement of avifauna by ensuring that contractors are aware of the requirements of the Construction Environmental Management	1. On a daily basis 2. Weekly 3. Weekly 4. Weekly 5. Weekly

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
which would lead to the displacement of avifauna from the area	○ Restricted access to the rest of the property; ○ Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint. • Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible. Access to the remainder of the area should be strictly controlled to prevent unnecessary disturbance of priority species. • Measures to control noise and dust should be applied according to current best practice in the industry.		2. Ensure that construction personnel are made aware of the impacts relating to off-road driving. 3. Construction access roads must be demarcated clearly. Undertake site inspections to verify. 4. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. 5. Ensure that the construction area is demarcated clearly and that construction personnel are made aware of	Programme (CEMPr.)	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
			these demarcations. Monitor via site inspections and report non-compliance.		
Avifauna: Displacement due to habitat transformation Total or partial displacement of avifauna due to habitat transformation associated with the vegetation clearance and the presence of the wind turbines and associated infrastructure.	• Ensure that all the recommendations for mitigation from the biodiversity/vegetation specialist, including rehabilitation of disturbed areas, are strictly implemented	Wind farm operator	Appointment of specialist to coordinate and monitor the rehabilitation of the vegetation.	Prevent unnecessary displacement of avifauna by ensuring that the rehabilitation of transformed areas is implemented according to the recommendations of the biodiversity/vegetation specialist..	Once-off

8.2.4. Bat

This section deals with the issues relative to bats during the construction phase.

Table 13: Bat

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Modification of Bat Habitat and Roost Disturbance/Destruction	• Minimise clearing of vegetation - Rehabilitate all areas disturbed during construction (including aquatic habitat) • Avoid construction activities at night. • Minimise disturbance and destruction of farm buildings on site • Minimise removal of trees • Minimise blasting and removal of rocky habitat on site • Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts).	Pofadder Wind Facility 3 (Pty) Ltd	• Apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) • Apply appropriate vegetation rehabilitation practices. • Ensure buildings, turbines and road culverts are correctly insulated and sealed to prevent bats from roosting. • Where trees and rocky crevices will be impacted, these features should be	• No bat roosts are destroyed • No bats colonise new project infrastructure for roosting • No infrastructure in No-Go areas (except roads) • All areas disturbed during construction are rehabilitated	During design and planning phase and throughout construction phase and until rehabilitation is complete.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			examined for roosting bats.		
Light Pollution	• Use as little lighting as possible to avoid sky-glo	Pofadder Wind Facility 3 (Pty) Ltd	• Using hoods, low pressure sodium and warm white lights • Maximise use of motion-sensor lighting.	• No infrastructure in No-Go areas (except roads) • Use of appropriate lighting technology • Minimised light pollution	Completed during design and construction phase.
Bat Mortality	• No placement of turbines within No-Go areas • Minimum blade sweep of 35 m • Blade feathering must be used to prevent free-wheeling of turbine blades below the turbine cut-in speed • Implement post-construction fatality monitoring • Apply curtailment or deterrents if fatality thresholds are exceeded.	Pofadder Wind Facility 3 (Pty) Ltd	• Adhere to the bat constraints map for No-Go areas (Figure 5). • Select turbine with 35 m minimum blades sweep • Implement blade feathering below turbine cut-in speed • Implement best practise bat fatality	• Bat fatalities do not exceed fatality thresholds for any species.	Turbine layout and turbine model finalised during design phase. Operational Phase fatality monitoring according to

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			monitoring according to Aronson et al. (2020). • Estimate bat fatality using GenEst (Simonis et al. 2018). • Develop bat adaptive management plan if fatality thresholds are exceeded which will include a curtailment plan and/or plan for use of acoustic deterrents.		Aronson et al. (2020).

8.2.5. Aquatic

This section deals with the issues relative to aquatic during the construction phase.

Table 14: Aquatic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Loss of riparian systems and disturbance of the alluvial water courses: Construction of road and MV cable watercourse crossings	• The working servitude within the watercourses must be demarcated on both sides using orange hazard netting prior to construction commencing.	Project Company, monitored by ECO/EO	• Taking into account the final design-layout, and any sensitive areas, demarcate the absolute minimal development footprint, and ensure that the appointed contractor is made aware of where what activities and impacts are allowed and disallowed.	• Minimise and maintain damage of watercourse vegetation the development footprint. • Prevent any residual or cumulative impacts arising. • To ensure the persistence/maintenance of the REC	Prior to commencement of construction activities
Loss of riparian systems and disturbance of the alluvial water courses: Construction of road and MV cable watercourse crossings	• All sensitive aquatic habitats outside of the demarcated construction area must be considered 'No-Go' areas for the duration of the construction phase. • No physical damage should be done to any aspects of the channel and banks of watercourses other than those necessary to complete the works as specified.	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments	• Minimise and maintain damage of watercourse vegetation the development footprint. • Prevent any residual or cumulative impacts arising. • To ensure the persistence/maintenance of the REC	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • There should be reduced activity at the site after large rainfall events when the soils are wet.		given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			with findings of these investigations.		
Loss of riparian systems and disturbance of the alluvial water courses: Excavation and trenching within watercourses	• Avoid stockpiling materials in vegetated areas that will not be cleared. • All material stockpiles should be located outside freshwater resource features. • Excavated soils should be stockpiled on the upslope side of the excavated trench so that eroded sediments off the stockpile are washed back into the trench; • Excavated soils will need to be replaced in the same order as excavated from the trench, i.e. sub-soil must be replaced first and topsoil must be replaced last (this will maximise opportunity	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers)	• Minimise and maintain damage of watercourse vegetation the development footprint. • Prevent any residual or cumulative impacts arising. • To ensure the persistence/maintenance of the REC	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	for re-vegetation of disturbed areas). • Closure and rehabilitation of the disturbed areas should commence as soon as the laying of underground cable has been completed.		having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Loss of riparian systems and disturbance of the alluvial water courses: Alien Invasive Plants	• All alien plant re-growth must be monitored, and should it occur, these plants should be eradicated. • Any disturbed areas should be	Contractor/ECO/EO	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr commitments relating to the	• The successful reduction in the treat (significance) posed by Alien Invasive Plants. • Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of	Throughout construction and operational phase as well as after the decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	rehabilitated and monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth. • Mitigation and follow up monitoring of residual impacts (alien vegetation growth and erosion) may be required.		management/eradication of AIPs. • The EMPr and IAP Management Plan should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, and operational processes,	desirable and/or indigenous species	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			reporting back to the relevant environmental authorities with findings of these investigations.		
Loss of riparian systems and disturbance of the alluvial water courses: Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable watercourse crossings)	• The recommended buffer areas between the delineated freshwater resource features and proposed project activities should be maintained.	Project Company, monitored by ECO/EO	• Taking into account the final design-layout, and any sensitive areas, demarcate the absolute minimal development footprint, and ensure that the appointed contractor is made aware of where what activities and impacts are allowed and disallowed.	• No indirect damage to downslope freshwater resource features and their associated vegetation.	Prior to commencement of construction activities
Loss of riparian systems and disturbance of the alluvial water courses: Construction of Wind Turbines and supporting infrastructure	• Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • Any erosion problems observed to be associated with the project infrastructure should be rectified as	Contractor/ECO/EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments	No indirect damage to downslope freshwater resource features and their associated vegetation.	Throughout construction and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
(excluding roads and mv cable watercourse crossings)	soon as possible and monitored thereafter to ensure that they do not re-occur. • There should be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased. • Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities • Stormwater from hardstand areas, buildings and the		given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	substation must be managed using appropriate channels and swales when located within steep areas.		with findings of these investigations.		
Increase in sedimentation and erosion: Construction of road and MV cable watercourse crossings	• All construction activities occurring directly within the watercourses to take place within the dry season. • The erosion and stormwater management measures included in the stormwater management plan for the Pofadder WEF 3 must be implemented. • The duration of construction work within the watercourses must be minimised as far as practically possible through	Contractor/ECO/EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that	• To minimise erosion of soil from site during construction. • To maintain watercourses'' RECs • To avoid downstream impacts including: o erosion; o sedimentation; o destabilisation of banks and channels.	Throughout construction and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	proper planning and phasing. • During the construction phases, monitor culverts to see if erosion issues arise and if any erosion control is required. • Any erosion problems observed during the construction phase should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • Any disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion		environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Silt traps should be used where there is a danger of topsoil eroding and entering streams and other sensitive areas. • These silt traps must be regularly monitored and maintained and replaced / repaired immediately as and when required. These measures should be regularly checked, maintained and repaired when required to ensure that they are effective • Construction of gabions and other stabilisation features to prevent erosion must be undertaken, if deemed necessary. • Under no circumstances must new channels be				

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	created for flow diversion and conveyance purposes unless approved as part of an EA or WUL • There should be reduced activity during the construction phase at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased. • Closure and rehabilitation of the disturbed areas should commence as soon as the laying of underground				

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	cable has been completed. • Soils should be landscaped to the natural landscape profile with care taken to ensure that no preferential flow paths or berms remain				
Increase in sedimentation and erosion: Construction of road and MV cable watercourse crossings	• Any areas disturbed during the construction phase should be encouraged to rehabilitate as fast and effective as possible and were deemed necessary by the ECO or Contractor's EO, artificial rehabilitation (e.g. re-seeding with collected or commercial indigenous seed mixes) should be applied in order to speed up the	Contractor/ECO/EO	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr commitments relating to site rehabilitation. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr and Rehabilitation Management Plan should be enforced and monitored for compliance by a suitably	• Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of desirable and/or indigenous species • Prevent accelerated erosion of ecosystem degradation	After construction and throughout operational phase as well as after the decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	rehabilitation process in critical areas (e.g. steep slopes and unstable soils). • All rehabilitated areas must be monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth.		qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, and operational processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Increase in sedimentation and erosion:	• No unnecessary vegetation	Contractor/ECO/EO	• The ECO will need to prepare an induction and training programme to	• Prevent upstream erosional features from spreading into the	Throughout construction and

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable watercourse crossings)	clearance may be allowed. • Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • Any erosion problems observed to be associated with the project infrastructure should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • There should be reduced activity at the site after large rainfall events when the soils are wet. • No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of		educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance.	aquatic buffer areas and the resource features themselves. • To allow for natural runoff patterns into the downslope freshwater resource features. • To avoid unnatural amounts of sediments carried into the downstream freshwater resource features form their catchments.	decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	bogging down has decreased. • Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities		• The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Potential impact on localised surface water quality – All associated infrastructure	• Implement appropriate measures to ensure strict use and management of all hazardous materials used on site • Waste should be stored on site in clearly marked containers in a demarcated area. • All waste material should be removed at the end of every working day to designated waste facilities at the main construction	Contractor/ECO/EO	• Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout construction phase • A complaints register must be maintained, in which any complaints from the community will be logged. Complaints must be investigated and, if appropriate, acted upon • Observation and supervision of waste management practices throughout construction phase	• To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons • To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons • To comply with waste management legislation • To minimise production of waste • To ensure appropriate waste storage and disposal	Throughout construction, maintenance and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	camp/suitable waste disposal facility. • All waste must be disposed of offsite. • Implement appropriate measures to ensure strict management of potential sources of pollutants (e.g. litter, hydrocarbons from vehicles and machinery, cement during construction etc.) • Implement appropriate measures to ensure containment of all contaminated water by means of careful run-off management on the development site. • Implement appropriate measures to ensure strict control over the		• Waste collection to be monitored on a regular basis • Waste documentation completed • An incident reporting system must be used to record non-conformances to the EMP/IWWMP • An appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. » Public complaints register must be developed and maintained on site.	• To avoid environmental harm from waste disposal	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	behavior of construction workers. • Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the substation and WEF. • Vehicles to refuel within a designated area, at least 100m from any freshwater resource feature. • Place spill kits on site which are operated by trained staff members for the adhoc remediation of minor chemical and hydrocarbon spillages.				

8.2.6. Terrestrial Ecology

This section deals with the issues relative to terrestrial ecology during the construction phase.

Table 15: Terrestrial Ecology

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Disturbance/loss of natural vegetation	• Demarcate all areas to be cleared with construction tape or similar material where practical. However, caution should be exercised to avoid using material that might entangle fauna. o Prevent unnecessary destructive activity within construction areas (prevent over-excavations and double handling) o Create specific turning points and parking areas for vehicles and heavy machinery as needed o Strictly prohibit any driving outside designated areas and roads.	Project Company, monitored by ECO/EO	• Taking into account the final design-layout, and any sensitive areas, demarcate the absolute minimal development footprint, and ensure that the appointed contractor is made aware of where what activities and impacts are allowed and disallowed.	• To minimise impacts on the biophysical environment • To prevent any residual or cumulative impacts arising.	Prior to commencement of construction activities
Disturbance/loss of natural vegetation	• No unnecessary vegetation clearance may be allowed. • ECO and/or Contractor's EO to provide supervision	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area	• To minimise impacts on the biophysical environment	EMPr induction and training: Prior to commencement

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	and oversight of vegetation clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place. • All vehicles to remain on demarcated roads and no unnecessary driving in the veld outside these areas should be allowed. • Regular dust suppression during construction, if deemed necessary, especially along access roads. • No fires should be allowed on-site • No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purpose without express permission from the ECO and or Contractor's EO.		avoiding any disturbance of vegetation outside of these areas. • Even within the development footprint, where vegetation can be allowed to persist undisturbed, this must be imposed. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and	• To prevent any residual or cumulative impacts arising.	of construction activities Rest of the mitigation measures: Throughout construction and decommissioning phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			back to the relevant environmental authorities with findings of these investigations.		
Disturbance of fauna	• Site access should be controlled and no unauthorised persons should be allowed onto the site. • Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person. • The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site. • Fires should not be allowed on site. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental	Contractor/ECO/EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments and how address/handle specific fauna when encountered. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in	• To minimise impacts on the biophysical environment • To prevent any residual or cumulative impacts arising. • Prevent mortality and injury of faunal species.	EMPr induction and training: Prior to commencement of construction activities Rest of the mitigation measures: Throughout construction and decommissioning phases Daily inspections throughout construction and decommissioning phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • All construction vehicles should adhere to a low speed limit (30km/h) to avoid collisions with susceptible species such as snakes and tortoises. • Construction vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint). • All mammal, large reptiles and avifauna species found injured during construction will be taken to a suitably qualified veterinarian or rehabilitation centre to either be put down in a humane manner or cared for until it can be released again		the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance.		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			• The ECO will need to be responsible for conducting regular site-inspections of the construction, reporting back to the relevant environmental authorities with findings of these investigations. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments and how address/handle specific fauna when encountered. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Disturbance of fauna	• All cable trenches, excavations should be checked on a daily basis	Contractor/ECO/EO	• The ECO will also need to prepare an induction and training	• To minimise impacts on the biophysical environment	EMPr induction and training:

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	for the presence of trapped animals. • Any animals found should be removed in a safe manner, unharmed, and placed in an area where the animal will be comfortable. • If the ECO or contractor is unable to assist in the movement of a fauna species, ensure a member of the conservation authorities assists with the translocation. • Note: the McGregor Museum in Kimberley could be approached for advice on relocating animals if required		programme to educate the contracting team on the EMPr commitments and how address/handle specific fauna when encountered. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse	• To prevent any residual or cumulative impacts arising. • Prevent mortality and injury of faunal species.	Prior to commencement of construction activities Rest of the mitigation measures: Throughout construction and decommissioning phases Daily inspections throughout construction and decommissioning phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Disturbance and loss of vegetation within sensitive habitats	• The working servitude within the watercourses must be demarcated on both sides using orange hazard netting prior to construction commencing.	Project Company, monitored by ECO/EO	• Taking into account the final design-layout, and any sensitive areas, demarcate the absolute minimal development footprint, and ensure that the appointed contractor is made aware of where what activities and impacts are allowed and disallowed.	• To minimise impacts on sensitive habitats. • To prevent any residual or cumulative impacts arising. • To ensure the persistence/maintenance of the REC	Prior to commencement of construction activities
Disturbance and loss of	• All sensitive habitats outside of the demarcated	Contractor/ECO/EO	• At all times be acutely aware of the specified	• To minimise impacts on sensitive habitats	Throughout construction and

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
vegetation within sensitive habitats	construction area must be considered 'No-Go' areas for the duration of the construction phase. • For watercourse road and cable crossings, no physical damage should be done to any aspects of the channel and banks of watercourses other than those necessary to complete the works as specified. • Avoid stockpiling materials in vegetated areas that will not be cleared.		development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO	• To prevent any residual or cumulative impacts arising. • To ensure the persistence/maintenance of the REC	decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			(Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Disturbance and loss of Faunal and Floral Species of Conservation Concern (SCC) as well as protected species.	• Preconstruction walk-through of the final development footprint for protected species that would be affected and that can be translocated.	Project Company, carried out by a registered Ecologist	• Within the development footprint, Identify, mark (GPS), count, describe and map all populations/individuals of protected and fauna-, flora SCC. • All results to be incorporated in an Ecological Pre-construction Walk-through Report	• To ensure the persistence of healthy, viable populations of protected and SCC within the project site. • To ensure the acceptable rehabilitation of the development footprint.	Prior to commencement of construction activities
Disturbance and loss of Faunal and Floral Species of Conservation Concern (SCC) as well as protected species.	• The above pre-construction footprint investigations will be used together with results from the ecological specialist report to draft the following: o A comprehensive search and rescue program for plants and possible burrowing animals o A comprehensive alien invasive species eradication and management plan	Project Company, carried out by a registered Ecologist	Compile detailed reports, with achievable goals.	• To ensure the persistence of healthy, viable populations of protected and SCC within the project site. • To ensure the acceptable rehabilitation of the development footprint.	Prior to commencement of construction activities

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Disturbance and loss of Faunal and Floral Species of Conservation Concern (SCC) as well as protected species.	• Obtain permits for protected plant removal and relocation prior to commencement of any activity related to this development	Project Company, or contractor responsible for vegetation clearing, assisted by an EAP/Specialist	Provide the relevant authorities with the necessary information and reports.	• To ensure the persistence of healthy, viable populations of protected and SCC within the project site	Prior to commencement of construction activities
Disturbance and loss of Faunal and Floral Species of Conservation Concern (SCC) as well as protected species.	• Search and Rescue (S&R) of all SCC and protected plants that will be affected by the development, especially species occurring in long term and permanent, hard surface development footprints (i.e. all buildings, new roads and tracks, lay down areas, and turbine positions) should take place. o Plants that can be considered for rescue, and included in subsequent rehabilitation programs are all desirable geophytes and indigenous succulents	Contractor monitored and approved by ECO/EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team responsible for S&R on the species to be S&R, the commitments, and appropriate methodology. • S&R team to develop an internal reporting structure to record and monitor S&R. • S&R should be enforced and monitored by a suitably qualified/trained ECO	• To ensure the persistence of healthy, viable populations of protected and SCC within the project site	Initial S&R: Prior to commencement of construction activities Any additional species only observed after the initial S&R: Throughout the construction phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• All rescued species should be transplanted immediately or bagged (or succulents left to first air-dry before planting) and kept in the horticulturist's or a designated on-site nursery, and should be returned to site or land portion once all construction is completed and rehabilitation of disturbed areas is required. • Replanting should occur in summer to early autumn once sufficient rains have fallen, in order to facilitate establishment.		(Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that S&R activities are being implemented appropriately. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Disturbance and loss of Faunal and Floral Species of Conservation Concern (SCC) as well as	• Any additional individuals of protected species affected by and observed within the development footprint during construction (after the initial Search and Rescue) should be translocated	Contractor monitored and approved by ECO/EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team responsible for S&R on the species to be S&R,	• To ensure the persistence of healthy, viable populations of protected and SCC within the project site	Initial S&R: Prior to commencement of construction activities Any additional species only observed after

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
protected species.	under the supervision of the ECO and/or Contractor's Environmental Officer (EO).		the commitments, and appropriate methodology. • S&R team to develop an internal reporting structure to record and monitor S&R. • S&R should be enforced and monitored by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that S&R activities are being implemented appropriately. The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant		the initial S&R: Throughout the construction phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • No unnecessary vegetation clearance may be allowed. • Limit the physical footprint of the road and verges that would require clearing to a minimum.	Contractor, ECO to control	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses.	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downstream freshwater resource features. • To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			• The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• No activities or disturbance/transformation permitted outside of the development area. • Any erosion problems observed along access roads or any hardened/ engineered surface should be rectified immediately and monitored thereafter to ensure that they do not re-occur. • Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible. • Implement best practice erosion protection and stormwater management	Contractor, ECO to control	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downstream freshwater resource features. • To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	during construction and operation;		construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation.	Contractor, ECO to control	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downstream freshwater resource features. • To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance.		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			• The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities • Run-off generated from cleared and disturbed areas such as access roads and slopes that drain into rivers, streams or wetlands must be controlled using erosion control and sediment trapping measures. These control measures must be established at regular intervals perpendicular to the slope to break surface flow energy and reduce	Contractor, ECO to control	• Design-Layout taking into account the location and nature of the specific infrastructure as well as the location, nature and morphology of the area wherein the infrastructure will be placed. • Additionally, the ECO will need to be responsible for conducting regular site-inspections of the construction, and operation footprint areas, identifying any additional areas that	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downslope freshwater resource features. • To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover • No reduction in the surface area or natural functionality of natural freshwater resource features as a result of the	Prior to commencement of construction activities and throughout the construction and decommissioning phases.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	erosion as well as trap sediment. • Sediment barriers (e.g. silt fences, sandbags, hay bales, earthen filter berms or retaining walls) must be established to protect downstream watercourses from erosion and sedimentation impacts from upslope. Sediment barriers should be regularly maintained and cleared so as to ensure effective drainage.		will have to be addressed. • Prompt and appropriate response, form the contractor, following any additional recommendations from the ECO.	establishment of infrastructure • No increase in runoff into downslope freshwater resource featurs as a result of construction of project related infrastructure • No increase in runoff into downslope freshwater resource features as a result of road construction	
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Topsoil must be removed and stored separately from subsoil. • Topsoils should be removed (and stored) under dry conditions to avoid excessive compaction whenever topsoil will have to be stored for longer than one year. • Topsoil to be stored in berms with a width of 150 – 200 cm, and a maximum	Contractor, ECO to control	• Prior to construction, site and soil conditions to be investigated and appropriate area for topsoil storage to be identified. • Ensure the appropriate removal and storage of topsoil as specified within the EMPr. • The EMPr should be enforced and monitored for compliance by a	• To retain full biological activity and functionality of topsoil • Remove and store all topsoil on areas that are to be excavated; and use this topsoil in subsequent rehabilitation of disturbed areas	Before and during construction phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	height of 100 cm, preferably lower o Place berms along contours or perpendicular to the prevailing wind direction o Adhere to the following general rule: the larger the pile of topsoil storage needs to be, the shorter should be the time it is stored • Topsoil handling should be reduced to stripping, piling (once), and re-application. Between the piling and reapplication, stored topsoils should not undergo any further handling except control of erosion and (alien) invasive vegetation		suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and	• Topsoil must be reapplied where appropriate as soon as possible in order to encourage and facilitate rapid regeneration of the	Contractor, ECO to control	• Topsoil re-application and rehabilitation done in accordance with the EMPr and Site Rehabilitation Management Plan	• To retain full biological activity and functionality of topsoil • Remove and store all topsoil on areas that are to be excavated; and use	During and prior to construction phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
associated degradation of ecosystems	natural vegetation on cleared areas. • Topsoils should be spread evenly over the ripped or trimmed surface, if possible, not deeper than the topsoil originally removed • The final prepared surface should not be smooth but furrowed to follow the natural contours of the land • The final prepared surface shall be free of any pollution or any kind of contamination • Care should be taken to prevent the compaction of topsoil			this topsoil in subsequent rehabilitation of disturbed areas	

8.2.7. Transportation

This section deals with the issues relative to transportation during the construction phase.

Table 16: Transportation

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Additional Traffic Generation:	• Ensure staff transport is done in the 'off peak' periods and by bus.	Holder of the EA/Contractor	All staff members are aware of the	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Increase in Traffic	• Stagger material, component and abnormal loads • Construction of an on-site concrete batching plant to reduce trips.		EMPr requirements relevant to them Ensure the EMPr is adhered to.	
Additional Traffic Generation: Increase of Incidents with pedestrians and livestock	• Upgrade of existing / new access points. • Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences & access cattle grids • Construction of an on-site concrete batching plant to reduce trips.	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Traffic Generation: Increase in Dust from gravel roads	• Upgrade of existing / new access point. • Reduction in the speed of the vehicles. • Construction of gravel roads in terms of TRH20. • Implement a road maintenance program under the auspices of the respective transport department. • Possible use of approved dust suppressant techniques. • Construction of an on-site batching plant and tower construction to reduce trips.	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Traffic Generation: Increase in Road Maintenance	• Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site batching plant to reduce trips.	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			Ensure the EMPr is adhered to.	
Additional Abnormal Loads	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. • Adequate enforcement of the law	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Internal Access Roads: Increase in Dust from gravel roads	• Enforce a maximum speed limit on the development. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques.	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Internal Access Roads: New / Larger Access points	• Adequate road signage according to the SARTSM • Approval from the respective roads department	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous

8.2.8. Noise

This section deals with the issues relative to noise during the construction phase.

Table 17: Noise

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Monitor construction noise	Ambient noise monitoring to be conducted.	Specialist noise consultant	As per the requirements of SANS 10103:2008	Validation of Noise Impact Assessment Findings to determine if further noise mitigation is required.	Three times during the construction phase

8.2.9. Visual

This section deals with the issues relative to visual during the construction phase.

Table 18: Visual

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Topsoil loss can reduce the viability of rehabilitation measures and needs to be carefully managed if available.	• Topsoil excavated from the site should be stockpiled and utilised for rehabilitation of the site after construction.	Project management and EPC	As defined by the rehabilitation specialist.	Topsoil is utilized and no sterilization of topsoil takes place.	As required.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Un-necessary roads have the potential to create a visual disturbance long after the usage as past.	• Limit road access to an efficient minimum by coordinated planning between the project management and the environmental control officer.	Project management and EPC	Temporary roads should be well marked and should only cross drainage lines on areas identified as permanent road features where erosion and soil loss management can be contained. Noncompliance with road signage and utilisation of no authorised roads should become a finable offence.	The surrounding landscape remains rural and agricultural in landscape and land use.	As required.
Windblown dust and dust from moving vehicles have the potential to become a significant nuisance factor to local farms around the site and along the access road.	• Set up a clear management plan with clear accountability structures with set thresholds for triggering of mitigations. • Set up a liaison committee to engage with local farmsteads located within 500m of an access road, with monthly communication with the farm owners on the effectiveness of the dust management procedures.	Project management and EPC (as the issue arises).	Should excessive dust be generated from the movement of vehicles on the roads such that the dust becomes visible to the immediate surrounds, dust-retardant measures should be implemented under authorisation of the EPC.	Dust generated on site as well as on the access road to the site, is well managed and does not become a nuisance factor for the workers or the surrounding farmsteads.	On-going

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Buildings painted bright colours can increase the visual presence of the structures in a rural landscape, creating higher levels of visual contrast and attracting the attention of the causal observer.	• The buildings should be painted a grey-brown colour (or other colour in keeping with the surrounding landscape) to assist in reducing colour contrast. • Sheet metal structures should make use of mid-grey colour, and preferable have a rough texture material.	Project management and EPC	At the commencement of construction, purchase order criteria for ordering paints and sheet metals need to be clearly defined.	Colour contrast generated from the buildings as seen from the roads is low and does not attract the attention of the casual observer.	Commencement of construction.
Light spillage from security lighting of structures can significantly increase the visual impact of a project in a rural landscape in a dark-sky context.	• Light spillage mitigation from security lighting should be implemented and monitored by the ECO during construction to ensure that light spillage does not create a glowing effect. • No overhead/ flood lighting of structures or areas. • No up lighting to be used.	Project management and EPC	At the commencement of construction, purchase order criteria for ordering of security lighting need to be clearly defined.	Lights contrast generated from the buildings as seen from the roads is low and does not attract the attention of the casual observer.	Commencement of construction.
Litter has the potential to degrade landscape character and can	• Littering should be a finable offence. • Fencing around the laydown should be diamond shaped to catch wind blown litter. The fences should be routinely	Project management and EPC	Littering rules need to be clearly defined and workers effectively informed of the	Solid waste litter is effectively controlled and does not	Checked bi-monthly

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
be contained by fencing around the construction camp/ laydown.	checked for the collection of litter caught on the fence.		consequences of littering.	become a landscape degradation risk.	
Soil erosion can result in visual scarring on prominent areas.	• In areas where construction has taken place on steeper slopes, soil erosion measures need to be implemented.	Project management and EPC (checked monthly)	Clear methodology for rehabilitation and restoration is provided by the rehabilitation specialist. As soon as construction has concluded on the area at hand, rehabilitation processes need to commence.	Soil erosion is limited and effectively managed such that visual scarring does not take place.	Commencement of construction. On-going
Cut and Fill areas can generate visual scarring in the landscape beyond the locality.	• Cut & Fill areas should be limited as much as possible, with specific detail placed on prevention of soil erosion. • Slopes should not exceed 1 in 6m gradients and need to be rehabilitated to natural vegetation directly post construction.	Project management and EPC with inputs from rehabilitation specialist.	Clear methodology for rehabilitation and restoration is provided by the rehabilitation specialist. As soon as construction has concluded on the area at hand, rehabilitation processes need to commence.	Cut/ fill scaring is limited and effectively managed and does not dominate the attention of the casual observer.	Commencement of construction. On-going
Topsoil loss can reduce the viability of rehabilitation measures and	• Topsoil excavated from the site should be stockpiled and utilised for rehabilitation of the site after construction.	Project management and EPC	As defined by the rehabilitation specialist.	Topsoil is utilized and no sterilization of	As required.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
needs to be carefully managed if available.				topsoil takes place.	

8.2.10. Socio-Economic

This section deals with the issues relative to socio-economic during the construction phase.

Table 19: Socio-Economic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Noise	The mitigation measures suggested by the noise specialist	The proponent in association with contractors	As stated by the noise specialist	Frequency of complaints laid and the time lag between notification of the complaint and resolutions.	Over construction & operation phases of the project
Increase in crime	Ensure that constructions workers are identifiable. All workers should carry identification cards and wear identifiable clothing.	The proponent in association with contractors	Safety of workforce including security on project site. Fence and secure project site	To minimise the risk potential for local communities	Over the construction phase of the project.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	Encourage local people to report any suspicious activity associated with the construction sites through the establishment of community liaison forum. Prevent loitering within the vicinity of the construction camp and construction sites				
Increase in HIV Infections	Ensure that an onsite HIV Infections Policy is in place and that construction have easy access to condoms Expose workers to a health and HIV/Aids awareness educational program.	Human resource department and project manager	Implement an HIV/AIDs Awareness and Training Programme for contractors workforce within two weeks of commencement of construction	To minimise the risk of the spread of STD's and HIV in the area.	Over construction & operation phases of the project
An influx of construction workers	Communicate the limitation of opportunities created by the project through Community Leaders and Ward Councillors. Draw up a recruitment policy in consultation with the community leaders and Ward Councillors of the area and ensure compliance with this policy	The proponent in association with contractors	As far possible source low-skilled workers from local communities and surrounding areas If feasible employ local contractors	To minimise the disruptive effect that the workforce may pose for local communities	Over construction phase of the project

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Hazard exposure	Ensure all construction equipment and vehicles are properly maintained at all times Ensure that operations and drivers are properly trained and make them aware, through regular toolbox talks, of any risk they may pose to the community. Place specific emphasis on the vulnerable sector of the population, such as children and the elderly. Ensure that fires lit by construction staff are only ignited in designated areas and that the appropriate safety precautions, such as not lighting fires in strong winds and completely extinguishing fires before leaving them unattended, are strictly adhered to. Make staff aware of the danger of fire during toolbox talks	The proponent in association with contractors	Provide relevant protection equipment and training to all staff personnel	To avoid and or minimise the potential risk of hazardous exposure on local communities and their livelihoods	Over construction phase of the project
Disruption of daily living pattens	Ensure that, at all times, people have access to their properties as well as to social facilities.	Project proponent in association with contractors	A public grievance and incident register should be established and	Register to be audited to understand any	During operational

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			should be monitored internally by the developer and made available for public scrutiny if requested	issues regarding property issues.	phase on a monthly basis
Disruptions to social and community infrastructure	Regularly monitor the effect that construction is having on infrastructure and immediately report any damage to infrastructure to the appropriate authority.	Project proponent in association with contractors	A public grievance and incident register should be established and should be monitored internally by the developer and made available for public scrutiny if requested	Register to be audited to understand any issues regarding property issues.	During operational phase on a monthly basis

8.3 Operation

8.3.1. Heritage

This section deals with the issues relative to heritage during the operation phase.

Table 20: Heritage

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY

Impacts to cultural landscape: Visible landscape scarring	Ensure disturbance is kept to a minimum and does not exceed project requirements. Rehabilitate areas not needed during operation.	Construction Manager or Contractor / ECO	Monitoring of surface clearance relative to approved layout	Minimise landscape scarring	Ongoing basis / as required

8.3.2. Agriculture and Soils

This section deals with the issues relative to agriculture and soils during the operation phase.

Table 21: Agriculture and Soils

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/FREQUENCY
Aspect: Protection of soil resources Erosion	• Maintain the storm water run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring.	Facility Environmental Manager	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	That existence of hard surfaces causes no erosion on or downstream of the site.	Bi-annually
Aspect: Protection of soil resources Erosion	• Facilitate re-vegetation of denuded areas throughout the site.	Facility Environmental Manager	Undertake a periodic site inspection to record the progress of all areas that require re-vegetation.	That denuded areas are re-vegetated to stabilise soil against erosion	Bi-annually

8.3.3. Avifauna

This section deals with the issues relative to avifauna during the operation phase.

Table 22: Avifauna

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Avifauna: Mortality due to collisions with the wind turbines: Bird collisions with the wind turbines	• Formal live-bird monitoring and carcass searches should be implemented at the start of the operational phase, as per the most recent edition of the Best Practice Guidelines at the time (Jenkins et al. 2015) to assess collision rates. The exact time when operational monitoring should commence, will depend on the construction schedule, and should commence when the first turbines start operating. The Best Practice Guidelines require that, as an absolute minimum, operational monitoring should be undertaken for the first two (preferably three) years of operation, and then repeated again in year 5, and again every five years thereafter for the operational lifetime of the facility. • A procedure for the immediate removal of carcasses within the development area must be implemented to prevent vultures from being attracted to the area where they could be at risk of collision with the turbines. • If an Endangered or Critically Endangered species mortality is recorded during the first year of operational monitoring, additional mitigation measures must be implemented which could include shut down on demand, or	Operations Manager Avifaunal Specialist	1. Appoint Avifaunal Specialist to compile operational monitoring plan, including live bird monitoring and carcass searches. 2. Implement operational monitoring plan. 3. Engage with the landowner to design and implement an effective system to locate a carcass promptly and ensure the immediate removal of the carcass before it can attract vultures. 4. Design and implement mitigation measures if mortality thresholds are exceeded in collaboration with the	Prevention of collision mortality on the wind turbines.	1. Once-off 2. Years 1,2, 5 and every five years after that for the duration of the operational lifetime of the facility. 3. Before the first turbines start turning. 4. As and when required, within six months of threshold having been

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
	other proven mitigation measures as recommended by the avifaunal specialist.		avifaunal specialist, including if need be Shutdown on Demand (SDoD). 5. Compile quarterly and annual progress reports detailing the results of the operational monitoring and progress with any recommended mitigation measures.		exceeded. 5. Quarterly and annually.
Avifauna: Mortality due to collisions and electrocutions on the 33kV network: Bird electrocutions on the overhead sections of the internal 33kV cables	• Conduct regular inspections of the overhead sections of the internal reticulation network to look for carcasses.	Operations Manager Avifaunal specialist	1. Carcass searchers under the supervision of the Avifaunal Specialist. 2. Design and implement mitigation measures if mortality thresholds are exceeded. 3. Compile quarterly and annual progress reports detailing the results of the operational monitoring and progress with any recommended mitigation measures.	Prevention of electrocution mortality on the overhead sections of the 33kV internal cable network.	1. At least once every two months. 2. As and when required, within six months of threshold having been exceeded. 3. Quarterly and annually

8.3.4. Bat

This section deals with the issues relative to avifauna during the operation phase.

Table 23: Bat

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Modification of Bat Habitat and Roost Disturbance/Destruction	• Minimise clearing of vegetation - Rehabilitate all areas disturbed during construction (including aquatic habitat) • Avoid construction activities at night. • Minimise disturbance and destruction of farm buildings on site • Minimise removal of trees • Minimise blasting and removal of rocky habitat on site • Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts).	Pofadder Wind Energy Facility 3 (Pty) Ltd	• Apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) • Apply appropriate vegetation rehabilitation practices. • Ensure buildings, turbines and road culverts are correctly insulated and sealed to prevent bats from roosting. • Where trees and rocky crevices will be impacted, these features should be examined for roosting bats.	• No bat roosts are destroyed • No bats colonise new project infrastructure for roosting • No infrastructure in No-Go areas (except roads) • All areas disturbed during construction are rehabilitated	During design and planning phase and throughout construction phase and until rehabilitation is complete.
Bat Mortality	• No placement of turbines within No-Go areas • Minimum blade sweep of 35 m	Pofadder Wind Energy Facility 3 (Pty) Ltd	• Adhere to the bat constraints map for	• Bat fatalities do not exceed	Turbine layout and turbine model

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Blade feathering must be used to prevent free-wheeling of turbine blades below the turbine cut-in speed • Implement post-construction fatality monitoring • Apply curtailment or deterrents if fatality thresholds are exceeded.		No-Go areas (Figure 5). • Select turbine with 35 m minimum blades sweep • Implement blade feathering below turbine cut-in speed • Implement best practise bat fatality monitoring according to Aronson et al. (2020). • Estimate bat fatality using GenEst (Simonis et al. 2018). • Develop bat adaptive management plan if fatality thresholds are exceeded which will include a curtailment plan and/or plan for use of acoustic deterrents.	fatality thresholds for any species.	finalised during design phase. Operational Phase fatality monitoring according to Aronson et al. (2020).

8.3.5. Aquatic

This section deals with the issues relative to aquatic during the operation phase.

Table 24: Aquatic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Increase in sedimentation and erosion - Entire development footprint	• All culverts, stormwater run-off infrastructure erosion prevention features/infrastructure must be monitored and maintained. • Any erosion problems observed to be associated with the project infrastructure should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.	Contractor, ECO to control	• Project site and infrastructure annually monitored by EO • The EO should be responsible for driving this process.	• Ensure that all culverts, stormwater run-off infrastructure and erosion prevention features are functioning optimally, • No disturbance or degradation of freshwater resource features occur throughout the operational phase.	Throughout the operational phase

8.3.6. Terrestrial Ecology

This section deals with the issues relative to terrestrial ecology during the operation phase.

Table 25: Terrestrial Ecology

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Site access should be controlled and no unauthorised persons should be allowed onto the site. • Strictly prohibit any driving outside designated areas and roads	Contractor, ECO to control	• Strict access control and the implementation of standard operating procedures	Prevent any additional disturbance of soil and vegetation outside of the development footprint	Throughout the operational phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Access roads or any hardened/ engineered surface should be regularly monitored for erosion problems. • Any erosion problems observed should be rectified immediately and monitored thereafter to ensure that they do not re-occur. • Implement best practice erosion protection and stormwater management during operation;	Contractor, ECO to control	• Frequent monitoring of the development site and infrastructure by the ECO/EO, identifying any additional areas that will have to be addressed. • Prompt and appropriate response, form the contractor, following any additional recommendations from the ECO.	• Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of desirable and/or indigenous species • Prevent accelerated erosion of ecosystem degradation	After construction and throughout operational phase
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible. • All bare/disturbed areas, affected by the development, should be rehabilitated and re-vegetated with locally occurring species, to bind the soil and limit erosion potential where applicable. • revegetation will be done according to an approved planting/landscaping plan, also indicating the desirable end states of permissible vegetation • The establishment and new growth of revegetated and replanted species shall be closely monitored • Where necessary, reseeding or replanting will have to be done if no acceptable plant cover has been created	Contractor, ECO to control	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr commitments relating to site rehabilitation. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr and Rehabilitation Management Plan should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control	• Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of desirable and/or indigenous species • Prevent accelerated erosion of ecosystem degradation	After construction and throughout operational phase as well as after the decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Monitor success of rehabilitation and revegetation and take remedial actions as needed according to the respective plan • Erosion shall be monitored at all times and measures taken as soon as detected • Where necessary, reseeding or replanting will have to be done if no acceptable plant cover has been created		Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, and operational processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Keep disturbance of indigenous vegetation to a minimum • Rehabilitate disturbed areas as quickly as possible • The meticulous implementation of the IAP and Rehabilitation Management Plans. • Regular monitoring by the operation and maintenance team for alien plants	Contractor, monitored by ECO	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr commitments relating to the management/eradication of AIPs.	• The successful reduction in the treat (significance) posed by Alien Invasive Plants. • Recreate a non-invasive, acceptable vegetation cover that will facilitate the	Throughout construction and operational phase as well as after the decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	must occur and could be conducted simultaneously with erosion monitoring. • When alien plants are detected, these must be controlled and cleared using the recommended control measures for each species to ensure that the problem is not exacerbated or does not re-occur and increase to problematic levels. • Clearing methods must aim to keep disturbance to a minimum. • No planting or importing any listed invasive alien plant species (all Category 1a, 1b and 2 invasive species) to the site for landscaping, rehabilitation or any other purpose must be undertaken.		• Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr and IAP Managment Plan should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, and operational processes,	establishment of desirable and/or indigenous species	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			reporting back to the relevant environmental authorities with findings of these investigations.		

8.3.7. Transportation

This section deals with the issues relative to transportation during the operation phase.

Table 26: Transportation

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Additional Traffic Generation: Increase in Traffic	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Traffic Generation: Increase of Incidents with pedestrians and livestock	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Additional Traffic Generation: Increase in Dust from gravel roads	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Traffic Generation: Increase in Road Maintenance	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Abnormal Loads	• The increase in traffic for this phase of the development is negligible and will not have a significant impact	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Internal Access Roads: New / Larger Access points	• Adequate road signage according to the SARTSM. • Approval from the respective roads department.	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them	Continuous

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			Ensure the EMPr is adhered to.	

8.3.8. Noise

This section deals with the issues relative to noise during the operation phase.

Table 27: Noise

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Reduce operational noise	Ambient noise monitoring to be conducted at NSA 40 and NSA 41 when operations commence to verify the noise emissions meet the night time noise rating limit. Mitigation measures to be implemented if the noise impact exceeds the 35dB(A) night noise rating limit such as running the turbines in low power mode at certain wind speeds at night.	Specialist noise consultant	As per the requirements of SANS 10103:2008	Reduction in Noise and thus reduction in chance of complaints arising	Once off during project operations

8.3.9. Visual

This section deals with the issues relative to visual during the operation phase.

Table 28: Visual

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Compaction of larger areas can result in soil sterilisation and landscape degradation.	Post construction, the laydown areas and other construction areas no longer needed for operational management, should be ripped (0.5m depth) to restore compacted topsoil, and then rehabilitated to natural vegetation under the supervision of the rehabilitation specialist.	Project management and EPC with inputs from rehabilitation specialist.	As defined by the rehabilitation specialist.	Soil sterilization does not take place and large degraded areas do not occur, with overall landscape integrity maintained.	On completion of construction phase. On-going
AWL lights at night have the potential to significantly detract from the 'dark-sky' sense of place of the rural landscape.	• Strategic placement of AWL at total project corner turbines. • Placement of the AWL in shallow cups such that ground flash incidence is limited.	Project management	As specified by the CAA.	AWL do not become dominating such that a clearly defined glow from multiple AWL at night is clearly visible at a regional level.	Project management team.
Soil erosion can result in visual scarring on prominent areas.	In areas where construction has taken place on steeper slopes, soil erosion measures need to be implemented.	Project management and EPC	Clear methodology for rehabilitation and restoration is provided by the rehabilitation specialist. As soon as construction has concluded on the area at hand, rehabilitation processes need to commence.	Soil erosion is limited and effectively managed such that visual scarring does not take place.	Bi-annual

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Light spillage from security lighting of structures can significantly increase the visual impact of a project in a rural landscape in a dark-sky context.	Light spillage measures designed during pre-construction phase should be implemented and monitored by the ECO during construction to ensure that light spillage does not create a glowing effect.	Project management and EPC.	A review of the security lights at night is undertaken by the EPC to check that undue light spillage is not taking place without loss of security.	Lights contrast generated from the buildings as seen from the roads is low and does not attract the attention of the casual observer.	At commencement of Operation Phase.
Old turbine blades and equipment have the potential to significantly degrade the local landscape character.	Old turbines and equipment should be removed from site and recycled/ managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) or deposited at a registered landfill if it cannot be recycled or reused.	Project management and EPC (as the need arises).	Old turbines blades are be removed from site and recycled/ managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) or deposited at a registered landfill if it cannot be recycled or reused.	The project area is not littered with old turbine blades resulting in the management area becoming visually degraded.	On-going
Windblown dust and dust from moving vehicles have the potential to become a significant nuisance factor to local farms around the site and along the access road.	Should excessive dust be generated from the movement of vehicles on the roads such that the dust becomes visible to the immediate surrounds, dust-retardant measures should be implemented under authorisation of the ECO.	Project management and EPC (as the need arises).	Set up a clear management plan with clear accountability structures with set thresholds for triggering of mitigations.	Dust generated on site as well as on the access road to the site, is well managed and does not become a nuisance factor for the workers or the surrounding farmsteads.	On-going.

8.3.10. Socio-Economic

This section deals with the issues relative to socio-economic during the operation phase.

Table 29: Socio-Economic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Noise	The mitigation measures suggested by the noise specialist	The proponent in association with contractors	As stated by the noise specialist	Frequency of complaints laid and the time lag between notification of the complaint and resolutions.	Over construction & operation phases of the project
Shadow flicker	• Identifying receptor points and applying appropriate technical measures such as computer modelling in sitting the wind turbines to limit the effect of shadow flicker. • Where necessary and appropriate apply tracking technology that will automatically shutoff and restart the affecting wind turbine to eliminate shadow flicker • Consider the application of appropriate screening measures to reduce the effect of shadow flicker	The proponent in association with service providers	Assessment through and health-related issues	Through careful siting of wind turbines to avoid residential areas	During operation phase
Blade glint	• Calculate and factor in the risk of blade glint in siting the wind turbines • Coat wind turbine blades with non-reflective costing to reduce blade glint.	The proponent in association with service providers	Assessment through residents or visitors coming into the area	The use of non-reflective coatings	During operation phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Where appropriate, adjust the angle of turbine blades to reduce blade glint.				
Electromagnetic fields and RF interference	• Wind turbine mechanism will be elevated and the risk of EMF's will be minimal. • Notwithstanding this, it would be pertinent to regularly monitor the levels of EMFs entitled by the turbines and, if necessary make the appropriate adjustments to ensure that these levels remain within acceptable parameters. • Ensure that power lines are not routed in close proximity (with 300 meters) of residential areas to limit the effect of EMFs. • Consult with the appropriate telecommunication authorities to ensure that the telecommunication installations identified within the vicinity of the project are not comprised through RFI.	The proponent in association with service providers	Through consultation with relevant authorities under this area of expertise	Ensure project area is not compromised due to any RF interference	During operation phase
Hazard exposure	• Install early detection techniques to avoid or reduce structural damage • Install lighting protection systems • Install fire prevention and control measures	The proponent in association with project manager	Safety measures to be adhered too at all times.	Avoid any hazard exposure of the development to reduce any damages	During operation phase
Transformation of the sense of place	• Apply the mitigation measures suggested in the Visual Impact Assessment Report. • Communicate the benefits associated with renewable energy to the broader community • Ensure that all affected landowners and tourist associations are regularly consulted	The proponent in association with project manager	Through consultation understand concerns regarding to changes in visual perspective and address matters	As part of the consultation should there be grievances then a grievance mechanism needs to be in	During construction & construction phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• A Grievance Mechanism should be put in place and all grievance should be dealt with transparently • The mitigation measures recommended in the Heritage and Palaeontology Impact Assessment should be followed.			place and dealt with openly	
Socio-economic stimulation	• Ensure that the procurement policy supports local enterprises • Establish a social responsibility programme either in line with the REIPPP BID guidelines or equivalent; • Work closely with the appropriate municipal structures regarding establishing a social responsibility programme; • Ensure that any trusts or funds are strictly managed in respect of outcomes and funds	The proponent	Develop policies in place that aligns with local economic plan of the municipality	Work closely with the municipality and various people with the structures of the organisation	During operation, construction and decommissioning phase

8.4 Decommissioning

8.4.1. Agriculture and Soils

This section deals with the issues relative to agriculture and soils during the decommissioning phase.

Table 30: Agriculture and Soils

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
Aspect: Protection of soil resources Erosion	• Implement an effective system of storm water run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	Engineer /Contractor	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	Every 2 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved.
Aspect: Protection of soil resources Erosion	• Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion.	Engineer /Contractor	Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	That vegetation clearing does not pose a high erosion risk.	Every 4 months during the decommissioning phase, and then every 6 months after completion of decommissionin

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/ FREQUENCY
					g, until final sign-off is achieved.
Aspect: Protection of soil resources Topsoil loss	• If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	Engineer /Contractor	Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and replacement. Check that topsoil covers the entire disturbed area.	That topsoil loss is minimised	As required, whenever areas are disturbed.

8.4.2. Avifauna

This section deals with the issues relative to avifauna during the decommissioning phase.

Table 31: Avifauna

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/FREQUENCY
Avifauna: Displacement due to disturbance:	• A site-specific EMPr must be implemented, which gives appropriate and detailed description of how construction activities must be conducted.	Contractor and ECO	1. Implementation of the EMPr. Oversee activities to ensure that the EMPr is implemented and enforced via site audits	Prevent unnecessary displacement of avifauna by ensuring that	1. On a daily basis 2. Weekly 3. Weekly 4. Weekly

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/FREQUENCY
The noise and movement associated with the de-commissioning activities at the WEF footprint will be a source of disturbance which would lead to the displacement of avifauna from the area	All contractors are to adhere to the EMPr and should apply good environmental practice during construction. The EMPr must specifically include the following: o No off-road driving; o Maximum use of existing roads, where possible; o Measures to control noise and dust according to latest best practice; o Restricted access to the rest of the property; o Strict application of all recommendations in the botanical specialist report pertaining to the limitation of the footprint.		and inspections. Report and record any non-compliance. 2. Ensure that construction personnel are made aware of the impacts relating to off-road driving. 3. Access roads must be demarcated clearly. Undertake site inspections to verify. 4. Monitor the implementation of noise control mechanisms via site inspections and record and report non-compliance. 5. Ensure that the footprint area is demarcated and that construction personnel are made aware of these demarcations. Monitor via site inspections and report non-compliance.	contractors are aware of the requirements of the Environmental Management Programme (EMPr.)	5. Weekly

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES/FREQUENCY

8.4.3. Bat

This section deals with the issues relative to bats during the decommissioning phase.

Table 32: Bat

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Modification of Bat Habitat and Roost Disturbance/Destruction	• Minimise clearing of vegetation - Rehabilitate all areas disturbed during construction (including aquatic habitat) • Avoid construction activities at night. • Minimise disturbance and destruction of farm buildings on site • Minimise removal of trees • Minimise blasting and removal of rocky habitat on site • Limit potential for bats to roost in project infrastructure (e.g., buildings, turbines, road culverts).	Pofadder Wind Facility 3 (Pty) Ltd	• Apply good construction abatement control practices to reduce emissions and pollutants (e.g., noise, erosion, waste) • Apply appropriate vegetation rehabilitation practices. • Ensure buildings, turbines and road culverts are correctly insulated and sealed to	• No bat roosts are destroyed • No bats colonise new project infrastructure for roosting • No infrastructure in No-Go areas (except roads) • All areas disturbed during	During design and planning phase and throughout construction phase and until rehabilitation is complete.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			prevent bats from roosting. • Where trees and rocky crevices will be impacted, these features should be examined for roosting bats.	construction are rehabilitated	

8.4.4. Aquatic

This section deals with the issues relative to aquatic during the decommissioning phase.

Table 33: Aquatic

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Loss of riparian systems and disturbance of the alluvial water courses: Construction of road and MV cable watercourse crossings	• All sensitive aquatic habitats outside of the demarcated construction area must be considered 'No-Go' areas for the duration of the construction phase. • No physical damage should be done to any aspects of the channel and banks of watercourses other than those necessary to complete the works as specified.	Contractor/ECO/ EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas.	• Minimise and maintain damage of watercourse vegetation the developmen t footprint. • Prevent any residual or	Throughout construction and decommissio ning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • There should be reduced activity at the site after large rainfall events when the soils are wet.		• The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental	cumulative impacts arising. • To ensure the persistence/ maintenanc e of the REC	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Loss of riparian systems and disturbance of the alluvial water courses: Excavation and trenching within watercourses	• Avoid stockpiling materials in vegetated areas that will not be cleared. • All material stockpiles should be located outside freshwater resource features. • Excavated soils should be stockpiled on the upslope side of the excavated trench so that eroded sediments off the stockpile are washed back into the trench; • Excavated soils will need to be replaced in the same order as excavated from the trench, i.e. sub-soil must be replaced first and topsoil must be replaced last (this will maximise opportunity for re-vegetation of disturbed areas). • Closure and rehabilitation of the disturbed areas should commence as soon as the laying of underground cable has been completed.	Contractor/ECO/ EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses.	• Minimise and maintain damage of watercourse vegetation the developmen t footprint. • Prevent any residual or cumulative impacts arising. • To ensure the persistence/ maintenanc e of the REC	Throughout construction and decommissio ning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			• The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance.		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			• The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Loss of riparian systems and disturbance of the alluvial water courses: Alien Invasive Plants	• All alien plant re-growth must be monitored, and should it occur, these plants should be eradicated. • Any disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth. • Mitigation and follow up monitoring of residual impacts (alien vegetation growth and erosion) may be required.	Contractor/ECO/ EO	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr commitments relating to the management/eradication of AIPs. • The EMPr and IAP Management Plan should be enforced and monitored for compliance by a suitably	• The successful reduction in the treat (significance) posed by Alien Invasive Plants. • Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishme	Throughout construction and operational phase as well as after the decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction,	nt of desirable and/or indigenous species	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			and operational processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Loss of riparian systems and disturbance of the alluvial water courses: Construction of Wind Turbines and supporting infrastructure (excluding roads and mv cable watercourse crossings)	• Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • Any erosion problems observed to be associated with the project infrastructure should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • There should be reduced activity at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased. • Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities • Stormwater from hardstand areas, buildings and the substation must be	Contractor/ECO/ EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a	No indirect damage to downslope freshwater resource features and their associated vegetation.	Throughout construction and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	managed using appropriate channels and swales when located within steep areas.		suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Increase in sedimentation and erosion: Construction of road and MV cable watercourse crossings	• All construction activities occurring directly within the watercourses to take place within the dry season. • The erosion and stormwater management measures included in the stormwater management plan (**Appendix 2**) for the Pofadder WEF 3 must be implemented. • The duration of construction work within the watercourses must be minimised as far as practically possible through proper planning and phasing. • During the construction phases, monitor culverts to see if erosion issues arise and if any erosion control is required. • Any erosion problems observed during the construction phase should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur.	Contractor/ECO/ EO	• The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a	• To minimise erosion of soil from site during construction. • To maintain watercourse s'' RECs • To avoid downstream impacts including: o erosion; o sediment ation; o destabilis ation of banks and channels .	Throughout construction and decommissio ning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • Any disturbed areas should be rehabilitated and monitored to ensure that these areas do not become subject to erosion • Silt traps should be used where there is a danger of topsoil eroding and entering streams and other sensitive areas. • These silt traps must be regularly monitored and maintained and replaced / repaired immediately as and when required. These measures should be regularly checked, maintained and repaired when required to ensure that they are effective • Construction of gabions and other stabilisation features to prevent erosion must be undertaken, if deemed necessary. • Under no circumstances must new channels be created for flow diversion and conveyance purposes unless approved as part of an EA or WUL		suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• There should be reduced activity during the construction phase at the site after large rainfall events when the soils are wet. No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased. • Closure and rehabilitation of the disturbed areas should commence as soon as the laying of underground cable has been completed. • Soils should be landscaped to the natural landscape profile with care taken to ensure that no preferential flow paths or berms remain		the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Increase in sedimentation and erosion: Construction of road and MV cable watercourse crossings	• Any areas disturbed during the construction phase should be encouraged to rehabilitate as fast and effective as possible and were deemed necessary by the ECO or Contractor's EO, artificial rehabilitation (e.g. re-seeding with collected or commercial indigenous seed mixes) should be applied in order to speed up the rehabilitation process in critical areas (e.g. steep slopes and unstable soils).	Contractor/ECO/ EO	• The ECO will need to prepare an induction and training programme to educate the contracting team on the EMPr commitments relating to site rehabilitation. • Contractor to develop an internal	• Recreate a non-invasive, acceptable vegetation cover that will facilitate the establishment of desirable and/or	After construction and throughout operational phase as well as after the decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• All rehabilitated areas must be monitored to ensure that these areas do not become subject to erosion or invasive alien plant growth.		reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr and Rehabilitation Management Plan should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being	indigenous species • Prevent accelerated erosion of ecosystem degradation	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, and operational processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Increase in sedimentation and erosion: Construction of Wind Turbines and supporting infrastructure (excluding roads and	• No unnecessary vegetation clearance may be allowed. • Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • Any erosion problems observed to be associated with the project	Contractor/ECO/ EO	• The ECO will need to prepare an induction and training programme to educate the contracting team	• Prevent upstream erosional features from spreading into the	Throughout construction and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
mv cable watercourse crossings)	infrastructure should be rectified as soon as possible and monitored thereafter to ensure that they do not re-occur. • There should be reduced activity at the site after large rainfall events when the soils are wet. • No driving off of hardened roads should occur immediately following large rainfall events until soils have dried out and the risk of bogging down has decreased. • Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities		on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental	aquatic buffer areas and the resource features themselves. • To allow for natural runoff patterns into the downslope freshwater resource features. • To avoid unnatural amounts of sediments carried into the downstream freshwater resource features form their catchments.	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Potential impact on localised surface water quality – All associated infrastructure	• Implement appropriate measures to ensure strict use and management of all hazardous materials used on site • Waste should be stored on site in clearly marked containers in a demarcated area.	Contractor/ECO/ EO	• Observation and supervision of chemical storage and handling practices and vehicle	• To ensure that the storage and handling of chemicals and	Throughout construction, maintenance and decommissioning phase

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• All waste material should be removed at the end of every working day to designated waste facilities at the main construction camp/suitable waste disposal facility. • All waste must be disposed of offsite. • Implement appropriate measures to ensure strict management of potential sources of pollutants (e.g. litter, hydrocarbons from vehicles and machinery, cement during construction etc.) • Implement appropriate measures to ensure containment of all contaminated water by means of careful run-off management on the development site. • Implement appropriate measures to ensure strict control over the behavior of construction workers. • Appropriate ablution facilities should be provided for construction workers during construction and on-site staff during the operation of the substation and WEF. • Vehicles to refuel within a designated area, at least 100m from any freshwater resource feature.		maintenance throughout construction phase • A complaints register must be maintained, in which any complaints from the community will be logged. Complaints must be investigated and, if appropriate, acted upon • Observation and supervision of waste management practices throughout construction phase • Waste collection to be monitored on a regular basis • Waste documentation completed • An incident reporting system	hydrocarbons on-site does not cause pollution to the environment or harm to persons • To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons • To comply with waste management legislation	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	• Place spill kits on site which are operated by trained staff members for the adhoc remediation of minor chemical and hydrocarbon spillages.		must be used to record non-conformances to the EMP/IWWMP • An appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. » Public complaints register must be developed and maintained on site.	• To minimise production of waste • To ensure appropriate waste storage and disposal • To avoid environmental harm from waste disposal	

8.4.5. Terrestrial Ecology

This section deals with the issues relative to terrestrial ecology during the decommissioning phase.

Table 34: Terrestrial Ecology

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Disturbance/loss of natural vegetation	• No unnecessary vegetation clearance may be allowed. • ECO and/or Contractor's EO to provide supervision and oversight of vegetation	Contractor/ECO/ EO	• At all times be acutely aware of the specified development	• To minimise impacts on the	Throughout construction and

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	clearing activities and other activities which may cause damage to the environment, especially at the initiation of the project, when the majority of vegetation clearing is taking place. • All vehicles to remain on demarcated roads and no unnecessary driving in the veld outside these areas should be allowed. • Regular dust suppression during construction, if deemed necessary, especially along access roads. • No fires should be allowed on-site • No plants may be translocated or otherwise uprooted or disturbed for rehabilitation or other purpose without express permission from the ECO and or Contractor's EO.		footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • Even within the development footprint, where vegetation can be allowed to persist undisturbed, this must be imposed. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained	biophysical environment • To prevent any residual or cumulative impacts arising.	decommissioning phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			back to the relevant environmental authorities with findings of these investigations.		
Disturbance of fauna	• Site access should be controlled and no unauthorised persons should be allowed onto the site. • Any fauna directly threatened by the associated activities should be removed to a safe location by a suitably qualified person. • The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated site. • Fires should not be allowed on site. • All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill. • All construction vehicles should adhere to a low speed limit (30km/h) to avoid	Contractor/ECO/ EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a	• To minimise impacts on the biophysical environment • To prevent any residual or cumulative impacts arising. • Prevent mortality and injury of faunal species.	Throughout construction and decommissioning phases Daily inspections throughout construction and decommissioning phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
	collisions with susceptible species such as snakes and tortoises. • Construction vehicles limited to a minimal footprint on site (no movement outside of the earmarked footprint). • All mammal, large reptiles and avifauna species found injured during construction will be taken to a suitably qualified veterinarian or rehabilitation centre to either be put down in a humane manner or cared for until it can be released again		suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			the construction, reporting back to the relevant environmental authorities with findings of these investigations. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments and how address/handle specific fauna when encountered. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			findings of these investigations.		
Disturbance of fauna	• All cable trenches, excavations should be checked on a daily basis for the presence of trapped animals. • Any animals found should be removed in a safe manner, unharmed, and placed in an area where the animal will be comfortable. • If the ECO or contractor is unable to assist in the movement of a fauna species, ensure a member of the conservation authorities assists with the translocation. • Note: the McGregor Museum in Kimberley could be approached for advice on relocating animals if required	Contractor/ECO/ EO	• The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through	• To minimise impacts on the biophysical environment • To prevent any residual or cumulative impacts arising. • Prevent mortality and injury of faunal species.	Throughout construction and decommissioning phases Daily inspections throughout construction and decommissioning phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Disturbance and loss of vegetation within sensitive habitats	• All sensitive habitats outside of the demarcated construction area must be considered 'No-Go' areas for the duration of the construction phase. • For watercourse road and cable crossings, no physical damage should be done to any aspects of the channel and banks of watercourses other than those necessary to complete the works as specified. • Avoid stockpiling materials in vegetated areas that will not be cleared.	Contractor/ECO/ EO	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the	• To minimise impacts on sensitive habitats • To prevent any residual or cumulative impacts arising. • To ensure the persistence/ maintenanc e of the REC	Throughout construction and decommissio ning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems	• Vegetation clearing should occur in a phased manner to minimise erosion and/or run-off. • No unnecessary vegetation clearance may be allowed.	Contractor, ECO to control	• At all times be acutely aware of the specified development footprint, and	• To minimise erosion of soil from site during construction	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Construction: Soil erosion and associated degradation of ecosystems	• Limit the physical footprint of the road and verges that would require clearing to a minimum.		remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained	• To minimise deposition of soil into downstream freshwater resource features. • To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting		

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• No activities or disturbance/transformation permitted outside of the development area. • Any erosion problems observed along access roads or any hardened/ engineered surface should be rectified immediately and monitored thereafter to ensure that they do not re-occur. • Re-instate as much of the eroded area to its pre-disturbed, "natural" geometry (no change in elevation and any banks not to be steepened) where possible. • Implement best practice erosion protection and stormwater management during construction and operation;	Contractor, ECO to control	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downstream freshwater resource features. • To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental	result of a loss of vegetation cover	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Roads and other disturbed areas should be regularly monitored for erosion problems and problem areas should receive follow-up monitoring by the EO to assess the success of the remediation.	Contractor, ECO to control	• At all times be acutely aware of the specified development footprint, and remain within this area avoiding any disturbance of vegetation outside of these areas. • The ECO will also need to prepare an induction and	• To minimise erosion of soil from site during construction • To minimise deposition of soil into downstream freshwater resource features.	Throughout construction and decommissioning Phases

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			training programme to educate the contracting team on the EMPr commitments. • Contractor to develop an internal reporting structure to monitor compliance with the commitments given in the EMPr as construction progresses. • The EMPr should be enforced and monitored for compliance by a suitably qualified/trained ECO (Environmental Control Officer) with any additional supporting EO's (Environmental Officers) having the required competency skills	• To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover	

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			and experience to ensure that environmental mitigation measures are being implemented and appropriate action is taken where potentially adverse environmental impacts are highlighted through monitoring and surveillance. • The ECO will need to be responsible for conducting regular site-inspections of the construction, processes, reporting back to the relevant environmental authorities with findings of these investigations.		
Soil erosion and associated	• Any stormwater within the site must be handled in a suitable manner, i.e. trap sediments, and reduce flow velocities	Contractor, ECO to control	• Design-Layout taking into account the location and	• To minimise erosion of soil from site	Prior to commence ment of

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
degradation of ecosystems Construction: Soil erosion and associated degradation of ecosystems	• Run-off generated from cleared and disturbed areas such as access roads and slopes that drain into rivers, streams or wetlands must be controlled using erosion control and sediment trapping measures. These control measures must be established at regular intervals perpendicular to the slope to break surface flow energy and reduce erosion as well as trap sediment. • Sediment barriers (e.g. silt fences, sandbags, hay bales, earthen filter berms or retaining walls) must be established to protect downstream watercourses from erosion and sedimentation impacts from upslope. Sediment barriers should be regularly maintained and cleared so as to ensure effective drainage.		nature of the specific infrastructure as well as the location, nature and morphology of the area wherein the infrastructure will be placed. • Additionally, the ECO will need to be responsible for conducting regular site-inspections of the construction, and operation footprint areas, identifying any additional areas that will have to be addressed. • Prompt and appropriate response, form the contractor, following any additional	during construction • To minimise deposition of soil into downslope freshwater resource features. • To minimise damage to vegetation by erosion or deposition • No accelerated overland flow related surface erosion as a result of a loss of vegetation cover • No reduction in the surface area or natural	construction activities and throughout the construction and decommissioning phases.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			recommendations from the ECO.	functionality of natural freshwater resource features as a result of the establishment of infrastructure • No increase in runoff into downslope freshwater resource featurs as a result of construction of project related infrastructure • No increase in runoff into downslope freshwater resource features as a result of road construction	

8.4.6. Transportation

This section deals with the issues relative to transportation during the decommissioning phase.

Table 35: Transportation

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Additional Traffic Generation: Increase in Traffic	• Ensure staff transport is done in the 'off peak' periods and by bus. • Stagger material, component and abnormal loads. • Construction of an on-site concrete batching plant to reduce trips.	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Traffic Generation: Increase of Incidents with pedestrians and livestock	• Reduction in speed of vehicles • Adequate enforcement of the law • Implementation of pedestrian safety initiatives • Regular maintenance of farm fences & access cattle grids	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Additional Traffic Generation: Increase in Dust from gravel roads	• Reduction in the speed of the vehicles. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques. • Implement a road maintenance program under the auspices of the respective transport department. • Construction of an on-site sorter and pressing machine to reduce trips.	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Traffic Generation: Increase in Road Maintenance	• Implement a road maintenance program under the auspices of the respective transport department.	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Additional Abnormal Loads	• Ensure abnormal vehicles travel to and from the proposed development in the 'off peak' periods or stagger delivery. • Adequate enforcement of the law	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them	Continuous

IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
			Ensure the EMPr is adhered to.	
Internal Access Roads: Increase in Dust from gravel roads	• Enforce a maximum speed limit on the development. • Appropriate, timely and high-quality maintenance required in terms of TRH20. • Possible use of approved dust suppressant techniques.	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous
Internal Access Roads: New / Larger Access points	• Adequate road signage according to the SARTSM • Approval from the respective roads department	Holder of the EA/Contractor	All staff members are aware of the EMPr requirements relevant to them Ensure the EMPr is adhered to.	Continuous

8.4.7. Visual

This section deals with the issues relative to visual during the decommissioning phase.

Table 36: Visual

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
Compaction of larger areas can result in soil sterilisation and landscape degradation.	• Post construction, the laydown areas and other construction areas no longer needed for operational management, should be ripped (0.5m depth) to restore compacted topsoil, and then rehabilitated to natural vegetation under the supervision of the rehabilitation specialist.	Project management and EPC with inputs from rehabilitation specialist.	As defined by the rehabilitation specialist.	Soil sterilization does not take place and large degraded areas do not occur, with overall landscape integrity maintained.	Within 1 year of closure.
Old, unused structures have the potential to significantly degrade the landscape character.	• All structures not required for agricultural purposes post-closure should be removed and where possible, recycled or reused. • Building structures should be broken down (including building foundations but excluding turbine foundations). • The rubble should be managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) and deposited at a registered landfill if it cannot be recycled or reused.	Project management and EPC	As defined by the rehabilitation specialist.	The post operation landscape reverts to rural agricultural without landscape degradation created by un-used/ old structures.	Within 1 year of closure.
Old towers have the potential to significantly degrade the	• Should turbine towers be constructed from concrete, the towers need to be demolished, the rubble buried in pits and the area shaped to appear as a natural dome. The pit areas would need to be	Project management and EPC (within 1 year of closure).	As defined by the rehabilitation and demolition specialist.	The post operation landscape reverts to rural agricultural	Within 2 years of closure.

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
landscape character.	rehabilitated to natural veld vegetation with input from a rehabilitation specialist. • Steel towers should be removed from site and managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) and deposited at a registered landfill if it cannot be recycled or reused.			without landscape degradation created by un-used/ old structures.	
Old turbine blades and equipment have the potential to significantly degrade the local landscape character.	• Old turbines and equipment should be removed from site and recycled/ managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) or deposited at a registered landfill if it cannot be recycled or reused.	Project management and EPC (as the need arises).	Old turbines blades are be removed from site and recycled/ managed according to the National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA) or deposited at a registered landfill if it cannot be recycled or reused.	The project area is not littered with old turbine blades resulting in the management area becoming visually degraded.	Within 1 year of closure.
Windblown dust and dust from moving vehicles have the potential to become a significant nuisance factor to local farms around the site and	• Set up a clear management plan with clear accountability structures with set thresholds for triggering of mitigations. • Set up a liaison committee to engage with local farmsteads located within 500m of an access road, with monthly communication with the farm owners on	Project management and EPC (as the issue arises).	Should excessive dust be generated from the movement of vehicles on the roads such that the dust becomes visible to the immediate surrounds, dust-retardant measures	Dust generated on site as well as on the access road to the site, is well managed and does not become a nuisance factor	On-going

ASPECT/ IMPACT	IMPACT MANAGEMENT ACTIONS	RESPONSIBILITY	METHOD	IMPACT MANAGEMENT OUTCOMES	TIMEFRAMES
along the access road.	the effectiveness of the dust management procedures.		should be implemented under authorisation of the EPC.	for the workers or the surrounding farmsteads.	

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: STORMWATER MANAGEMENT PLAN

POFADDER WIND FACILITY 3 (PTY) LTD

POFADDER WIND ENERGY FACILITY 3

Stormwater Management Plan

Issue Date: 27th July 2022
Revision No: 1
Project No: 16876
Document No: SW_P3

Date:	27th July 2022	
Document Title:	**Pofadder Wind Energy Facility 3** Stormwater Management Plan	
Revision Number:	1	
Author:	Merchandt Le Maitre (Pr. Tech Eng.)	
Signature:	 Pr. N°: 2018300094	Date: 27th July 2022
Reviewed:	Richard Hirst (Pr Tech Eng.)	
Signature:	 Pr. N°: 2018300110	Date: 27th July 2022
For:	POFADDER WIND FACILITY 3 (PTY) LTD	

EXECUTIVE SUMMARY

Objective

The Applicant, Pofadder Wind Facility 3 (PTY) LTD, proposes the construction of a wind energy facility (WEF), known as the Pofadder WEF 3 located on a site ±35 km south-east of Pofadder within the Kai !Garib Local Municipality and the Z F Mgcawu District Municipality in the Northern Cape Province. At this stage, the proposed Pofadder WEF 3 will comprise up to thirty-one (31) wind turbines with a maximum total energy generation capacity of up to approximately 248 MW.

The main objective of the 'Stormwater Management Plan' is to determine the impact/s of the proposed development on the immediate and greater area concerning stormwater and to include these findings in the Environmental Impact Assessment (EIA) submission. The assessment will comprise a desktop assessment and include preliminary stormwater-related matters arising during the construction phase, through the Operation & Maintenance Phase, up to and including the decommissioning phase of the development.

The proposed Pofadder Wind Energy Facility 3 forms part of cluster development with two additional developments adjacent to this facility as separate EIA applications: - Pofadder Wind Energy Facility 1 and Pofadder Wind Energy Facility 2. Although this report only focuses on the Pofadder WEF 3, all three developments are considered for this study as they share common boundaries, drainage lines and catchments.

Key Findings

No significant risks concerning the proposed development are foreseen, provided the recommendations below are noted before and during the detailed design and construction stages. Furthermore, several recommendations were highlighted and therefore noted as important.

The proposed development / infrastructure will have a minimal impact on the stormwater quality and quantities post-development (operational phase). This development's construction phase typically generates the highest surface run-off during the construction phases coinciding with the wet season. However, it will be temporary, and impacts can be mitigated and considered nominal. The post-development stormwater flow from the operation phase will have a minimal impact on the immediate environment if adequate stormwater designs are implemented to maintain existing drainage patterns and flows in the catchment.

Many mitigation measures are proposed to accommodate the development and reduce the impact on the surrounding area.

Recommendation

Concerning this report, the associated assessment and the findings made within, it is SiVEST's opinion that the Pofadder WEF 3 will have a nominal impact on the existing stormwater catchment. The project is therefore deemed acceptable from a stormwater perspective, provided the recommendations and mitigation measures in this report are implemented. Hence, Environmental Authorisation (EA) should be granted for the EIA application.

This document should also be read in conjunction with the EMPr. The developer, owner, and professional team must adhere to the requirements and conditions set out in the EMPr.

DECLARATION BY SPECIALIST

I, MERCHANDT LE MAITRE, 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 48 and is punishable in terms of section 24F of the Act.

Signature of Specialist:

Name of Company: SiVEST SA (PTY) Ltd

Date: 27th July 2022

POFADDER WIND FACILITY 3 (PTY) LTD

POFADDER WIND ENERGY FACILITY 3

STORMWATER MANAGEMENT PLAN

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

SiVEST Civil Engineering Division has been appointed by the Pofadder Wind Facility 3 (Pty) Ltd. (hereafter referred to as "Pofadder 3" or "Pofadder WEF 3") to complete a Stormwater Management Plan (SWMP) for the proposed 248 MWac Pofadder Wind Energy Facility 3 and associated grid infrastructure (hereafter referred to as the "proposed facility / facilities"). The facility is situated ±35 km south-east of Pofadder within the Kai !Garib Local Municipality and the Z F Mgcawu District Municipality in the Northern Cape Province.

The proposed facility and associated grid infrastructure between Springbok and Upington will not be located within a Renewable Energy Development Zone (REDZ).

The proposed Pofadder Wind Energy Facility 3 forms part of cluster development with two additional developments adjacent to this facility as separate EIA applications: - Pofadder Wind Energy Facility 1 and Pofadder Wind Energy Facility 2. Although this report only focuses on the Pofadder WEF 3, all three developments are considered for this study as they share common boundaries, drainage lines and catchments.

2 WIND ENERGY FACILITY COMPONENTS

The WEF will consist of the following:

2.1 WEF Components

At this stage, the proposed Pofadder 3 WEF will comprise up to thirty-one (31) wind turbines with a maximum total energy generation capacity of up to approximately 248 MW. In summary, the proposed Pofadder WEF 2 development will include the following components:

- Up to 31 wind turbines, each with a maximum of 8 MW output per turbine, with a maximum total export capacity of ±248 MW. This number, size and output of turbines will be subject to allowable limits in terms of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP).
- Each wind turbine will have a maximum hub height and a rotor diameter of up to approximately 200 m;
- Concrete turbine foundations and turbine hardstands;
- Each turbine will have a circular foundation with a diameter of up to 32 m. The turbine foundation will be placed alongside the 45 m wide hardstand, resulting in an area of about 45 m x 32 m that will be permanently disturbed for the foundation. The combined permanent footprint for the turbines will be approximately 4.4 ha.
- Each turbine will have a crane hardstand of approximately 70 m x 45 m. The permanent footprint for turbine crane hardstands will be ±9 ha.
- Each turbine will have a blade hardstand of approximately 80 m x 45 m (3 600 m2). The combined permanent footprint for blade hardstands will be ±10 ha.
- One (1) new 33/132 kV on-site substation occupies an area of approximately 1.6 ha.
- The wind turbines will be connected to the proposed on-site substation via medium voltage (33 kV) underground cables, mainly running alongside the access roads. Where burying of cables is not possible due to technical, geological, environmental or topographical constraints, cables will be overhead via 33 kV monopoles.
- The main access road will be between 8 – 12 m wide (to allow vehicles to pass).

- Internal roads with a width of 6 – 8 m will provide access to each wind turbine. Existing farm roads will be upgraded and used wherever possible, although new site roads will be constructed where necessary.
- A 12 m wide corridor may be temporarily impacted during construction and rehabilitated to a 6 m wide corridor after construction. The internal gravel roads will have a 6 – 8 m wide surface and a 12m wide road clearance during construction. Additional space might be required for cut and fill, side drains and other stormwater control measures, turning areas and vertical and horizontal turning radii to ensure the safe delivery of the turbine components.
- Pofadder WEF 3 will have a total road network of approximately 48 km.
- One (1) construction laydown / staging area of up to approximately 7 ha (to be rehabilitated following construction). It should be noted that no on-site labour camps will be required to house workers overnight as all workers will be accommodated in the nearby towns and transported daily to the site (by bus);
- The gatehouse and security house will occupy an area of up to 0.5 ha.
- Battery Energy Storage System (BESS) of approximately 3.6 ha.
- One (1) permanent Operation and Maintenance (O&M) building (including offices, warehouses, workshops, canteen, visitors centre and staff lockers) occupying an area of up to 1 ha;
- The temporary establishment of a site camp and concrete batching plant occupying an area of up to 1.6 ha.
- Galvanised palisade fencing to be used at the substations with the maximum height of the fencing to be up to 3.5 m.
- Water will be sourced from either the Local Municipality, supplied from a private contractor and trucked in, from existing boreholes within the application site or from a new borehole if none of these options are available.

2.2 Grid Connection Components

In order to evacuate the energy generated by the WEF's to supplement the national grid, Pofadder Grid (Pty) Ltd is proposing two grid connection alternatives which will be assessed in a separate Integrated Grid Basic Assessment Reports (BAR).

3 OBJECTIVE & SCOPE OF WORK

The study's main objective is to develop a conceptual stormwater management plan for the proposed development during the operation & maintenance phase. To achieve this objective, the following will be assessed and discussed under their relevant headings in this report: -

- Climate
- Surface Hydrology
- Development Stormwater Management
- Development run-off Calculations
- Conclusions & Recommendations

The scope of work consist of the following:

a) A site investigation (Completed on 15th July 2022).

b) Consultations with the relevant authorities and / or stakeholders.

c) Extract the climate of the area from sources commonly available

d) Desktop analysis of the existing surface hydrology

e) Evaluate the impact of the proposed development on the existing catchment and propose a suitable SWMP.

f) Conclude and propose possible mitigation measures.

g) Seasonal impacts affect this assessment.

3.1 Legal Requirement & Guidelines

Key legal requirements and guidelines for the proposed facilities are as follows:

- Government Notice 509 (GN509) as published in Government Gazette 40229 of 2016 and refers to the National Water Act, 1998 (Act No. 36 of 1998)
- National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA)
- National Water Act, 1998 (Act No 36 of 1998) (NWA)

4 SPECIALIST CREDENTIALS

Merchandt Le Maitre from SiVEST Consulting Engineers compiled this Stormwater Management Plan. He has a B Tech (Baccalaureus Technologiae) in Civil Engineering with over 17 years of experience, with 12 years in renewable energy. His extensive experience in the different facets of Civil Engineering means he can advise clients in the renewable energy sector in; geotechnical engineering, topographical studies, stormwater management, water demand, transportation studies, access / layout designs and glint & glare assessments. A full Curriculum Vitae is included in 'Appendix A.

Table 4.1 Specialist Credentials & Experience

Company	SiVEST (Pty) Ltd
Contact Details	merchandtm@sivest.co.za
Qualifications	B Tech (Baccalaureus Technologiae) in Civil Engineering
Professional Registrations & Memberships	• Pr. Tech Eng – Engineering Council of South Africa • MSAICE – Member of South African Institute of Civil Engineers • SAWEA – South African Wind Energy Association
Expertise to carry out the Stormwater Management Plan	• Dyansons Klip 5 • De Aar Solar • Droogfontein Solar • Mierdam Solar • Prieska PV • Hoekplaas PV • Noupoort WEF • Copperton PV • Klipgats PV • Euphorbia PV • Verbena PV • Hillardia PV

5 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations are to be noted:

- The analysis is based on the information provided at the time by Pofadder Wind Facility 3 and its representatives.
- Digital Terrain Model: 25m DEM from NGI (2014) & 2m DEM from GeoSmart (2016:2919BA, 2919BB, 2919BC & 2919BD)
- Technical Specifications for the facility are:

Table 5.1 Technical Specification for Pofadder WEF 3

Technical Component	Dimensions
Number of Turbines	Maximum of 31
Capacity	≤ 248 MWac
Hub Height	≤ 200 m
Rotor Diameter	≤ 200 m
Construction Period (assumed)	± 24 months (TBC)
Expected Lifespan	20 - 25 years (TBC)
Road Width	Up to 8 m
Length of Internal Roads	±48 km

- Some of the figures provided are indicative as many of the components are still at the design stage and will only be confirmed closer to the construction time.

6 PROJECT DESCRIPTION

6.1 Locality

Pofadder WEF 3 and associated infrastructure is located ±35 km south-east of Pofadder in the Northern Cape Province. The facility is ±22 km from Road R358 regional road (MR0736) and 29 km from Road DR2986 to the N14 Freeway between Springbok and Upington in the Kai !Garib Local Municipality and the Z F Mgcawu District Municipality as indicated in **Figure 6:1**.

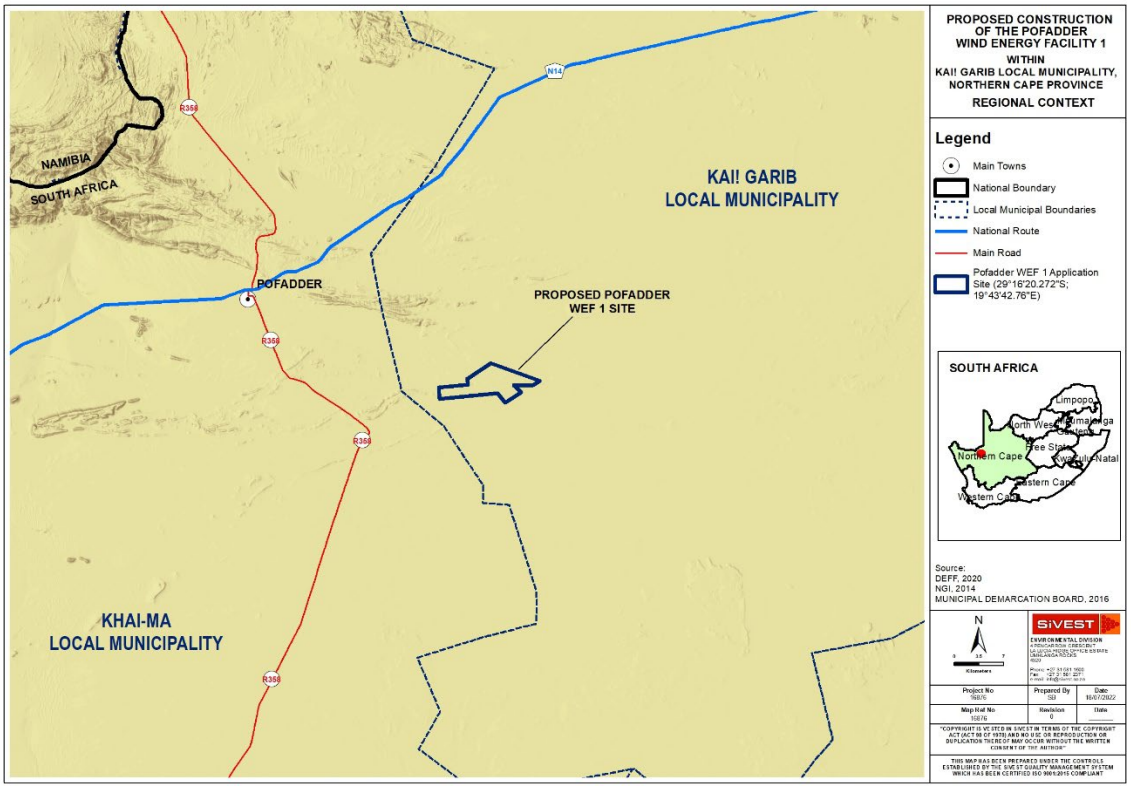


Figure 6:1 Pofadder WEF - Regional Context

The WEF will be located on the following properties (Refer to **Figure 6:2**):

- Remaining Extent of the Farm Ganna-Poort No. 202
- Remaining Extent of the Farm Lovedale No. 201
- Portion 3 of the Farm Sand-Gat No. 150

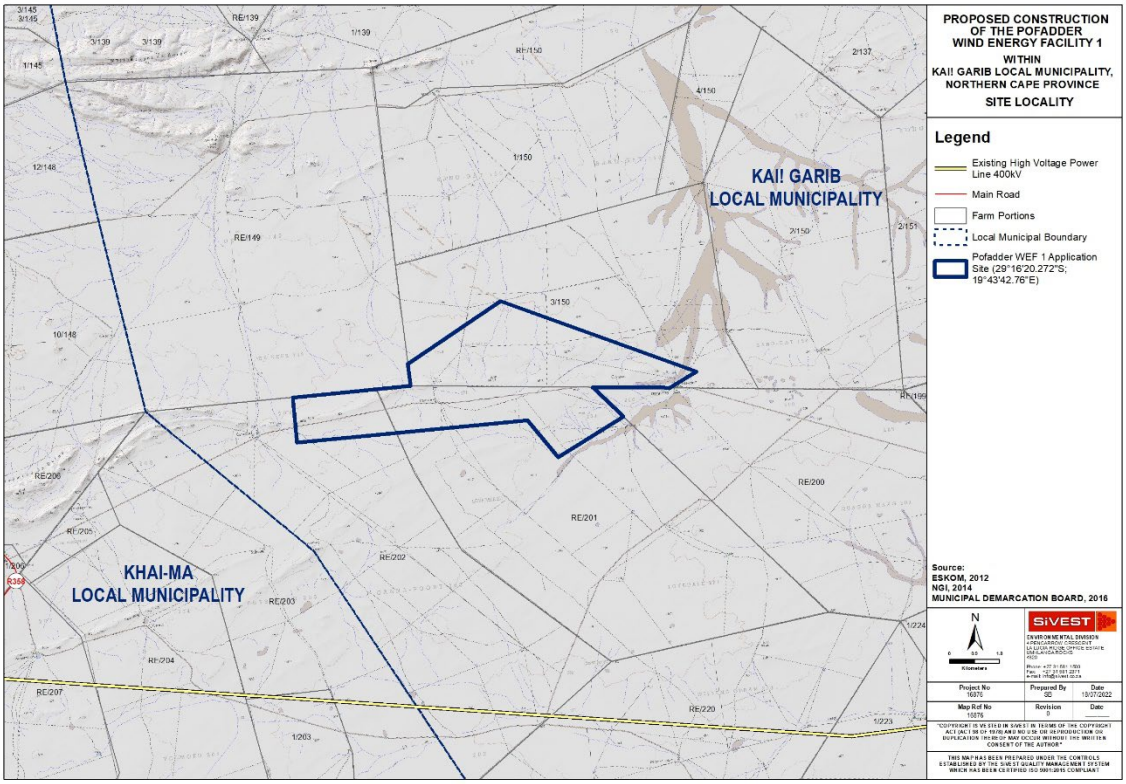


Figure 6:2 Pofadder WEF - Site Locality

7 GEOTECHNICAL STUDY

7.1 Palaeontology Impact Assessment

A comprehensive Palaeontology Impact Assessment[1] for the proposed development was completed in February 2022 by Prof. Marion Bamford on the proposed sites indicated in **Section 6**.

A summary extract from the Palaeontological Impact Assessment confirms the site comprises the following geological context. Refer to **Figure 7:1** and **Table 7:1**:

[1] Bramford, Prof M (2022). Paleontology. Pofadder WEFs 1,2,3. Pofadder Wind Facility 3 (Pty) Ltd

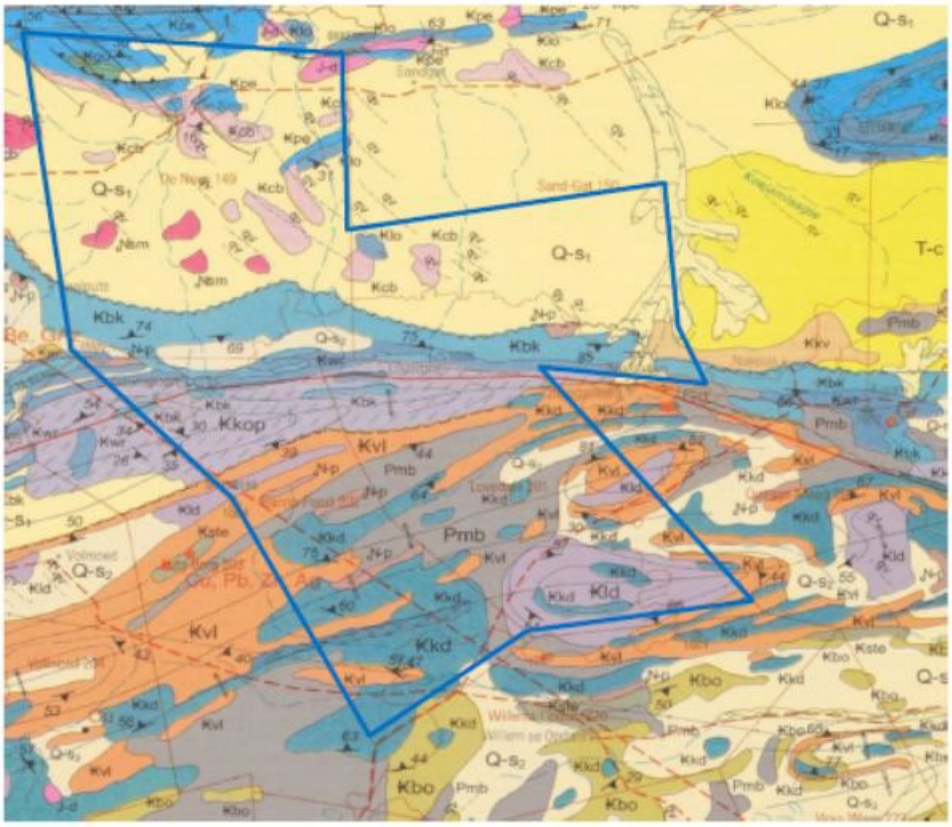


Figure 7:1 Geological Map of Proposed Development Pofadder WEF 1,2 & 3

Abbreviations of the rock types are explained in **Table 7:1** below:

Table 7.1 Explanation of **Figure 7:1** and Approximate Ages

Symbol	Group / Formation	Lithology	Approximate Age
Qs-1	Quaternary Sands	Re windblown sands & Dunes	Quaternary, ca 2.5 Ma to present
Qs-2	Quaternary Sands	Sand, Scree, Rubble, Sandy Soil	
T-c	Tertiary Calcrete	Calcrete	Tertiary, ca 65 Ma to 2.5 Ma
Jd	Jurassic Dyke	Dolerite	Ca 183 Ma
Pmb	Mbizane Formation Dwyka Group Karoo Supergroup	Diamictite, Tillites, Subordinate Sandstone and Mudstone	Late Carboniferous to Early Permian. Ca 300 – 290 Ma
Kbk	Brulkolk Formation Bushmanland Group Namaqua – Natal Suite	Gneiss	>1200 Ma
Kvl	Voelmoed Formation Kamiesberg Group	Quartzite, Schist, Ironstone	Ca 1600 Ma

Symbol	Group / Formation	Lithology	Approximate Age
	Namaqua – Natal Suite		
Kkd	Kraandraai Formation Kamiesberg Group Namaqua – Natal Suite	Gniess	Ca 1600 Ma
Kld	Lekkerdrink Formation Gladkop Group Namaqua – Natal Suite	Gniess	2050-1700 Ma
Kkp	Koeipoort Formation Gladkop Metamorphic Suite Namaqua – Natal Suite	Gniess	2050-1700 Ma

In summary, the facility will have the following typical soil profile: -

- *Tertiary calcretes, quaternary sands (red & grey) and alluvium covering the site*
- *The metamorphic rock of the Namaqua – Natal belts underlies the Karoo sediments.*

Material excavation (soils and sand) is expected to be soft in the upper layers of alluvium / sand with *intermediate to hard* excavation techniques below in the metamorphic rock.

We recommend that a comprehensive Geotechnical Report be carried out to form part of the detailed design stage and refinement of the SWMP.

8 CLIMATE

8.1 Climate Classification[2]

Pofadder WEF 2 and associated infrastructure is located ±35 km south-east of Pofadder in the Northern Cape Province. Referring to the Klöppen-Geiger climate classification system, the Northern Cape Province has a variety of climates and is predominantly dominated by hot desert climates (type 'BWh') and cold semi-arid climates (type 'BSk'). The Pofadder area is classified as a hot desert climate (type 'BWh').

8.2 Average Temperature[3]

The Average Maximum temperatures range between 18.3° and 34.3°C. January is the year's warmest month, with an average high temperature of 34.3°C. July is the coldest month of the year with an average low temperature of 7.4°C. Refer to **Figure 8:1** below.

[2] en-climate-data
[3] Weather Atlas

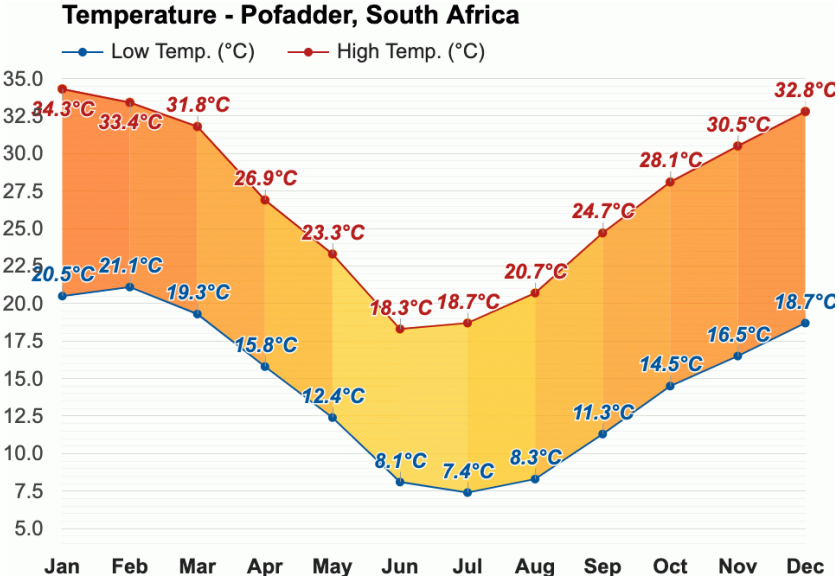


Figure 8:1 Average Temperature – Pofadder, South Africa

8.3 Mean Annual Precipitation (MAP)[4]

As mentioned in **Section 8.1** above, the Pofadder region is a hot desert climate with an annual average rainfall of ±45 mm, mainly between December and April. February is, on average, the wettest month of the year, with ±12 mm accumulated for the month. The driest months with the least amount of rainfall of ±1mm accumulated for the month is the month of July, August and September. Refer to **Figure 8:2** below.

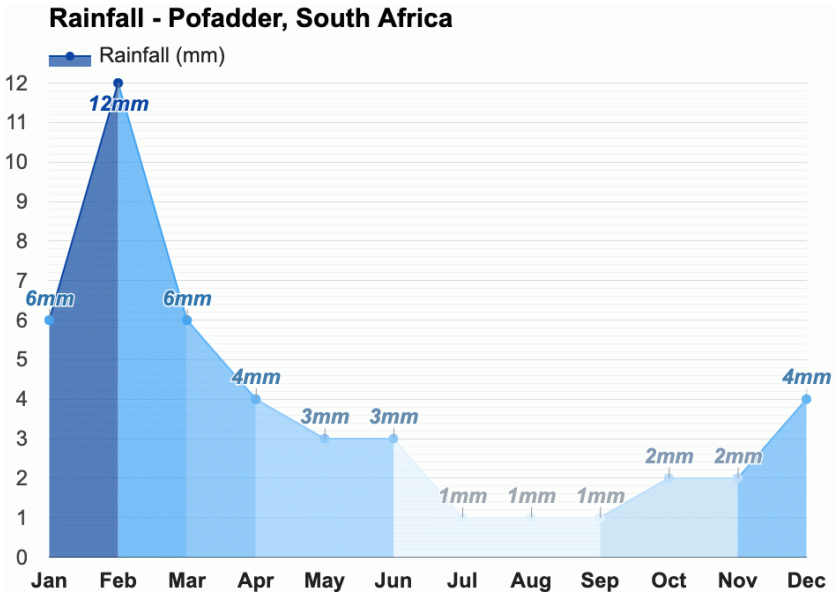


Figure 8:2 Average Rainfall – Pofadder, South Africa

The average rainfall days per annum is ±29 days, with February having the highest number of rainfall days (5.1 days). The month with the least rainfall days is November (0.8 days). Refer to **Figure 8.3** below.

[4] Weather Atlas

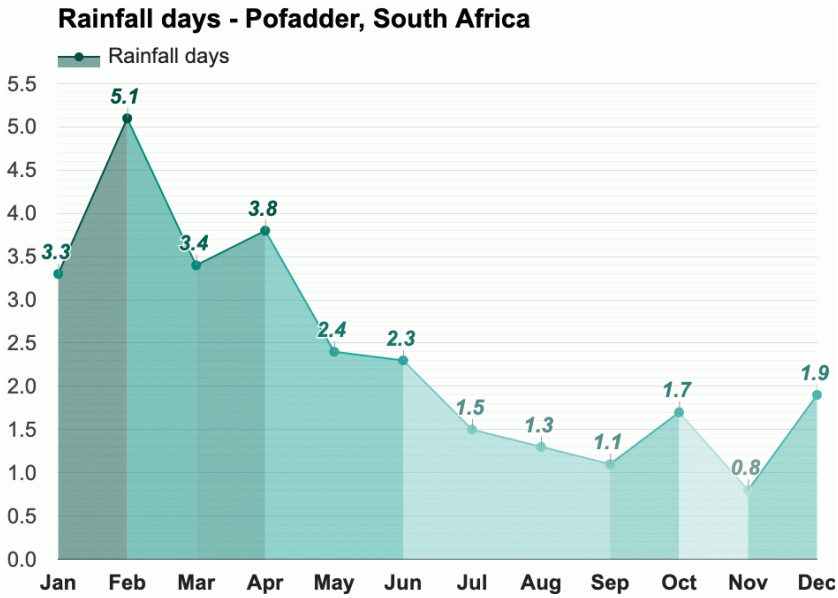


Figure 8:3 Average Rainfall Days – Pofadder, South Africa

8.4 Humidity[5]

The region's relative humidity ranges from a maximum of 46% in June to a minimum of 25% in November.

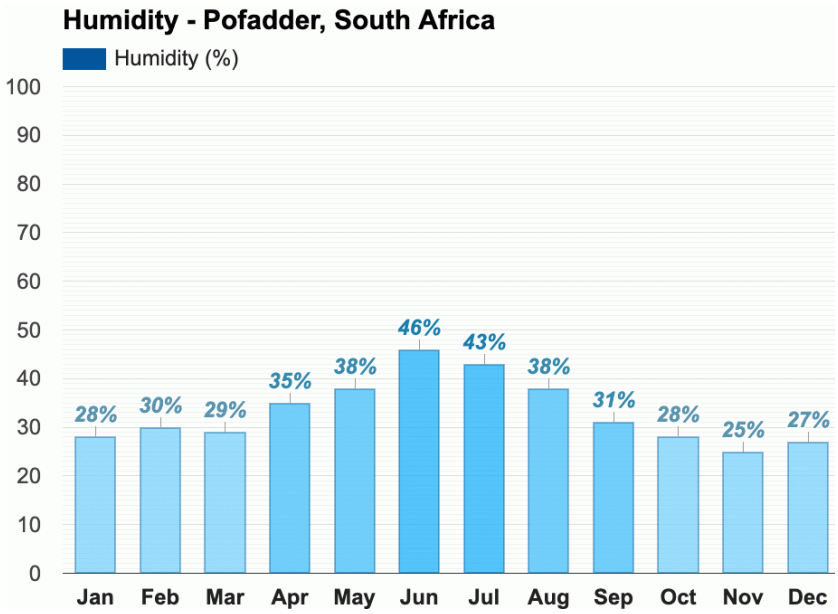


Figure 8:4 Average Relative Humidity – Pofadder, South Africa

8.5 Design Rainfall

Design Rainfall Estimation[6] software was used to obtain the rainfall data (tabulated below in **Table 8:1**) required for the run-off calculations.

[5] Weather Atlas

[6] *Design Rainfall Estimation in South Africa Version 3 developed by MJ Gorven, JC Smithers and RE Schulze*

Table 8.1 Pofadder WEF 2 Design Rainfall Data

Return Period		2yr	5yr	10yr	20yr	50yr	100yr	200yr
Duration		Rainfall Depth (mm)						
5	min	5.80	9.20	11.60	14.10	17.80	20.70	24.00
10	min	8.60	13.50	17.10	20.90	26.20	30.60	35.30
15	min	10.80	16.90	21.50	26.20	32.90	38.40	44.30
30	min	13.20	20.70	26.20	32.00	40.20	46.90	54.10
45	min	14.80	23.30	29.50	35.90	45.10	52.70	60.90
60	min	16.10	25.30	32.00	39.10	49.00	57.30	66.10
90	min	18.10	28.40	36.00	43.90	55.10	64.40	74.30
120	min	19.70	30.90	39.10	47.70	59.90	70.00	80.80
240	min	22.40	35.10	44.50	54.30	68.20	79.60	91.90
360	min	24.10	37.90	48.00	58.50	73.50	85.80	99.10
480	min	25.50	40.00	50.60	61.80	77.50	90.60	104.60
600	min	26.60	41.70	52.80	64.40	80.80	94.40	109.00
720	min	27.50	43.10	54.60	66.60	83.60	97.70	112.80
960	min	29.00	45.50	57.60	70.30	88.20	103.00	119.00
1200	min	30.20	47.40	60.00	73.20	92.00	107.40	124.00
1440	min	31.30	49.00	62.10	75.80	95.20	111.10	128.30
1	day	25.70	40.30	51.10	62.30	78.20	91.40	105.50
2	days	30.00	47.10	59.70	72.80	91.40	106.80	123.30
3	days	32.90	51.60	65.40	79.80	100.20	117.00	135.10
4	days	34.30	53.80	68.10	83.10	104.40	121.00	140.80
5	days	35.40	55.60	70.40	85.90	107.80	125.90	145.40
6	days	36.40	57.10	72.20	88.10	110.70	129.30	149.20
7	days	37.20	58.30	73.90	90.10	113.20	132.20	152.60

9 SURFACE HYDROLOGY

9.1 Drainage of Catchment

9.1.1 Primary Catchment

The site falls within the 'Orange River' drainage catchment (Primary Catchment 'D'), covering an area of ±973 000 km² (including the Vaal River catchment). To the north, the Orange River catchment extends into Namibia, to the east, the Drakensburg mountains, to the south, the Western Cape and Eastern Cape provincial boundaries to the south, ultimately flowing westwards between South Africa and Namibia towards the Atlantic Ocean, shown in **Figure 9.1** below.

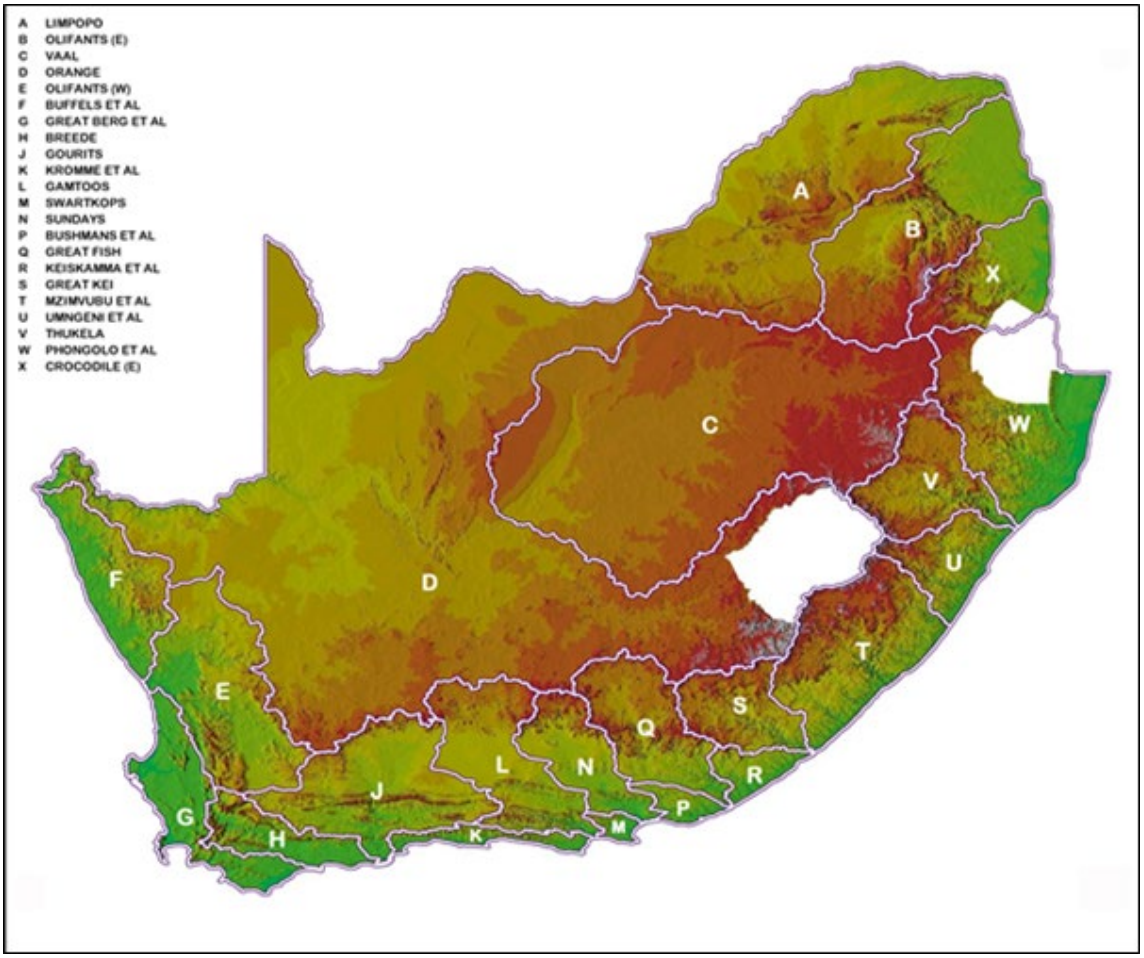


Figure 9:1 Department of Water and Sanitation (DWS) – Primary Catchments

9.1.2 Quaternary Catchment

The proposed facility is located in Quaternary Catchment D81F, D81G and D53G. Catchment D81F and D81G form part of the upper reaches of the Kaboep Rivier, and catchment D53G forms part of the upper reaches of the Sout River, that then ultimately flows into the lower reaches of the Orange River.

10 STORMWATER MANAGEMENT

10.1 Impact of Development[7]

Development is defined as the process of modification or evolution which historically involves the improvement / construction of buildings and civil infrastructure. A new development leads to an alteration in the hydraulic properties of the subjected area, changing surface run-off properties into pervious or impervious layers and subsequently increasing the surface run-off and altering inundation areas. Common historical stormwater infrastructure and surfaces are constructed to manage the run-off more efficiently, resulting in shorter catchment response times and increased peak flows.

As a result of the proposed development, stormwater management is key to reducing the negative impacts and keeping the receiving environment in its natural state. The management is achieved with

[7] *Guidelines for Human Settlement Planning and Design compiled by CSIR Building and Construction Technology*

adequate mitigation measures, per the applicable stormwater drainage standards and policies, to ensure the development can be accommodated within the receiving environment.

10.2 The Purpose of Stormwater Management[8]

The purpose of stormwater management is based on several aspects: health and safety, quality of life, and water conservation. These aspects are briefly described below:

- Directing and discharging the stormwater allows the public to protect their health, welfare, and safety. It also provides for the protection of property from flood hazards.
- Enhance the quality of life in communities that are affected.
- To grasp the opportunity to conserve water for beneficial public uses.
- To safeguard the natural environment.
- The balance of economic development and the necessity for a sustainable environment; and
- Optimum stormwater management methodologies are adopted so that the primary beneficiaries pay as per their possible gains.

10.3 Stormwater Management Policies & Design Guidelines

Urban Stormwater Management policies require that the post-development run-off from an area for storms of similar recurrence intervals may not exceed the run-off generated under the pre-development condition. For rural developments, the emphasis should focus more on the detrimental effect to the immediate environment concerning the control of water velocity and erosion rather than minor increases between the pre and post-development flow volumes.

This study area falls within Kai !Garib Local Municipality and the Z F Mgcawu District Municipality, and, to our knowledge, specific policies, design guidelines, and standards are not available. Therefore, we recommend that the stormwater drainage system refers to the "Red Book[9]" and the "Drainage Manual[10]".

10.4 Stormwater Management Philosophy

The Stormwater Management Philosophy for the proposed development urges the developer, the professional teams, and contractors to achieve the following:

- Always maintain adequate ground cover in all areas to reduce the risk of erosion by wind, water and all forms of traffic.
- Prevent concentration of stormwater flow at any point where the ground is susceptible to erosion. Where unavoidable, adequate protection of the ground must be provided.
- Reduce concentrated stormwater flows as much as possible by providing effective attenuation measures.
- Ensure the development does not increase the stormwater flow rate above what the natural ground can safely accommodate.
- Ensure that all stormwater control structures are constructed safely and aesthetically pleasing in keeping with the overall development.
- Prevent pollution of waterways and water features.
- Contain soil erosion by constructing protective works to trap sediment at appropriate locations. This protection applies particularly during construction; and

[8] *Guidelines for Human Settlement Planning and Design compiled by CSIR Building and Construction Technology*
[9] *Guidelines for Human Settlement Planning and Design compiled by CSIR Building and Construction Technology*
[10] *Drainage Manual 6th Edition, Published by The South African National Roads Agency SOC Ltd, 2013*

- Avoid situations where natural or artificial slopes become saturated and unstable during and after construction.

10.5 Stormwater Management Drainage System

Stormwater drainage systems can be seen as dual systems incorporating minor and major storm return periods.

The minor stormwater drainage system caters for frequent storm events. Storms are of a minor nature, usually including stormwater run-off with frequent return periods such as 2yr, 5yr and / or 10 years.

The major stormwater drainage system caters for severe, infrequent storm events supported by the minor drainage system. Storms of a major nature include less frequent return periods such as 20 years and more.

11 PRE-DEVELOPMENT RUN-OFF CHARACTERISTICS

11.1 Catchment Description

The development falls within eight (8) minor catchment areas, forming part of the three (3) quaternary catchments mentioned in **Section 9.** The development's catchment areas vary in size ranging from 6.1 km^2 to 241 km^2 and flat (<1%). The development catchment shows no evidence of clearly defined watercourses with overland sheet flow occurring in multiple directions through the respective catchments.

The development is located in a rural area of the Northern Cape Province where sheep farming predominantly occurs. Referring to the SANBI Vegetation Map (2012), the vegetation in the area is described as 'Bushmanland Arid Grassland'.

The proposed WEF development is located away from any streams, rivers or floodplains and, therefore, will not be impacted by a flood line.

11.2 Site Topography

Extensive, irregular plains cover the area on a slightly sloping plateau. All three developments combined have a natural ridge line to the north, dividing the development into two catchments, one flowing north and the other south-east. The drainage lines to both catchments ultimately join up again in the Orange River. As mentioned above, no defined drainage lines run through the proposed developments; however, more prominent drainage lines, namely the Kaboep Rivier, Nousrivier, Brabeesrivier and Hartbeesrivier are located within the Quaternary catchments outside the proposed developable area. (Refer to **Figure 11:1** below).

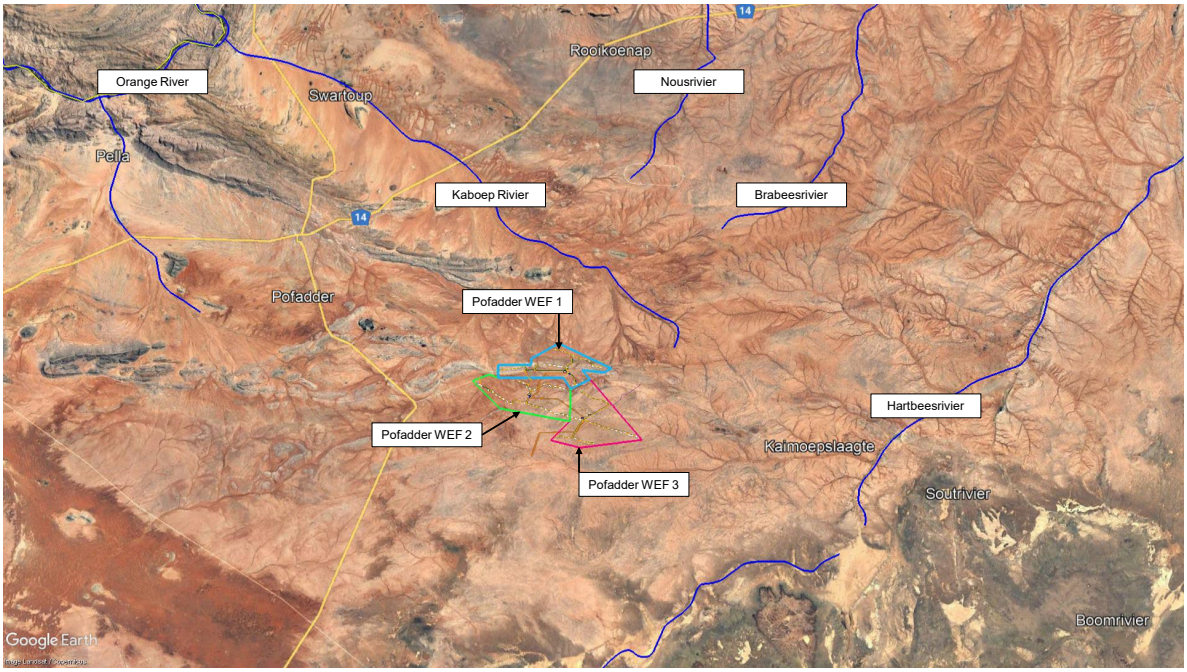


Figure 11:1 Larger Drainage Lines (Blue) outside the development

Please note that detailed contour data was not available for the broader study area. Therefore, the National Geo-Spatial Information (NGI) 's 25 m DEM was sourced to provide terrain data for this area.

Contours were generated from the Digital Elevation Model (DEM) at 2.5 m intervals using ESRI's 3D Analyst Extension for ArcGIS. Therefore, we recommend that an updated and detailed SWMP be completed once a more accurate Digital Terrain Model (DTM) of the site is available

From **Figure 11:2** and **Figure 11:3** below, we confirm a natural slope of less than 3% for catchment areas forming part of the development with the following percentages:

- Wetlands & Pans (<3%) – 95%
- Flat Areas (3% to 10% slope) – 5%
- Hilly Areas (10% to 30% slope) – 0%
- Steep Areas (>30% slope) – 0%

11.3 Site Vegetation

The vegetation in this area is made up of sparsely vegetated plains, dominated by white grasses giving the vegetation a semidesert 'steppe' character. In years of abundant rainfall, more vegetation and longer grass can be expected.

Figure 11:2 Current Site Vegetation (2022 - High Rainfall)

Figure 11:3 Typical Drainage Lines

Figure 11:2 and **Figure 11:3** indicates the typical ground cover on the site, with the following percentage splits applicable: -

- Thick Bush & Plantations – 0%
- Light Bush & Farmlands – 0%
- Grasslands – 50%
- No Vegetation – 50%

11.4 Geotechnical Conditions

Concerning **Section 7** – **Geotechnical Study** above, soil conditions have been assumed as follows: -

- Very Permeable – 20%
- Permeable – 70%
- Semi-permeable – 10%
- Impermeable – 0%

11.5 Hardstand Areas

The property currently has no areas of hardstand: -

- Hardstand Areas – 0%

11.6 Run-Off Coefficient

Based on *Table 3C.1* of the *Drainage Manual – 6th Edition*[11], the following run-off coefficients have been assigned for this calculation: -

Table 11.1 Pre-Development Run-Off Coefficient

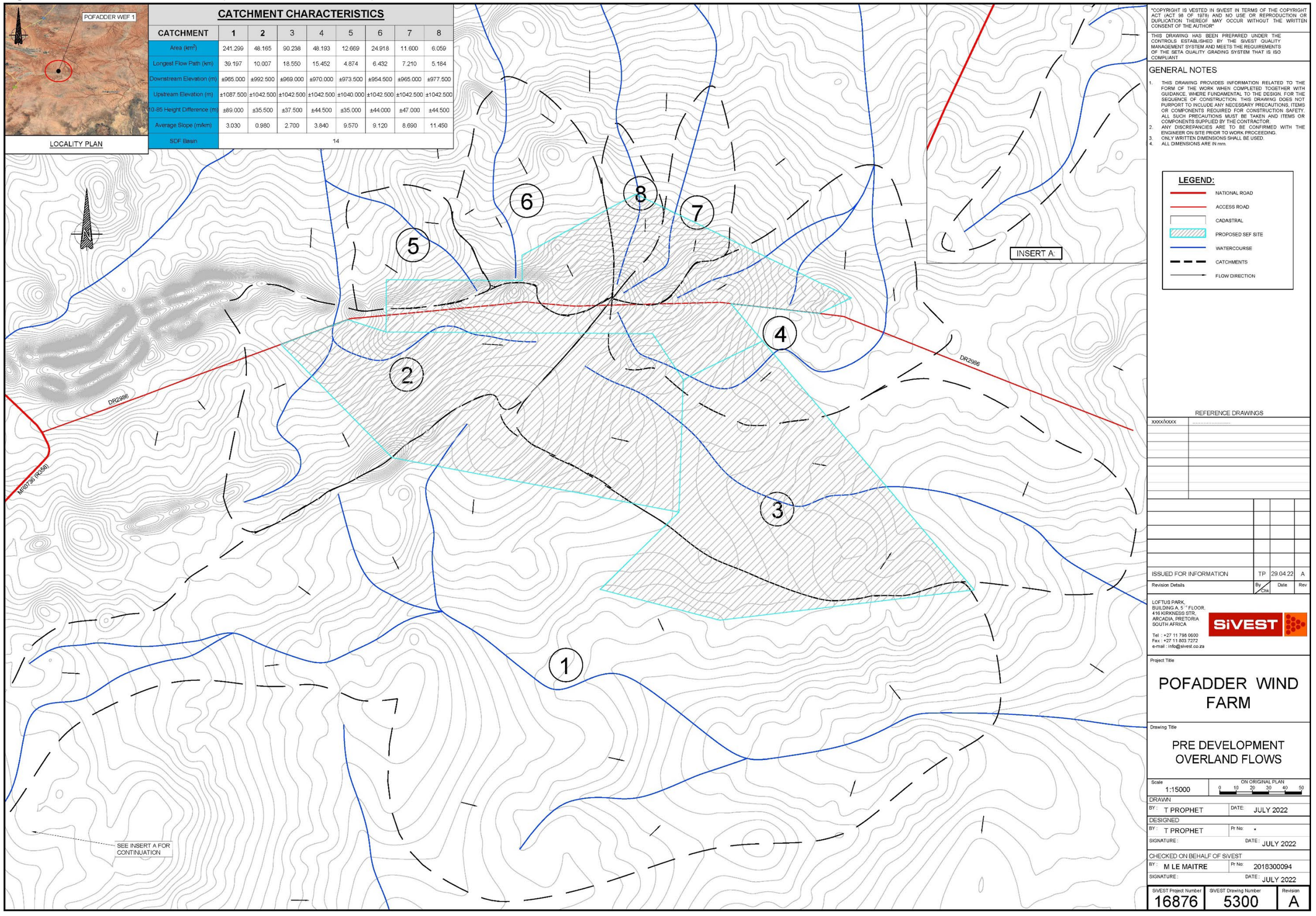
Surface Slope - Wetlands & Pans	**0,03**	**95,0%**	0,029
Surface Slope - Flat Areas (3-10%)	**0,08**	**5,0%**	0,004
Surface Slope - Hilly Areas (10-30%)	**0,16**	**0,0%**	0,000
Surface Slope - Steep Areas (>30%)	**0,26**	**0,0%**	0,000
Soil - Very Permeable	**0,04**	**20,0%**	0,008
Soil - Permeable	**0,08**	**70,0%**	0,056
Soil - Semi-Permeable	**0,16**	**10,0%**	0,016
Soil - Impermeable	**0,26**	**0,0%**	0,000
Vegetation - Thick Bush / Plantations	**0,04**	**0,0%**	0,000
Vegetation - Light Bush / Farmlands	**0,11**	**0,0%**	0,000
Vegetation - Grasslands	**0,21**	**50,0%**	0,105
Vegetation - No Vegetation	**0,28**	**50,0%**	0,140
			0,358

Based on the preceding table, we calculated a **PRE-DEVELOPMENT Run-Off Coefficient** of **0.358**.

It should also be noted that no 'Area Reduction Factor' has been applied as we believe the drainage catchment areas are too small.

[11] *Drainage Manual 6th Edition, Published by The South African National Roads Agency SOC Ltd, 2013*

Figure 11:4 Pofadder WEF 3 Development Area– Pre-Development Overland Flow



12 POST-DEVELOPMENT RUN-OFF CHARACTERISTICS

12.1 Site Development Plan (SDP)

Concerning the SDP, the proposed Pofadder WEF 3 layout will consist of a series of 31 turbines along with an access road, internal roads, substation, battery energy storage system (BESS), turbine laydown areas, auxiliary buildings, and external access roads etc. The total development area will cover a combined area of ±13 500 ha. In contrast, Pofadder WEF 1 will only cover ±3 600 ha, Pofadder WEF 2 ±4 800 ha and Pofadder WEF 3 ±5 100 ha.

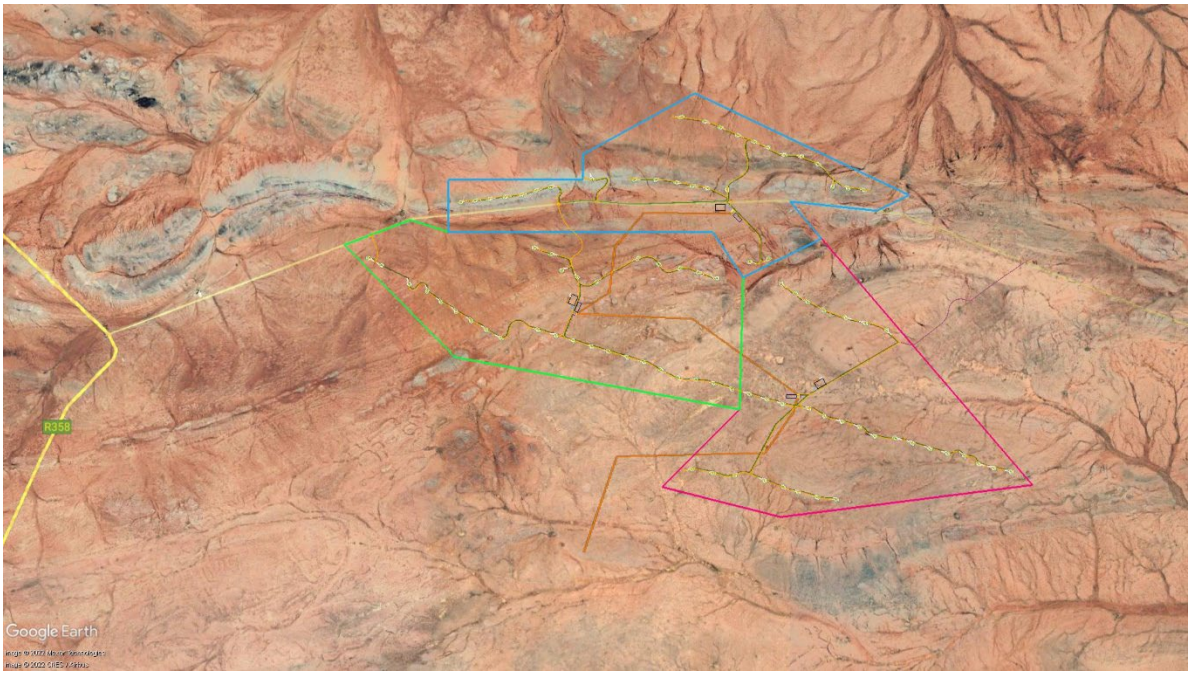


Figure 12:1 Pofadder WEF 3 SDP (Indicated in blue)

12.2 Site Topography

Bulk platforms, roads and buildings will be constructed at less steeper slopes than the natural topography.

The following percentage splits are applicable: -

- Flatter Areas (0% to 3% slope) – 95%
- Flat Areas (3% to 10% slope) – 5%
- Hilly Areas (10% to 30% slope) – 0%
- Steep Areas (>30% slope) – 0%

12.3 Geotechnical Conditions

Concerning **Section 7 – Geotechnical Study**, it has been assumed that the percentages used in the 'pre-development' run-off coefficient will remain unchanged for the 'post-development' as there would be little or no effect from the facility on the existing ground conditions.

The following percentages will be used: -

- Very Permeable – 20%
- Permeable – 70%

- Semi-permeable – 10%
- Impermeable – 0%

12.4 Developed Components

Once developed, it has been confirmed that the property will have no significant impervious surfaces in the form of surfaced roads or buildings other than the natural ground cover. However, gravel roads and platforms will be constructed across the site to provide access to the WTG's. Gravel roads will have frequent discharge points to reduce stormwater concentrations and ultimately minimise the development impact.

A slight increase in the area of imperviousness has therefore been assumed.

- Gravel Roads & Platforms – 94%
- WEF Facility – 6%
- Grasslands – 0%
- No Vegetation – 0%

12.5 Run-Off Coefficient

Based on *Table 3C.1* of the *Drainage Manual – 6th Edition*[12], the following run-off coefficients percentages have been assigned for this calculation: -

Table 12.1 Post-Development Run-Off Coefficient

UN-DEVELOPED COMPONENT: Run-off Percentages			
Surface Slope - Wetlands & Pans	**0,03**	**95,0%**	0,029
Surface Slope - Flat Areas (3-10%)	**0,08**	**5,0%**	0,004
Surface Slope - Hilly Areas (10-30%)	**0,16**	**0,0%**	0,000
Surface Slope - Steep Areas (>30%)	**0,26**	**0,0%**	0,000
Soil - Very Permeable	**0,04**	**20,0%**	0,008
Soil - Permeable	**0,08**	**70,0%**	0,056
Soil - Semi-Permeable	**0,16**	**10,0%**	0,016
Soil - Impermeable	**0,26**	**0,0%**	0,000
Vegetation - Thick Bush / Plantations	**0,04**	**0,0%**	0,000
Vegetation - Light Bush / Farmlands	**0,11**	**0,0%**	0,000
Vegetation - Grasslands	**0,21**	**50,0%**	0,105
Vegetation - No Vegetation	**0,28**	**50,0%**	0,140
			0,358
DEVELOPED COMPONENT: Run-off Percentages			
Surface Slope - Wetlands & Pans	**0,03**	**100,0%**	0,030
Surface Slope - Flat Areas (3-10%)	**0,08**	**0,0%**	0,000
Surface Slope - Hilly Areas (10-30%)	**0,16**	**0,0%**	0,000
Surface Slope - Steep Areas (>30%)	**0,26**	**0,0%**	0,000
Soil - Very Permeable	**0,04**	**20,0%**	0,008
Soil - Permeable	**0,08**	**70,0%**	0,056
Soil - Semi-Permeable	**0,16**	**10,0%**	0,016
Soil - Impermeable	**0,26**	**0,0%**	0,000

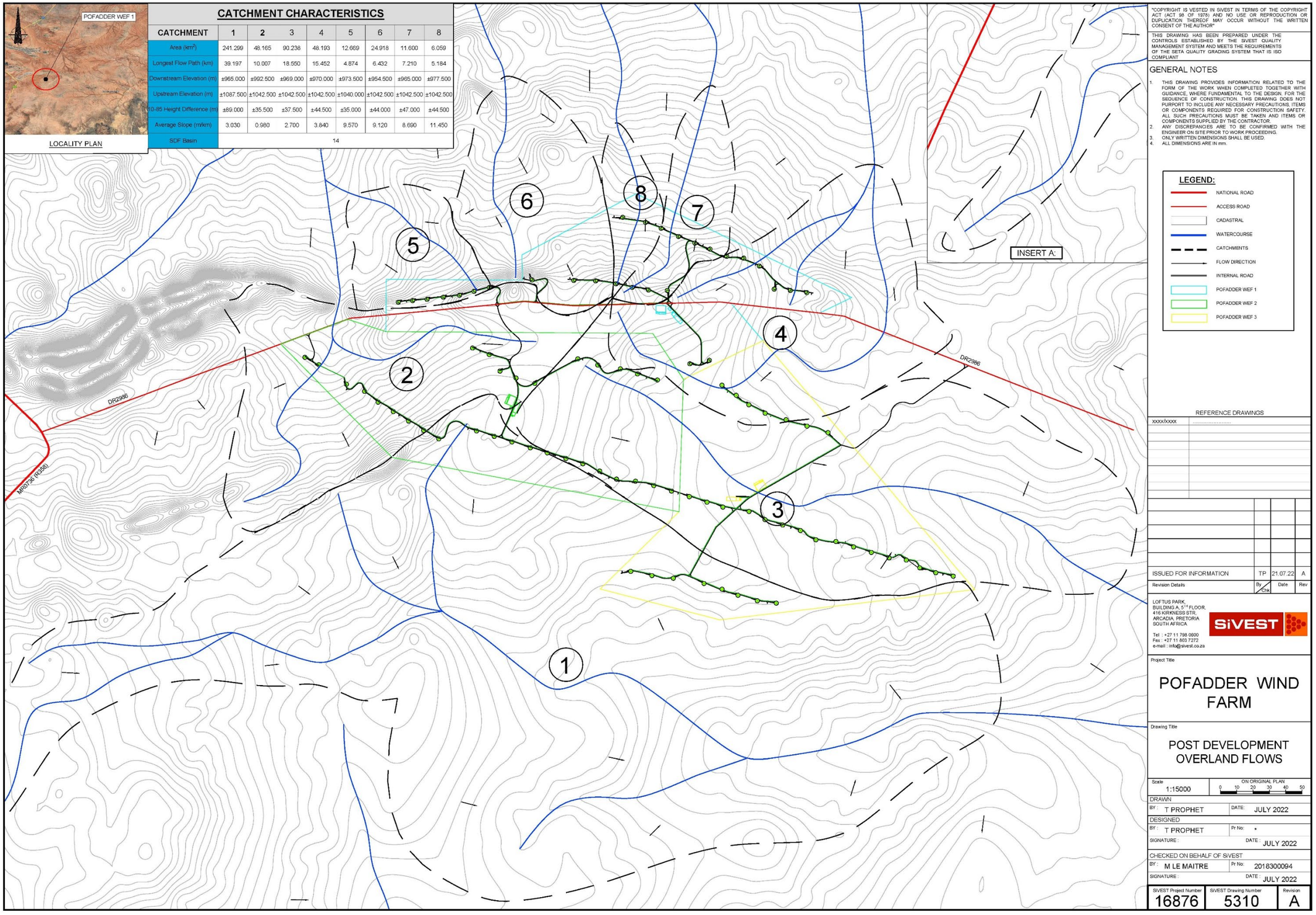
[12] *Drainage Manual 6th Edition, Published by The South African National Roads Agency SOC Ltd, 2013*

Gravel Roads & Platforms	**0,50**	**94,0%**	0,470
WEF Facilities	**1,00**	**6,0%**	0,060
Vegetation - Grasslands	**0,21**	**0,0%**	0,000
Vegetation - No Vegetation	**0,28**	**0,0%**	0,000
			0,640

RUN-OFF COEFFICIENT: Without DOLOMITE		
Percentage **UN-DEVELOPED**	**99,0%**	**0,354**
Percentage **DEVELOPED**	**1,0%**	**0,006**
TOTAL Run-Off coefficient		**0,360**

Based on the preceding table, we calculated a factored **POST-DEVELOPMENT Run-Off Coefficient** of **0.360.**

Figure 12:2 Pofadder WEF 3 – Post-Development Overland Flow



13 SURFACE MODELLING

13.1 Modelling Selection

EMPIRICAL and STATISTICAL METHODS were not considered for this project as insufficient hydrological records and observed points were available for the area. Therefore, a deterministic method has thus been selected to determine the results.

This method comprises mainly manual, graphic and computer-generated spreadsheets. Therefore, we believe our selection of the 'UNIT HYDROGRAPH METHOD '(HRU 1972) is appropriate because the site does not have a varying degree of post-development land change and does not have any existing permanent dams and sub-catchments. Computerised spreadsheets have been used to assist with iterations and to eliminate manual calculation errors.

As noted in **Section 11**, the proposed site is affected by eight (8) minor catchments. **Section 13.2** below modelled the surface run-off for each catchment for Pre and Post-Development conditions.

13.2 Surface Run-Off Modelling Results

Table 13.1 Pre-Development Modelling Results

Return Period	Catchment No.							
	1	2	3	4	5	6	7	8
1 : 2 year	17,06	12,05	10,54	7,98	5,05	7,27	3,33	2,06
1 : 5 year	85,02	49,09	49,91	35,89	18,26	28,51	13,26	7,93
1 : 10 year	111,22	64,21	65,28	46,94	23,88	37,29	17,35	10,38
1 : 25 year	145,84	84,21	85,61	61,56	31,32	48,90	22,75	13,61
1 : 50 year	172,03	99,33	100,98	72,61	36,94	57,68	26,83	16,05
1 : 100 year	207,69	114,45	119,79	84,81	42,56	66,47	30,92	18,49

Table 13.2 Post-Development Modelling Results

Return Period	Catchment No.							
	1	2	3	4	5	6	7	8
1 : 2 year	17,06	12,05	10,54	7,98	5,05	7,27	3,33	2,06
1 : 5 year	85,02	49,09	49,91	35,89	18,26	28,51	13,30	7,95
1 : 10 year	111,22	64,21	65,28	46,94	23,88	37,29	17,39	10,40
1 : 25 year	145,84	84,21	85,61	61,56	31,32	48,90	22,81	13,64
1 : 50 year	172,03	99,33	100,98	72,61	36,94	57,68	26,91	16,09
1 : 100 year	207,69	114,45	119,79	84,81	42,56	66,47	31,00	18,54

The results above indicate that the proposed development will have little to no effect between the Pre and Post-Development flows. Therefore, we believe implementing minor localised stormwater management guidelines can accommodate the proposed development without negatively impacting the downstream catchment.

14 STORMWATER MANAGEMENT & GUIDELINES

The buildings / structures within the development will require the control of stormwater run-off as per the stormwater management philosophy and policies of the local authority / municipality. The following guidelines are intended to assist in the design of the major and minor stormwater infrastructure and to

ensure that the objectives of this SWMP are met during the planning, design, construction, and operational phases of the development.

14.1 Buildings

Any building will inevitably result in some degree of flow concentration or deflection around buildings. The developer / owner shall ensure that all stormwater flow paths are protected against erosion.

Any inlet to a piped system shall be fitted with a screen / grating to prevent debris and refuse from entering the stormwater system. This must be installed immediately on the installation of the infrastructure. The onus is on the owner / developer to maintain the state of the screen / grating to ensure smooth flow.

No building works, earthworks, walls or fences may obstruct or encroach on a watercourse inside or outside the site without approved plans that do not compromise the objectives of the SWMP in addition to any required Authority approvals.

14.2 Roof Drainage

Building designs must ensure that rainfall run-off from roofing and other areas, not subjected to excessive pollution, can be efficiently captured for re-use for on-site irrigation and non-potable water uses.

Where storage for re-use and ground conditions permit, rainwater run-off should connect to detention areas to maximise groundwater recharge. These detention areas must be designed to attenuate run-off, specifically, the peak flows experienced in the reaches of a watercourse-.

14.3 Parking and Paved Areas

Parking or paved areas should be designed to attenuate stormwater run-off to an acceptable degree by allowing ponding or infiltration. Stormwater from such areas must be discharged and controlled as overland sheet flow or larger attenuation facilities.

14.4 Roads

Roads should be designed and graded to avoid the concentration of flow along and off the road. Regular side drains discharge points along roads for overland flow to continue as sheet flow towards drainage lines per pre-development conditions (Refer **Figure 6.1**). Where flow concentration is unavoidable, measures to incorporate the road into the major stormwater system should be taken, providing appropriately designed attenuation storage facilities at suitable points.

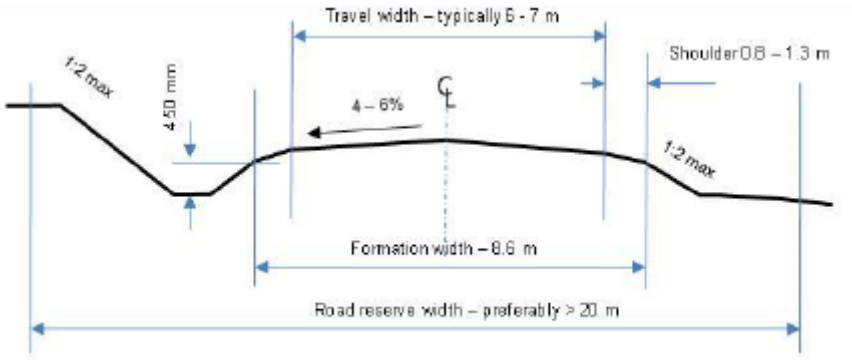


Figure 14:1 Typical Road Cross Section showing side drains

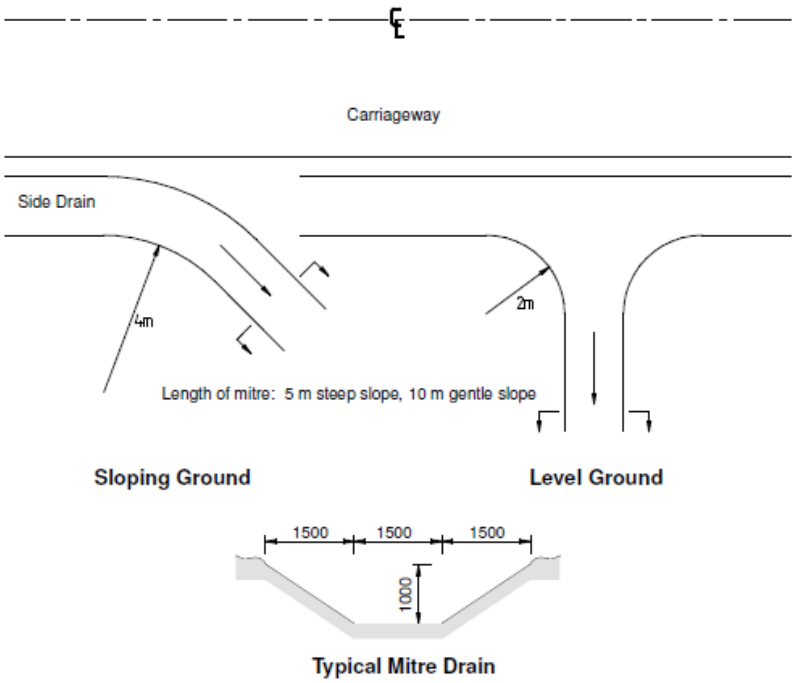


Figure 14:2 Typical Stormwater Mitre Drain / Channel

Gravel roads crossing drainage lines require a suitable sized culvert, concrete causeways or cut-off walls to ensure vehicles can safely pass over natural drainage lines. Culverts for roads must be designed to ensure that the capacity of the culvert does not exceed the pre-development stormwater flow at that point, and attenuation storage should be provided on the upstream side of the road crossing.

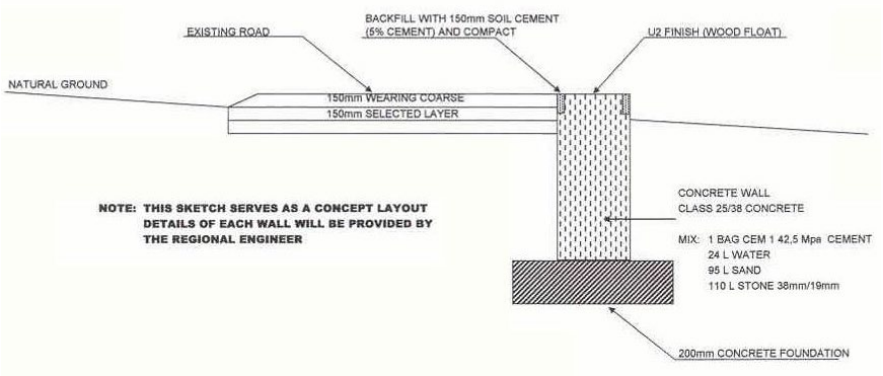


Figure 14:3 Typical Detail of a Cut-Off wall

Figure 14:4 Typical Low-Level Concrete structure

Outlet and culvert discharge points into the natural watercourse must be designed to dissipate flow energy, and any unlined downstream channel must be adequately protected against soil erosion. (Refer **Figure 14.4**)

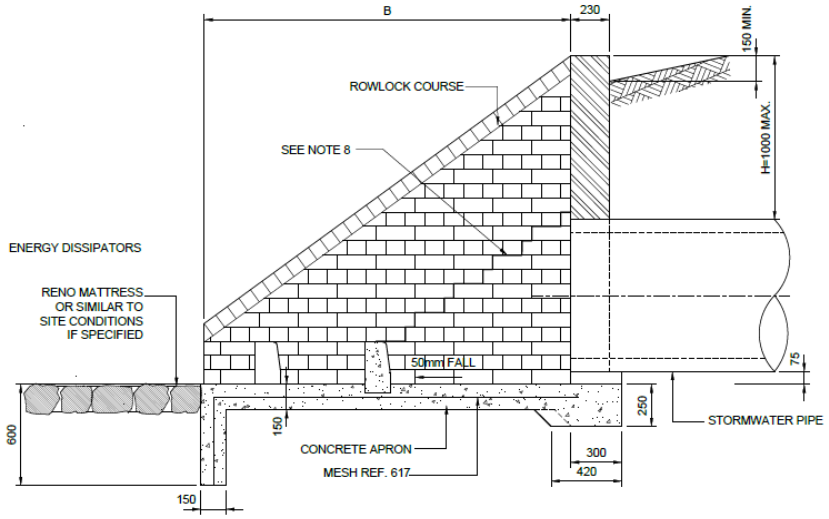


Figure 14:5 Typical Stormwater Headwall with Energy Dissipators

14.5 Subsurface Disposal of Stormwater

Any construction providing for the subsurface disposal of stormwater should be designed to ensure that such disposal does not cause slope instability or areas of concentrated saturation or inundation. Infiltration structures should be integrated into the terrain to be unobtrusive and in keeping with the natural surroundings.

14.6 Channels

Channels may be constructed to convey stormwater directly to a natural watercourse where deemed necessary and unavoidable. The channels must be suitably lined to prevent erosion and scour and provide maximum possible energy dissipation of the flow. Such linings will vary from vegetated earthen to stone pitching or reinforced concrete.

14.7 Energy Dissipation

Measures should be taken to dissipate flow energy wherever concentrated stormwater flow is discharged onto the natural ground.

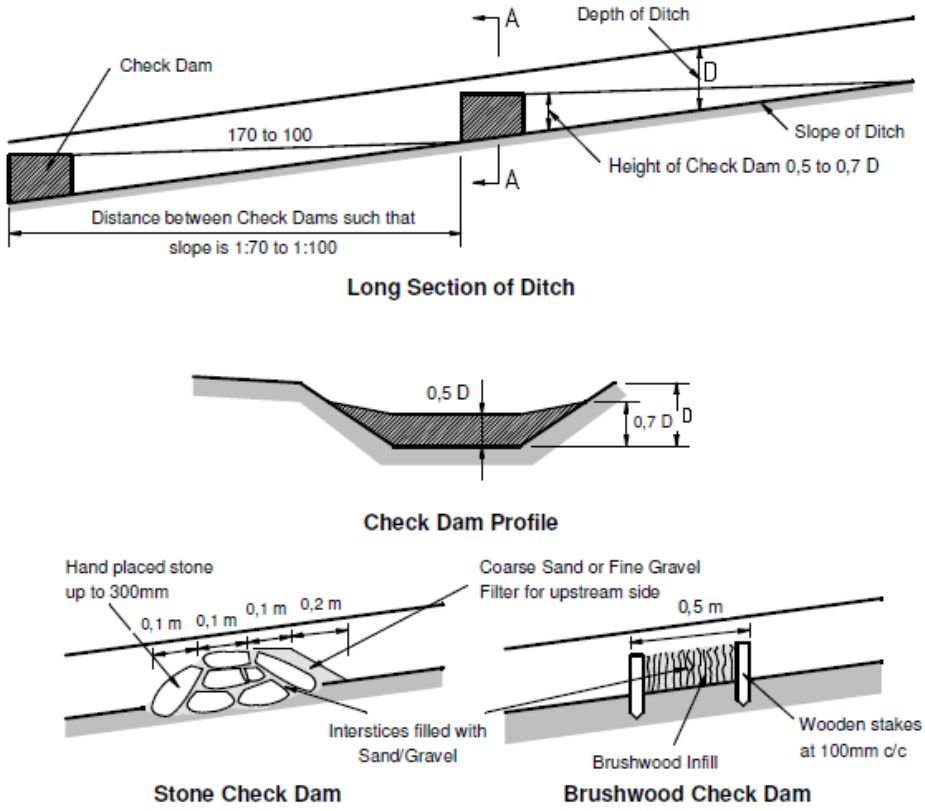


Figure 14:6 Typical Erosion Control

14.8 Open Trenches

Open trenches should not be left open and unprotected for extended periods and should be progressively backfilled as construction proceeds. Excavated material to be used as a backfill must be placed close to the trench on the upstream side to avoid loose material from washing away.

14.9 Stockpiles

Material is to be stockpiled away from drainage paths. Loose material such as stone, sand or gravel must be covered or kept damp to minimise dust. Temporary silt screens are to be positioned immediately downstream of stockpiles to intercept loose material which may be washed away.

14.10 Stormwater Pollution Control

The stormwater systems should be free from materials that could harm the water systems' fauna, flora, and aquatic life.

Sites which generate "dirty" (Grey or Black) water must have measures in place that separates the clean and "dirty" water. Depending on the nature of the "dirty" water, the water must either be discharged into the wastewater system or contained on-site for off-site treatment.

15 STORMWATER MANAGEMENT POLICY

The following rules are to be observed by the owner, developer, professional team, contractors, and sub-contractors:

- The Environmental Management Program (EMPr), as per the EIA and approved by the competent authority, will manage stormwater run-off during construction. All construction activities within the development must comply with the EMPr. This SWMP document is supplementary to the EMPr. The control measures herein are not considered all-encompassing as the contractor will have to adapt site-specific control measures.
- Before the commencement of any construction activities, the contractor must compile and submit his construction SWMP, which needs to comply with the approved EMPr. The plan must include measures to control and prevent erosion during and after construction.
- Existing flood lines / wetlands / stormwater attenuation areas should be protected from encroachment by the development.
- Development designs must include measures for attenuating the increased concentration of stormwater run-off. The post-development peak flows can be attenuated to pre-development conditions if adequate stormwater mitigation measures are not implemented.
- On-site stormwater control systems, such as swales, berms and attenuation ponds, must be constructed before any other construction commences. These systems are to be monitored and appropriately adjusted as construction progresses to ensure complete stormwater, erosion and pollution control.
- All formed embankments must be adequately stabilised.
- An approved landscaping and re-vegetation plan must be implemented immediately after building works have reached a stage where newly established ground cover is not at risk from the construction works.
- The contractor must show that all the provisions, regulations and guidelines in this document have been considered.
- In the event of a failure to adequately implement the approved SWMP, the contractor shall be responsible for all consequential damage at his own cost. The developer is therefore advised to ensure that all members of the professional team and contractors are competent to undertake the development work and are adequately insured.
- Appropriate designed attenuation / detention facilities will be located at appropriately selected sites based on geotechnical, environmental and topographical conditions, including wetland conservation.
- Where conditions permit, open ditches, drains and channels will be used instead of pipes. On steeper slopes, where high flow velocities are anticipated, appropriate linings for all channels must be provided to withstand erosion. Such linings will vary from vegetated earthen to stone pitching and reinforced concrete.
- Flow velocities must be reduced wherever possible to reduce the erosion potential in channels and points of flow concentration (typically at outlets).
- Silt, trash and oil traps must be strategically provided to ensure water quality is not compromised and to prevent blockages in the drainage systems.
- Areas within the proposed development that are bound on stormwater attenuation areas, near road crossings, watercourse confluences and water features might be subject to flooding. In these situations, all development should take place above the outfall levels with an appropriate freeboard allowance.
- Potential future development in these sub-catchments should be considered and any stormwater attenuation requirements should be identified for areas flowing into the development area. Likewise, consideration must be given to the stormwater flowing out of the development, which may impact the downstream areas and watercourses. Appropriate measures must be taken to ensure any upstream development does not result in an increased flood damage risk downstream; and

- All-natural and unlined channels should be inspected for adequate binding of soil by sustainable ground cover. Stone pitching should be used to reinforce channel inverts on steep slopes.

16 CONCLUSION & IMPACT STATEMENT

- In conclusion;
    - The Surface Modelling (**Section 13**) reveals that the proposed development / infrastructure will have a minimal impact on the stormwater quality and quantities of post-development stormwater flow (operational phase).
    - The highest impact will, in all likelihood, occur during the construction phase, and these impacts must be strictly managed under the advisement of the guidelines set out in this document.
    - The need for formal stormwater interventions can be minimised if the development is designed to maintain the existing drainage patterns. Overland flow via poorly-defined drainage paths will be the primary form of conveyance.
    - The Civil Engineers must prepare a detailed stormwater management plan for construction purposes describing and illustrating the proposed stormwater and erosion control measures during the detailed design phase.
    - A comprehensive geotechnical study is completed before the detailed design stage of this development.
    - The guidelines described in **Section 14 – STORMWATER MANAGEMENT & GUIDELINES** should be incorporated into the detailed design of the development.
    - The policy described in **Section 15 – STORMWATER MANAGEMENT POLICY** be implemented.
- Impact Statement;
    - Concerning this report, associated assessment and the findings made within, it is SiVEST's opinion that the Pofadder WEF 3 and associated grid infrastructure will have a nominal impact on the existing stormwater catchment. The project is therefore deemed acceptable from a stormwater perspective, provided the recommendations and mitigation measures in this report are implemented. Hence, Environmental Authorisation (EA) should be granted for the EIA application.
    - This document should also be read in conjunction with the EMPr. The developer, owner, and professional team shall ensure that the requirements and conditions set out in the EMPr are adhered to.

17 REFERENCES

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South African National Botanical Institute – *National Vegetation Map 2012*

South African National Roads Agency – *Drainage Manual 6th Edition (2013)*

Bramford, Prof M – *Paleontology. Pofadder WEFs 1,2,3. Pofadder Wind Facility 3 (Pty) Ltd (2022)*

Weather Atlas (Pofadder) – *www.weather-atlas.com*

Western Cape Provincial Administration – *Gravel Roads Manual Rev 0*

APPENDIX A: SPECIALIST CURRICULUM VITAE

M 03/2022

CURRICULUM VITAE

Merchandt Le Maitre

Name	Merchandt Le Maitre
Profession	Civil Engineer
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Divisional Manager: Civil Engineering Division
Years with Firm	17 Years
Date of Birth	25 September 1982, Johannesburg, South Africa
ID Number	820925 5037 086
Nationality	South African

Education

- University of Johannesburg (2006)
- University of South Africa (2016)

Professional Qualifications

- N Dip: Civil Engineering
- B Tech: Civil Engineering (Water)
- Pr.Tech.Eng. (Reg. No. 2018300094)

Membership in Professional Societies

- Engineering Council of South Africa (ECSA) – Pr Tech Eng; (Reg N° 2018300094)
- South African Institute of Civil Engineers (SAICE)
- South African Wind Energy Associations (SAWEA)

Employment Record

Nov 2020 – present	SiVEST SA (PTY) LTD: Divisional Manager
May 2004 – Oct 2020	SiVEST SA (PTY) LTD: Senior Civil Engineering Technician
Jan 2004 – April 2004	Con Roux Zambia - Junior Foreman
Dec 2002 – Dec 2003	Neda Engineering - Vacation Work

Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
English	Fluent	Fluent	Fluent
Afrikaans	Fluent	Fluent	Fluent

Years of Working Experience: 17

M 03/2022

CURRICULUM VITAE

Merchandt Le Maitre

Countries of Work Experience

- South Africa
- Swaziland
- Zambia
- Kenya
- Namibia

Fields of Expertise

- Bulk Services Studies
- Feasibility Studies
- Service Reports
- Infrastructure Design
- Contract Documentation & Procurement
- Contract Administration
- Procurement and Construction Monitoring

Overview

Merchandt joined SiVEST as a student Civil Engineering Technician in 2004 to which he received a company bursary to complete his studies and join the company permanently thereafter. Since joining permanently he has been actively involved in numerous township projects and associated infrastructure projects.

A summary of the experience in each field is indicated below:

Roads & Stormwater
Design, Implement & Contract Administration:
- Provincial Road Intersections (Class 2 Roads)
- Municipal Roads (Class 3-5 Roads)
- Residential & Industrial Township services
- Bulk Stormwater Infrastructure

Hydrology
- Attenuation Reports
- Flood Inundation Assessments / Floodline Reports
- Stormwater Management Reports
- Stormwater Assessments / Investigations
- Roof Gutter & Down Pipe Design / Assessments / Reports

Water & Sanitation
Design, Implement & Contract Administration:
- Water supply lines including Bulk Water
- Water pump stations
- Sanitation networks including Outfall Sewers
- Sewer pump stations
- Farm Irrigation Network

Renewable Energy
- Transportation Impact Assessments
- Water Demand Assessments
- Glint & Glare Assessments
- Stormwater Management Reports

- Preliminary Engineering Reports & Designs

Projects Experience (by Sector)

TOWNSHIP SERVICES

- Tijger Valley Extension 10, 20, 21, 22, 23, 27, 38-44, 72, 105-113, 19, 62, 103, 104, 34, 35, 36, 123 etc. - Design, Procurement, Contract Administration and Monitoring.
- Derdepoort Extension 181- Design, Procurement, Contract Administration and Monitoring.
- Project Springbok, Sasolburg - Design, Procurement, Contract Administration and Monitoring.
- Arcadia Extension 11 - Design, Procurement, Contract Administration and Monitoring.
- Lakeside Erf 181- Design, Procurement, Contract Administration and Monitoring.
- Longmeadow Extension 10, 11 & 12 - Design, Procurement, Contract Administration and Monitoring.
- Bushwillow Estate - Design, Procurement, Contract Administration and Monitoring.
- Forum Homini – Draughting Monitoring of Dam Spillway construction & sewer reticulation.
- Longmeadow Extension 7, 8, 9, 10, 11, 12 – Township services and design of earth retaining wall.
- Lakeside Erf 181 – Design and supervision of Township Services including Attenuation facilities.
- Mbabane Kingdom Hall – Bulk earthworks and road Design, Procurement, Contract Administration and Monitoring.
- Kungwini Bulk Water – Draughting and supervision of a Steel Bulk Water Supply Pipe.
- Mooikloof Booster Station – Design and supervision of a water booster pump facility..
- PTN 2 of 148 Athol – Compiling and analysis Stormwater Assessment.
- Mooibosch Development – Compiling of Services reports and Floodline Determination.
- Hazeldean Extension 39 – Design and supervision of Township Services.
- Hazeldean Retirement – Design of Township Services.
- Kungwini Collector Sewer – Design of Collector Sewer.
- Maroeladal Extension 9 – Design and compilation of Services Report.
- Hazeldean Oukraal – Design of Township Services
- Hazeldean Business Park – Design and compilation of Services Reports.
- Erf 181 Derdepoort – Design and compilation of Services Reports and preliminary design of Provincial Intersection.
- Erf 92 Edenburg – Floodline Determination and design and compilation of the Services reports.
- Longmeadow Extension 12 Stormwater – Design of Stormwater Reticulation.
- Astral Foods - Design, Procurement, Contract Administration and Monitoring of civil services.
- Eastgate Solar Roof – Glint & Glare Assessment
- Cotton Gin Mpumalanga – Design & Procure all services

ROADS & INTERSECTION DESIGN

- D631 Intersection – Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- D36 Intersection & Road Widening - Design, Wayleave Approval, Procurement.
- K34 Intersection – Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- K101 Intersection – Design, Wayleave Approval.
- Justice Mahomed, University, Walton Jameson Rd Intersection – Design, Wayleave Approval.
- Cedar Road West – Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- Brikor – Design of New Intersection.
- New Zealand Embassy – Design of Intersection.
- East Point Game - Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.

HYDROLOGY AND STORMWATER

- Hazeldean Floodline - Data collection, Flood determination and compilation.

- Gautrain Railway Stormwater Management – Design and compile stormwater management and attenuation facilities.
- Stormwater Modelling for Project Springbok – Attenuation of hazardous material in stormwater system.
- Sappi Ngodwana Floodline – Data collection, Flood determination and compilation. This floodline included cognisance of the Ngodwana dam.
- Irene Mall Stormwater Management - Accommodation of the Post Development stormwater flow through an existing township / suburb.
- Loftus Park Stormwater Management – Accommodation of the Post Development stormwater flow through an existing township / suburb.
- Pienaars River Floodline Modelling – Modelling of the river through two future Class 1 & 3 road bridge structures.
- Renewable Energy Stormwater Management – A number of Management Plans for the Renewable Energy sector has been completed.
- Longmeadow Extension 10 (Pick & Pay) – Design and compilation of Stormwater Management report.
- Erf 4173 Peter Place – Floodline Determination.
- Irene Mall Township – Design of Township Services and Stormwater Management.
- Mitsubishi McCarthy Midrand – Design and compilation of Stormwater Management report.
- Isago @ N12 – Floodline Determination.
- Innoland – Floodline Determination.
- Lot 204 Edenburg – Floodline Determination
- Erf 90 Douglasdale – Floodline Determination.
- PTN 35 Houtkoppen – Floodline Determination.
- Erf 4173 Peter Place – Floodline Determination.
- Hyde Close Floodline – Floodline Determination.
- Chartwell Floodline – Floodline Determination
- Hyundai East Rand – Roof Gutter & Down Pipe design
- Oilifants River – Floodline Determination

WATER TRANSFER / RETICULATION AND SANITATION COLLECTORS / OUTFALLS

- Bojanala Platinum District Municipality – Water & Sanitation Bulk Master Planning.
- Hazeldean Development – Bulk Water Supply & Collector Sewer Design, Procurement, Contract Administration and Monitoring.
- Mamba Kingdom – Bulk Water Analysis.
- Lesedi Local Municipality Bulk Water - Design, Wayleave Approval, Procurement, Contract Administration and Monitoring.
- NEF Tomato Paste Project – Design of Farm Irrigation Network

RENEWABLE ENERGY

- Dyansons Klip 5 – Stormwater Management Report
- De Aar Solar – Stormwater Management Report
- Droogfontein Solar – Stormwater Management Report
- Mierdam Solar – Stormwater Management Report
- Prieska– Stormwater Management Report
- Hoekplaas – Stormwater Management Report
- Noupoort WEF – Stormwater Management Report
- Copperton PV – Stormwater Management Report
- Klipgats PV – Stormwater Management Report
- Tooverberg Wind Energy Facility – Transportation Impact Assessment & Water Demand Assessment
- Umsobomvu Solar Energy - Transportation Impact Assessment
- Prieska Solar Energy - Transportation Impact Assessment Amendment
- Droogfontein Solar Energy - Transportation Impact Assessment Amendment

- Loeriesfontein Solar Energy - Transportation Impact Assessment Amendment
- Koeris WEF - Transportation Impact Assessment Amendment
- East Gate Shopping Centre - Glint & Glare Assessment
- Oya Energy - Glint & Glare Assessment
- Yemaya – Glint & Glare Assessment
- Beaufort West WEF – Preliminary Engineering Design
- Heuweltjies WEF – Transportation Study
- Kraaltjies WEF – Transportation Study
- Koup 1 & 2 – Transportation Study
- Grootegeluk Solar Project – Transportation Study
- Renewstable Swakopmund – Glint & Glare Assessment
- Several projects are Confidential as they are not yet in the public domain and hence have not been included in the list above.

OTHER

- Project Springbok – Design of Services and Railway Siding.
- Phalaborwa Mining Company – Preliminary Design of Bulk Water feed and Railway Line.
- Kansanshi Copper Mine, Zambia – Junior Site Foreman.
- Final QC for Sasol Secunda.
- NDT testing – MMC Nelspruit, Global Forest Products Sabie.
- Boiler inspections and preliminary design – MMC Nelspruit, Global Forest Products, TSB Malelane.

Computer Skills

- AutoCAD Civil 3D
- AutoCAD Storm and Sanitary Analysis
- Microsoft Office
- Microsoft Project
- TechnoCAD
    - Surfmate
    - Roadmate
    - Pipemate
    - Watermate
- AutoTURN (Vehicle Turning Simulation Software)
- RiverCAD
- HecRAS
    - 1D Flood Modelling
    - 2D Flood Modelling

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