Environmental Management Programme

Perdekraal East Wind Farm, Western Cape

Mainstream Renewable Power Perdekraal East (Pty) Ltd
(DEA Ref No.:12/12/20/1783/2)

March 2016

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DEA Ref No.: **12/12/20/1783/2**
ERM Ref No.: **0308534**

Mainstream Renewable Power Perdekraal East (Pty) Ltd

Environmental Management Programme (EMPr) for the Perdekraal East Wind Farm, Western Cape

Prepared by: Nadia Mol and Lisa Otten (ERM)

For and on behalf of
Environmental Resources Management

Approved by:

Signed: Stuart Heather-Clark

Position: Partner

Date: 09 March 2016

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LIST OF ACRONYMS

CNS	Communication, Navigation and Surveillance
CSM	Contract Site Manager
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DMR	Department of Mineral Resources
DoE	Department of Energy
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPSA	Environmental Assessment Practitioners of South Africa
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMI	Electromagnetic Interference
EMPr	Environmental Management Programme
ERM	Environmental Resources Management
ERP	Emergency Response Plan
ESO	Environmental and Social Officer
EWT	Endangered Wildlife Trust
FEPAs	Freshwater Ecological Protection Areas
I&APs	Interested & Affected Parties
IA	Implementation Agreement
IWS	Inkululeko Wildlife Services (Pty) Ltd
MC	Main Contractor
MPRDA	Mineral and Petroleum Resources Development Act (No. 28 of 2002)
NEMA	National Environmental Management Act
NHRA	National Heritage Resources Act (No. 25 of 1999)
O&M	Operations and Maintenance
OHSA	Occupational Health and Safety Act (No. 85 of 1993)
OSMP	Open Space Management Plan

PC	Project Company
REF	Renewable Energy Facility
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANDF	South African National Defence Force
SANS	South African National Standards
SM	Site Manager
ToR	Terms of Reference
TSA	Turbine Supply Agreement

LIST OF ABBREVIATIONS

%	Percent
dBA	Decibels
ha	Hectare
MW	Mega Watts
kV	Kilovolt
m	Metres
km	Kilometres
km^2	Square Kilometres

Alternative: A possible course of action, in place of another, that would meet the same purpose and need (of the proposal). Alternatives can refer to any of the following but are not limited to: alternative sites for development, alternative projects for a particular site, alternative site layouts, alternative designs, alternative processes and alternative materials.

Blade: The part of the turbine that is moved by the wind, there are three blades on a typical wind turbine.

Environment: The surroundings within which humans exist and that are made up of:

i. the land, water and atmosphere of the earth;
ii. micro-organisms, plant and animal life;
iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and
iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being. This includes the economic, social, cultural, historical and political circumstances, conditions and objects that affect the existence and development of an individual, organism or group.

Environmental Assessment: The generic term for all forms of environmental assessment for projects, plans, programmes or policies. This includes methods/tools such as environmental impact assessment, strategic environmental assessment, sustainability assessment and risk assessment.

Hub: The centre of a wind generator rotor, which holds the blades in place and attaches to the shaft.

Hub Height: The distance from ground level to the centre of the hub.

Impact: The positive or negative effects on human well-being and / or on the environment.

Interested and Affected Parties: Individuals, communities or groups, other than the proponent or the authorities, whose interests may be positively or negatively affected by the proposal or activity and/ or who are concerned with a proposal or activity and its consequences.

Mitigate: The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action.

Nacelle: The protective covering over a generator or motor.

Rotor: Consists of the blade and hub, the mechanical link between the blades and the low-speed shaft.

Rotor Diameter: The diameter of a circle swept by the rotor measured from blade tip to blade tip.

Significance: Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e. biophysical, social and economic).

Stakeholder Engagement: The process of engagement between stakeholders (the proponent, authorities and I&APs) during the planning, assessment, implementation and/or management of proposals or activities.

1 INTRODUCTION

1.1 OVERVIEW

Mainstream Renewable Power Perdekraal East (Pty) Ltd (hereafter the 'Project Company') has appointed Environmental Resources Management (Pty) Ltd (hereafter ERM) to prepare the Final Environmental Management Programme (EMPr) for the development of the Perdekraal East Renewable Energy Facility (REF). The proposed Wind Farm ('the Site') is located approximately 32 km north of the town of Touwsrivier in the Western Cape Province, South Africa.

ERM submitted the Final Environmental Impact Assessment (EIA) for the development of the Perdekraal Wind Farm in 2011 which was granted Environmental Authorisation (EA) on 04 January 2012 (Ref: *12/12/20/1783*). The EA was amended on 04 December 2012 for the purposes of splitting the Wind Farm into two separate projects each under the jurisdiction of different developers. (i.e. Perdekraal East and Perdekraal West). The amendment was granted and both projects were issued with amended EAs. The Project Company's portion, Perdekraal East, was designated as Site 2 (Perdekraal West being Site 1) with the reference number *12/12/20/1783/2*. The Perdekraal East Wind Farm was subsequently awarded preferred bidder status during bid round four in June 2015.

As per *Condition 13* of the EA and in order to meet financial close, the Project Company is required to submit the Final EMPr to the Department of Environmental Affairs (DEA) for approval prior to commencing with construction.

The aim of the Final EMPr is to provide a set of guidelines and actions aimed at addressing potential environmental risks and impacts associated with the construction, operation and decommissioning phases of the project, and will be included in contract documentation between the Project Company and its contractors. The Final EMPr also provides assurance to regulators and stakeholders that their requirements with respect to environmental and socio-economic performance will be met, and provides a framework for compliance auditing and inspection programs.

This Final EMPr incorporates relevant mitigation measures from the final EIA, the conditions of the EA and Amendment EA and measures that have been identified as necessary from more detailed investigations and pre-construction monitoring. Supporting reports and/or plans are detailed in *Table 1.1* below.

Table 1.1 Specialist Monitoring Reports, Walk-Throughs and Additional Plans and Policies

Plans	Responsibility	Annexure
Monitoring Reports and Impact Assessment		
Pre-Construction Avian Monitoring Report	Avisense Consulting	*Annex D*
Pre-Construction Bat Monitoring Report	Natural Scientific Services cc	*Annex E*
Agricultural Impact Assessment	Agri Informatics Development Trust	*Annex F*
Freshwater Assessment	Blue Science	*Annex G*
Terms of Reference and Methodology for the Riverine Rabbit Monitoring Programme	Endangered Wildlife Trust: Drylands Conservation Programme	*Annex H*
Walk-Throughs		
Avian Walkthrough Report	Avisense Consulting	*Annex I*
Ecological (fauna/flora) Walkthrough Report	Simon Todd Consulting	*Annex J*
Heritage Walkthrough Report	ACO Associates cc	*Annex K*
Palaeontological Walkthrough Report	Natura Viva cc	*Annex L*
Plans and Policies		
Stormwater Management Plan	GroundTruth: Water, Wetlands and Environmental Consultants	*Annex M*
Alien Management Plan	Simon Todd Consulting	*Annex N*
Plant Rescue and Protection Plan	Simon Todd Consulting	*Annex O*
Revegetation and Rehabilitation Plan	Simon Todd Consulting	*Annex P*
Open Space Management Plan	Simon Todd Consulting	*Annex Q*

The structure of the EMPr is indicated *Table 1.2*.

Table 1.2 Structure of the EMPr

Section	Heading	Content
Section 1	Introduction	Background information regarding the site location, the proposed Wind Farm, the development layout plan and the EMPr.
Section 2	Implementation of the Final EMPr	Provides details of the communication and organisational structures within which the Final EMPr will be implemented, responsibilities of key role players, and provides the terms of reference for the construction team and Environmental Control Officer (ECO).
Section 3	Permit Requirements	Provides details of additional permits which may be required prior to construction and during operation.
Section 4	Mitigation and Monitoring Measures	Mitigation and Monitoring measures for the planning and design (pre-construction), construction and operational phases of the Wind Farm.
Section 5	Pre-Construction Monitoring Requirements	Provides an overview of pre-construction monitoring requirements regarding avifauna, bats and the riverine rabbit.
Section 6	Conclusion	Concluding remarks regarding the implementation of the EMPr.

1.2 *DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER*

ERM was appointed by the Project Company as the Environmental Assessment Practitioner (EAP) to finalise the EMPr for the Perdekraal East Wind Farm. ERM and the specialists appointed by ERM have no financial ties to nor are they a subsidiary, legally or financially, of the Project Company. Remuneration for the services by the Project Company in relation to the Final EMPr is not linked to approval by any decision-making authority and ERM has no secondary or downstream interest in the development.

ERM is a leading global provider of environmental, health, safety, risk, social consulting, and sustainability services. ERM has over 150 offices in more than 40 countries and territories with a staff complement in excess of 5,000 people. ERM is committed to providing a consistent, professional, quality service that creates value for our clients in the mining, oil and gas, power, manufacturing, chemical and pharmaceutical, ports and infrastructure sectors. Over the past three years we have worked for more than 50 percent of the Global Fortune 500 companies delivering innovative solutions for business and selected government clients, helping them understand and manage the sustainability challenges they face.

ERM has been involved in projects across every country in Africa for over 36 years, and in 2003 established a permanent presence in Sub-Saharan Africa to meet the growing needs of our clients. ERM is one of the largest, totally focused, sustainability consulting firms in the region with offices in Kenya (Nairobi), Mozambique (Maputo) and South Africa (Cape Town, Durban and Johannesburg). With over 180 dedicated staff involved in environmental and social projects throughout the continent, ERM offers clients effective, cost-conscious solutions using experienced local and global expertise.

The responsible personnel at ERM for completing the Final EMPr include Stuart Heather-Clark, Nadia Mol and Lisa Otten. Details of the EAPs are provided in *Table 1.3* below.

Table 1.3 Details of Environmental Assessment Practitioners

Name	Stuart Heather-Clark
Responsibility	Partner in Charge
Degree	MPhil Environmental Science and BSc Civil Engineering
Professional registration	Certified EAPSA
Experience in years	22
Experience	22 years' experience in EIA in South Africa and various African countries.

Name	Nadia Mol
Responsibility	Project Manager
Degree	BSc (Hons) Environmental and Geographical Science
Professional registration	Pr Sci Nat (No 400159/09), IAIA
Experience in years	19

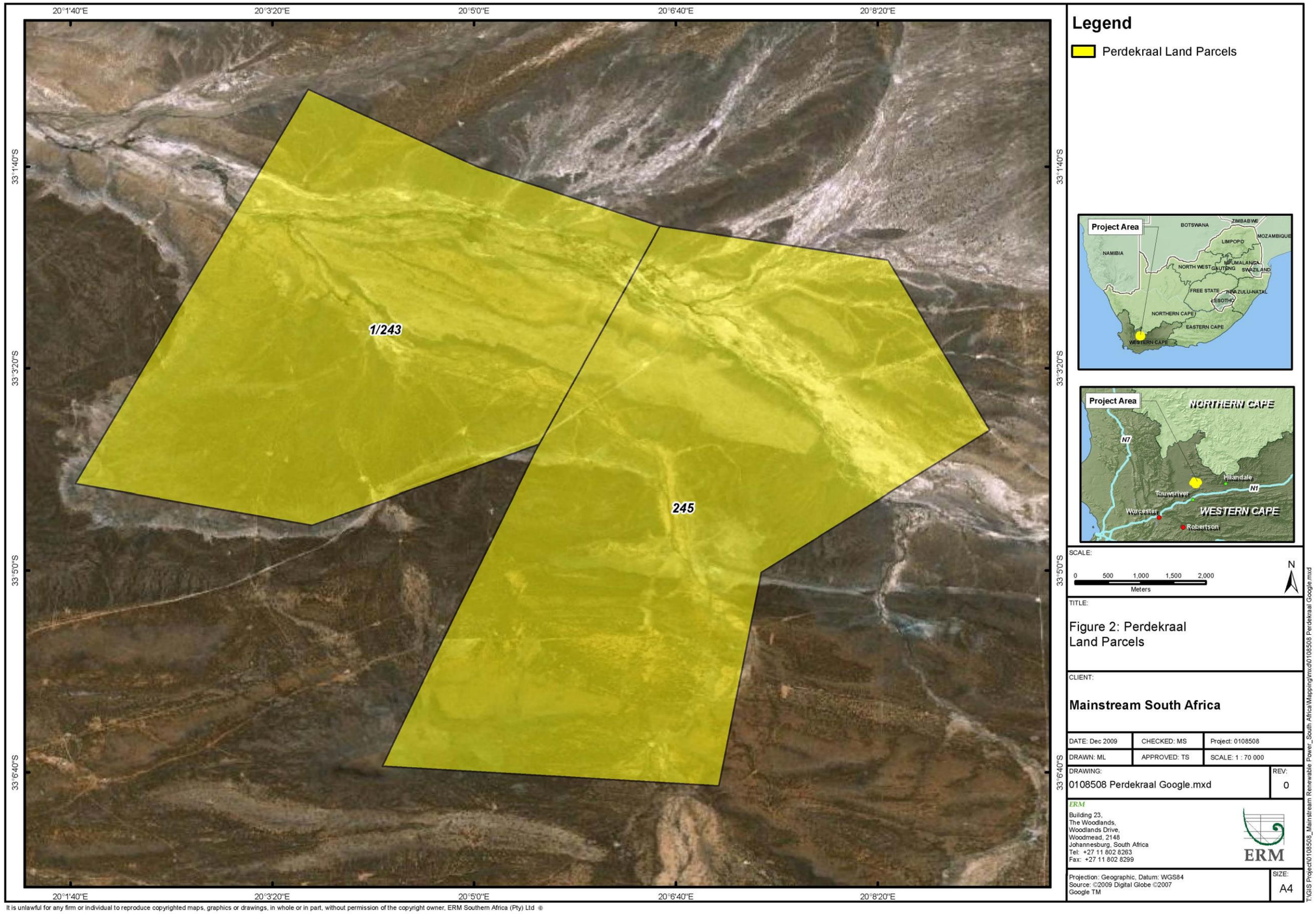
Name	Nadia Mol
Experience	Nadia has over nineteen years' experience in environmental consulting in South African and various African countries.

Name	Lisa Otten
Responsibility	Project Consultant
Degree	BSc (Hons) Environmental Management
Experience in years	3
Experience	Lisa has significant experience at ERM in undertaking African environmental regulatory processes for various clients.

1.3 SITE LOCATION AND DESCRIPTION

The Site falls within the jurisdiction of the Cape Winelands District Municipality and Witzenberg Local Municipality and is located approximately 32 km north of the town of Touwsrivier. The Site is made up of two land parcels including Farm Lower Stinkfontein No 245, and Portion 1 of Rietpoort Farm 243 (*Figure 1.1*).

Figure 1.1 Location of Perdekraal East Wind Farm



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Perdekraal East's total site lease area is 3,054.95 ha (30.55 km^2) and it is estimated that the infrastructure will occupy the following land:

- Wind turbine generators will take up approximately 1.56 ha;
- Internal road network will take up approximately 16.8 ha; and
- Associated infrastructure (i.e. operations and maintenance area, substation, laydown area etc.) would take up approximately 3.97 ha.

This translates into a land take of 22 ha or approximately 0.73 percent of the overall site area.

1.4 OVERVIEW OF THE PROPOSED PROJECT

1.4.1 Wind Turbine Generators

The Perdekraal East Wind Farm will have an installed capacity of 110 MW, consisting of approximately 55, two (2) MW turbines. The EA granted a hub height of up to 120 m, with a rotor diameter (measured from blade tip to blade tip) of up to 120 m for the turbines. However, it is proposed to modify these turbine specifications to increase the rotor diameter. This will necessitate an application for an amendment to the EA in terms of the National Environmental Management Act (Act No. 107 of 1998) (NEMA). The EMPr has been developed to cover all possible turbine design options.

The detailed design of the foundation for each turbine will depend on the turbine model procured and the site-specific ground conditions. The turbines are to be supported on reinforced concrete foundations with an approximate area of 325 m^2 to a depth of up to 3.5 m. The foundation will include a concrete pedestal at the centre, which projects above ground level and to which the turbine tower is connected. There will be a gravel surfaced hard standing of approximately 40 m x 20 m adjacent to each turbine for use by cranes during construction and retained for maintenance use throughout the life span of the project. Each turbine will have an electrical transformer beside it.

1.4.2 Electrical Connections

The wind turbines will be connected to one another by means of underground medium voltage 33 kV cables. These cables will run along the internal road network to a central point on the site where an overhead 33 kV transmission line will convey the electricity to the new project substation. Both underground cables and the above-ground lines will follow the internal and/ or existing road networks and will therefore not increase the disturbance footprint of the facility.

The Site will be connected to the national grid at Eskom's Kappa Substation. A new 132 kV transmission line will run along the northern boundary of the

existing Eskom 400 kV transmission line to the Kappa Substation. A new project substation (with an approximate compound size of 150 m x 150 m) and transformer will be constructed in the south western extent of Farm Lower Stinkfontein No 245, just north of the existing Eskom 400 kV transmission line.

1.4.3 Access Roads and Site Access

The Site can be accessed via a gravel road which connects to the R356 in the west, and the R354 in the east. An internal gravel road network will be used by construction vehicles and will be retained throughout the lifetime of the facility for use by maintenance vehicles. The roads will be approximately 10 m wide including drainage trenches and cabling but may be wider for short sections to enable turning, passing and to accommodate sharp bends. Existing roads and tracks will be used where possible, as is the case with the access road to the new project substation, where the existing farm road will be upgraded to four meters wide.

1.4.4 Additional Infrastructure

Construction Phase

Additional temporary infrastructure required during construction will include the following:

- Lay down areas will have to be prepared, either beside an access route, for the assembly of the turbine components or as an area adjacent to each turbine. The lay down areas will cover an area of approximately 10,000 m^2 – this hard standing area could be temporary or if the landowner prefers, left for long-term use.

- A temporary site compound area for contractors of approximately of 5,000 m^2 will be constructed which will house the site office, meeting rooms, canteen etc.

Operational Phase

Additional infrastructure associated with the operation of the proposed renewable energy facility will include:

- A single story Operations and Maintenance (O&M) building of 3,000 m^2 with a warehouse/workspace, office, telecoms, security and ablution facilities will be constructed on the site preferably close to the substation.

- A substation with a compound area of 150m by 150m will be constructed in the vicinity of the O&M building.

- At least two permanent wind measuring mast of 70m to 100m in height.

- Although the bulk of the site is currently fenced, additional fencing may be erected as required (i.e. around the O&M building).

- Bunding for transformers and any other oil containing equipment to ensure full containment in the event of any oil leakage.

1.5 FINAL DEVELOPMENT LAYOUT PLAN

The final layout plan of the Site is provided in *Figure 1.2*. In accordance with *Amendment 2: Amendment to the Northern Site Boundary* of the Amendment EA (*12/12/20/1783/2/AM1)*, the final development layout was made available to registered Interested and Affected Parties (I&APs) for comment from the 13th November 2015 to the 13th December 2015.

The following has been included in the final development layout map as per requirements of the Amendment EA:

- Position of wind turbines and associated infrastructure.

- Foundation footprint – indicated by the position of the wind turbines (foundations will be approximately 3 m deep with a diameter of approximately 20 m).

- Internal roads (that will have a width of up to 8 m).

- Wetlands, drainage lines, rivers, streams and water crossings of roads and cables.

- All sensitive features e.g. heritage sites, wetlands, pans and drainage channels that will be affected by the Wind Farm and associated infrastructure.

- Substation that has a footprint of 22 500 m^2.

- The connection route to the distribution / transmission network (i.e. the 132 kV power line). Please note that pylon positions are not included as these will only be confirmed during construction.

- The temporary construction laydown area.

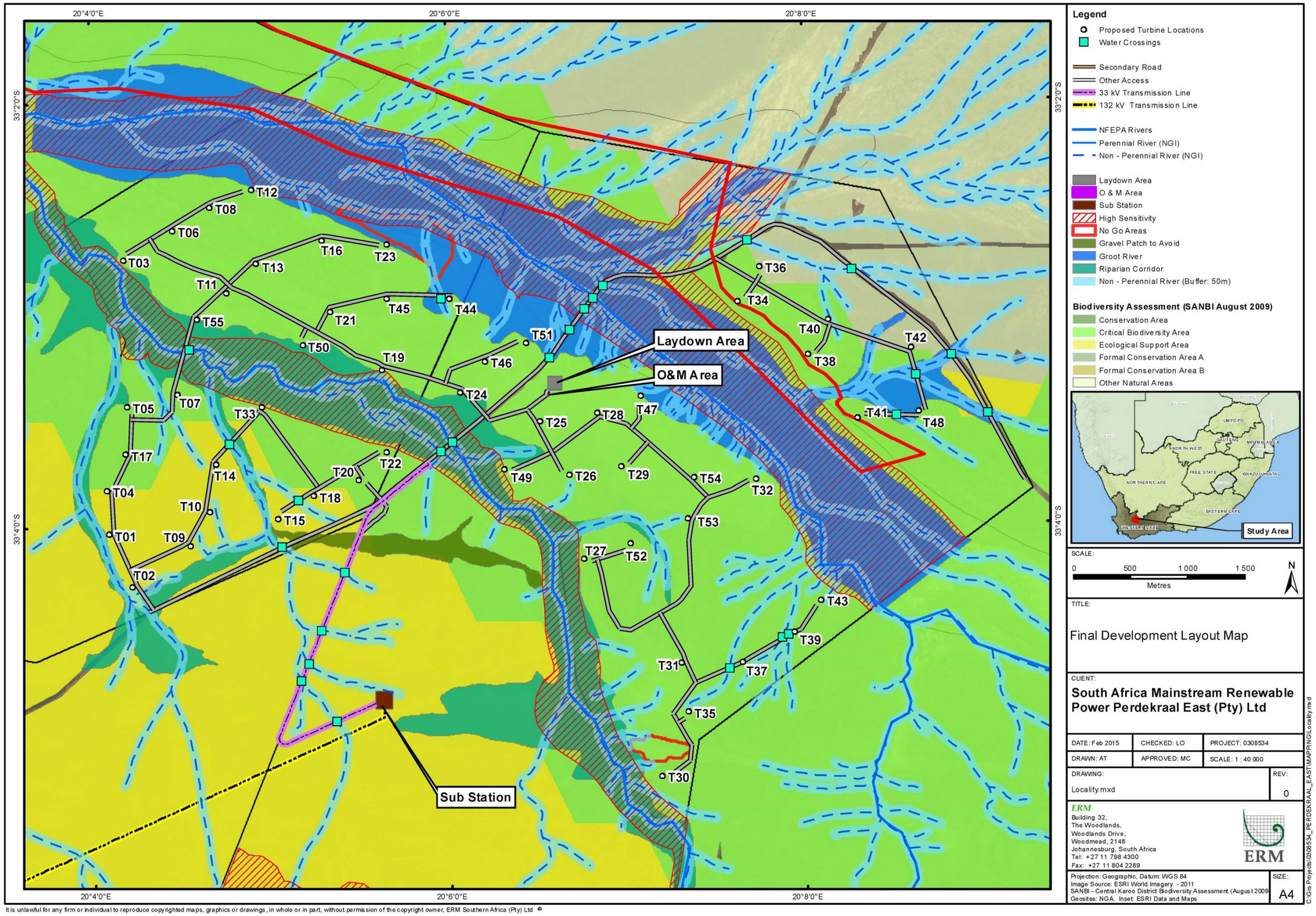
- On-site buildings including accommodation (referred to as the Operations and Maintenance (O&M) area).

- All "no-go" and buffer areas.

- The map has been overlaid with the biodiversity assessment data (August, 2009) of the South African National Biodiversity Institute (SANBI).

The Amendment EA requires that soil heaps and borrow pits be reflected in the final development layout. Soil heaps (temporary for topsoil and subsoil and permanently for excess material) are not reflected in the map as the positions for these will only be known during construction. Further, borrow pits are not envisaged for the construction and operation of the Wind Farm, and are therefore not depicted.

Figure 1.2 Final Development Layout Map



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2 IMPLEMENTATION OF THE FINAL EMPR

2.1 INTRODUCTION

The Final EMPr details the mitigation measures which must be implemented during the development of the Site and assigns responsibilities for specific tasks. The Final EMPr is applicable to all work activities during the pre-construction, construction and operation of the Perdekraal East Wind Farm. It is an open-ended document implying that information gained during pre-construction, construction and operational activities and/or monitoring of procedures on the Site could lead to changes in the Final EMPr.

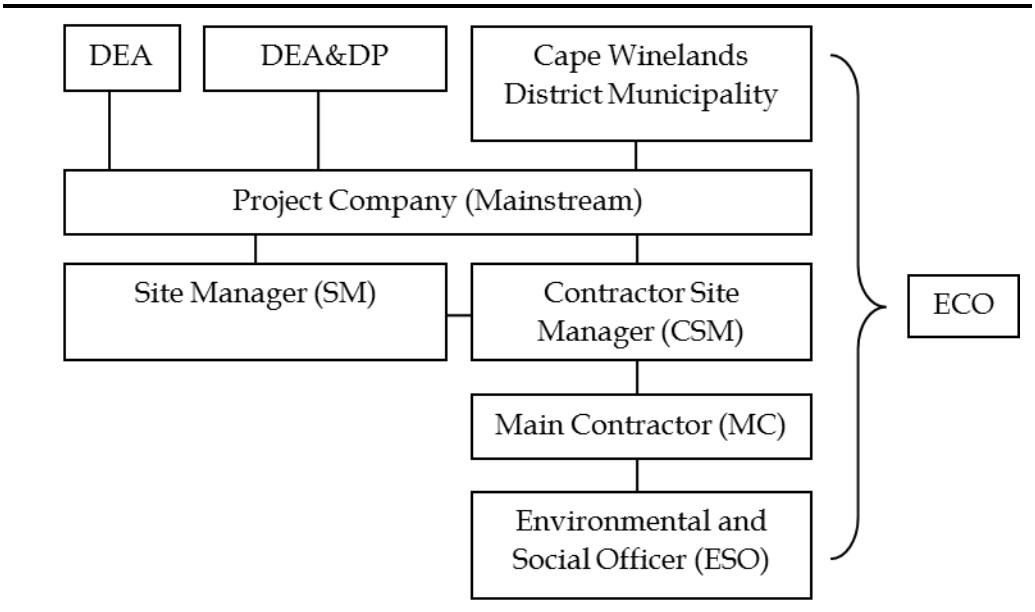
2.2 ROLES AND RESPONSIBILITIES

The key role-players during the construction phase of the Wind Farm, for the purposes of environmental management, include but are not limited to:

- the Project Company;
- Site Manager;
- Main Contractor;
- Environmental and Social Officer;
- Environmental Control Officer; and
- representatives of the relevant authority/ies.

Details of the responsibilities of each of the key role-players have been provided in *Section 2.2* below. Lines of communication and reporting between the various parties are illustrated in *Figure 2.1* below.

Figure 2.1 Roles and Responsibilities: Lines of Communication and Reporting



2.2.1 *Project Company*

The Project Company will have the ultimate responsibility for ensuring the measures outlined in the Final EMPr are implemented during all phases of the project, including pre-construction, construction, operation, and decommissioning and rehabilitation. The Project Company will review and approve contractor plans for delivery upon the actions contained in the Final EMPr and evaluate performance through monitoring and auditing. The responsibilities of the Project Company during the lifecycle of the Perdekraal East Wind Farm are detailed in *Table 2.1* below.

Table 2.1 ***Project Company Responsibilities during the Lifecycle of the Wind Farm***

Phase	Responsibility
Pre-construction	• Implement the recommendations outlined in the Final EMPr (including the recommendations made during the preconstruction walk-throughs); • Implement as many additional recommendations as possible to lessen the total environmental impact of the Project from the design stage, through to construction and ultimately the operational phase.
Construction	• Ensure that all relevant approvals and permits have been obtained prior to the start of construction activities on the site • Ensure that the Final EMPr has been approved by DEA prior to the start of construction activities on the Site • Ensure that DEA has been notified of the date on which construction activities will be starting, prior to commencement of the activity • Ensure that all conditions of approval have been complied with
Operation	• Ensure that all relevant approvals and permits have been obtained prior to the start of operation activities on the Site • Ensure that operation of the Wind Farm is undertaken in line with the requirements of the operational phase EMPr • Continuously seek to improve any negative environmental impacts which result from the operational phase
Decommissioning	• Develop a detailed decommissioning and rehabilitation plan prior to decommissioning the Wind Farm and associated infrastructure • Ensure that all relevant approvals and permits have been obtained prior to the start of construction activities on the site • Ensure that all conditions of approval have been complied with

2.2.2 *Site Manager*

The Site Manager (SM) is responsible for overall construction management as well as the implementation of the Final EMPr and Plans requested by the Department of Environmental Affairs (DEA) (see *Section 6*), and will liaise directly with the Environmental and Social Officer (ESO), Environmental Control Officer (ECO), Main Contractor (MC) and Project Company on environmental, health and safety matters. The SM's responsibilities will encompass the following:

- Management of the site in terms of the conditions of the Environmental Authorisation (EA) and Final EMPr.

- Ensuring construction activities remain within the authorised footprint.

- Monitoring compliance of Site activities on a daily basis.

- Undertake internal audits of construction activities to monitor compliance against the EMPr.

- Recommend the suspension of work activities where such activities contravene the EA or Final EMPr.

- Keep records of:
    - Environmental incidents;
    - Contractors non-compliance to the Final EMPr; and
    - Contractor fines and penalties.

- Implement corrective action if/when non-compliances with EA or Final EMPr are identified.

2.2.3 Main Contractor

The Main Contractor (MC) is responsible for the overall construction of the Site, and ensuring that all construction activities are undertaken in line with the requirements of the EA and Final EMPr. The MC's responsibility encompasses the following:

- Ensure implementation of the EA and EMPr during all works on the Site, including all additional requirements as may be contained in approved method statements.

- Ensure that all sub-contractors', employees, suppliers, agents etc. are fully aware of the environmental requirements detailed in the EA and Final EMPr.

- Liaise closely with the PM, ESO and the ECO and ensure that the works on the Site are conducted in an environmentally controlled manner.

- Inform the PM, ESO and ECO should environmental conditions on the Site deteriorate, e.g. dumping, pollution, littering and damage to vegetation.

- Implement corrective and preventive actions where required.

- Provide an environmental register to record all incidents, complaints or non-compliances during the construction phase.

- Develop specific method statements for construction in environmentally sensitive areas.

- Carry out instructions issued by the PM, ESO or ECO, required to comply with the Final EMPr.

Contractor Site Manager

The Contractor Site Manager (CSM) is responsible for overall contract management with the Main Contractor (MC) and sub-contractors. The CSM's responsibility encompasses the following:

- Establishing contracts between the MC and appointed sub-contractors.

- Liaising with the SM to ensure that the MC and sub-contractors adhere to the Final EMPr.

- Establishing and managing the contract for the supply and installation of the wind turbines (as per the Turbine Supply Agreement (TSA)).

- The TSA contractor will be required to adhere to the Final EMPr and will report to the SM via the CSM.

2.2.4 Environmental and Social Officer

The ESO is appointed by the MC to manage the daily implementation of the Final EMPr and compile weekly environmental and social monitoring reports. The key responsibility of the ESO is to advise the MC on environmental and social/stakeholder issues, liaising with the ECO where necessary and ensuring that all incidents and complaints are addressed in an acceptable manner. The ESO's responsibility encompasses the following:

- Monitoring construction activities on a daily basis to ensure compliance with the EA and Final EMPr.

- Maintaining a detailed register of incidents (including spillage of bitumen, fuels, chemicals, or any other material) and indicating how these issues were addressed, what remediation activities were undertaken, and what preventative measures were implemented to avoid re-occurrence of incidents/complaints.

- Implementation of the grievance mechanism including keeping record of each grievance case and the associated process of resolution and outcome.

- Advising the MC of non-compliances and measures required to achieve compliance.

- Submitting a brief monitoring report to the ECO on a weekly basis.

- Providing environmental and social awareness training to all staff on site.

- Assisting the MC with drafting environmental method statements, or applying for amendments to the Final EMPr if necessary.

2.2.5 Environmental Control Officer

The Project Company will appoint an independent ECO for the duration of the construction phase of the project. The ECO's responsibility encompasses the following:

- Ensure that the MC has a copy of the Final EMPr and all agreed method statements.

- Undertake regular Site inspections (with frequency determined by the nature of the on-site activities as may be appropriate) to audit compliance of all parties with the requirements of the Final EMPr.

- Advise/recommend on actions or issues impacting on the environment to the PM, who shall issue any required Site instructions to the MC.

- Assist the ESO in conducting environmentally awareness training with all staff on site on key requirements of the EMPr, environmental safeguards, good housekeeping practices, and general aspects relating to site sensitivity.

- Review and approve environmental method statements together with the SM (when applicable).

- Assist the MC in finding environmentally responsible solutions to problems that may arise.

- Recommend to the SM the removal of person(s) and/or equipment not complying with the EA and Final EMPr.

- Undertake photographic monitoring of the construction at the site.

- Keep records of all activities/ incidents concerning the environment (including spillage of bitumen, fuels, chemicals, or any other material) on the Site in a Site Diary / Logbook.

- Maintain copies of all reports submitted to the DEA.

- Complete temporary and permanent site closure checklists.

- Take immediate action on the Site to stop works where significant and irreparable damage is being inflicted on the environment, and to inform the SM immediately of the occurrence and action taken.

- Undertake regular internal review of the EMPr and make recommendations regarding its updating to the SM and Project Company.

The ECO has the authority to recommend to the DEA that works be stopped if it is in his/her opinion that serious harm to, or impact on the environment is likely to occur or has occurred and such actual or potential harm or impact is in contravention of the Final EMPr, and which is or may be caused by construction or related works.

In the event of failure by the MC or MC's employee to show adequate consideration to the environmental aspects of their contract, the ECO may recommend to the SM to have the MC's representative or any employee(s) removed from the Site or to suspend work until the matter is remedied.

The ECO shall keep a Site Diary or Logbook in which events and concerns of environmental significance are to be recorded. The ECO will compile a monthly report of such events, concerns and general compliance of the MC with the construction phase requirements of the Final EMPr. The ECO's monthly report will be submitted to the SM and if required, to DEA, the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) and Witzenberg District Municipality. The ECO is also required to attend regular meetings of the project management team to report on environmental issues and to minute the requirements that emerge.

The ECO will be responsible for the compilation of a final completion checklist for the project, completed when all construction works related to the Project have terminated and the Site has been cleared of all construction related debris, materials or equipment not forming part of the permanent works. The completion checklist will audit the MC's compliance with the construction phase requirements of the EMPr throughout the duration of the construction phase and, together with a final written report, will be submitted to the DEA in order to achieve "environmental closure" for the construction phase of the project.

During the construction phase the ECO will be responsible for ensuring the overall environmental and socio-economic objectives of the Final EMPr are met. Specialists such as palaeontologists, archaeologists, bird specialists etc. will be utilised as required. When working on site, the ECO will report to the SM.

2.3 COMMUNICATION CHANNELS

2.3.1 Site Meetings during the Construction Phase

The ECO and ESO are required to attend regular meetings with the Project management team to facilitate the transfer of information and to update all parties on the environmental compliance of the project as a whole. The ECO or

ESO will minute the discussions, and specifically any decisions arising relating to environmental management actions and responsibility.

The ECO will compile a summary report outlining the main construction activities relating to the environment, aspects of non-compliance, and document agreed environmental actions and dates of achieving compliance by the MC. The summary report will form part of the construction phase EMPr records.

The following people should attend these meetings:

- Project Company's Representative;
- SM;
- ECO;
- MC's representative; and
- ESO.

2.3.2 Environmental Education and Awareness

The MC, in consultation with the ESO and/or ECO, shall arrange for a presentation to site staff to familiarise them with the environmental requirements of the construction phase of the Final EMPr prior to the commencement of construction.

This presentation should take cognizance of the level of education, designation and language preferences of the staff. General site staff would commonly receive a basic environmental awareness presentation or talk highlighting general environmental and social "do's and don'ts", including good housekeeping practices. This information would be provided throughout construction in the form of regular toolbox talks.

Management level staff on the Site, e.g. Site agents and foremen, who require more detailed knowledge about the environmental sensitivities on site and the construction phase requirements of the Final EMPr, will benefit from a separate and more detailed presentation of these issues. If required, the ESO and/or ECO may call upon the services of a professional trainer or environmental consultant to present the technical contents of the Final EMPr.

Environmental education of staff can be assisted by compilation of posters placed in staff venues e.g. canteens and site offices.

2.3.3 Method Statements

The MC must compile and provide Method Statements to the ECO and SM for approval prior to the commencement of construction activities. Method statements will be required for specific activities that are deemed or identified to pose a risk to the environment and/or which require site specific detail beyond that contained in the EMPr or when requested by the SM or ECO.

A Method Statement is a "live document" in that modifications are negotiated between the MC and the ECO/project management team, as circumstances unfold. Changes to, and adaptations of, Method Statements can be implemented with the prior consent of all parties. All Method Statements will form part of the construction phase of the Final EMPr documentation and are subject to the terms and conditions contained within the construction phase of the EMPr.

Note that a Method Statement is a starting point for understanding the nature of the intended actions to be carried out and allows for all parties to review and understand the procedures to be followed in order to minimise risk of harm to the environment.

A Method Statement describes the scope of the intended work in a step-by-step description, in order for the ECO and the SM to understand the MC's intentions. This will enable them to assist in devising any mitigation measures, which would minimise environmental impact during these tasks.

For each instance where it is requested that the MC submit a Method Statement to the satisfaction of the SM and ECO, the format must clearly indicate the following:

- What - a brief description of the work to be undertaken;
- How - a detailed description of the process of work, methods and materials;
- Where - a description/sketch map of the locality of work (if applicable);
- When - the sequencing of actions with due commencement dates and completion date estimates;
- Who – The person responsible for undertaking the works described in the Method Statement; and
- Why – a description of why the activity is required.

2.3.4 ESO and ECO Diary/Logbook Entries

The ESO and ECO will maintain a Site diary or logbook that relates to environmental issues as they occur on the Site for record keeping purposes. Recorded issues will form part of feedback presented at Project meetings by the ESO and/or ECO.

2.3.5 Site Memo Entries

Site memos, stipulating recommended actions required to improve compliance with the Final EMPr by the MC will be issued by the ECO to the PM, who in turn will ensure that the MC is informed of the recommended instruction.

Comments made by the ECO in the Site Memo book are advisory and all consequential Site Instructions required may only be issued by the PM. Site Memos will also be used for the issuing of stop work orders to the MC for activities deemed to pose immediate and serious risk of unnecessary damage to the environment.

2.3.6 Dispute Resolution

Any environmentally related disputes or disagreements during the construction phase will firstly be referred to the SM or alternatively to the DEA if no resolution on the matter is reached. Similarly, disputes or disagreements during the operations phase can be referred to the operational SM or the DEA if required.

2.3.7 Community Relations

The Project Company must continue to engage with stakeholders throughout the construction and operation of the Site. Communication with local communities and other local stakeholders will be a key part of this engagement process and will require the Project Company and MC to work closely together during the construction period.

The objectives of communication and liaison with local communities are the following.

- To provide residents in the vicinity of the Site (e.g. Touwsrivier residents and neighbours) and other interested stakeholders with regular information on the progress of work and its implications.

- To monitor implementation of mitigation measures and the impact of construction on communities via direct monitoring and feedback from those affected in order to ensure that mitigation measures are implemented and the mitigation objectives achieved.

- To manage any disputes between the Project Company, the contractors and local community.

This engagement process can also serve to inform the pre-construction establishment of the Community Development Trust linked to the development of the Site.

Grievance Procedure

The Project Company must develop a grievance procedure to ensure fair and prompt resolution of problems arising from the project. The grievance procedure should be underpinned by the following principles and commitments:

- Implement a transparent grievance procedure, and disseminate key information to directly impacted stakeholders.

- Seek to resolve all grievances timeously.

- Maintain full written records of each grievance case and the associated process of resolution and outcome for transparent, external reporting.

The responsibility for resolution of grievances will lie with the Project Company and its contractors.

Social Responsibilities

The Project Company and MC must encourage and implement wherever possible the procurement of locally based labour, skills and materials. This will be in line with the Implementation Agreement (IA) between the Department of Energy (DoE) and Project Company.

3 PERMIT REQUIREMENTS

Activities undertaken during site preparation, construction and operation may require additional permits, over and above the Environmental Authorisation. The Project Company is responsible for ensuring that the necessary permits are in place in order to comply with national and local regulations. Additional permit requirements, including those for heritage, borrow pits, water use and abnormal vehicle loads are described below.

3.1 HERITAGE AND PALAEONTOLOGY

The protection and management of South Africa's heritage resources is controlled by the National Heritage Resources Act (NHRA), 1999 (Act No. 25 of 1999). The objective of the NHRA is to introduce an integrated system for the management of national heritage resources.

Should any archaeological materials (artefacts; cultural material such as historic glass, ceramics, etc.; sub-surface structures, etc.) be uncovered or exposed during earthworks or excavations, they must be reported to the South African Heritage Resources Agency (SAHRA) immediately. After assessment, and if appropriate, a permit will be obtained from SAHRA or Heritage Western Cape to remove such remains.

Similarly, if significant fossils are found, an appropriately qualified palaeontological specialist will investigate the find, and if required, a permit will be obtained from SAHRA or Heritage Western Cape to recover and preserve the paleontological resources for scientific purposes before work can be commenced again

3.2 BORROW PITS

A borrow pit refers to an open pit where material (soil, sand or gravel rock) is removed for use at another location. The Project Company may want to use borrow pits for certain earthworks operations, such as the construction of roads, embankments, bunds, berms, and other structures, if suitable material is not available in the vicinity.

The establishment of borrow pits is regarded as a mining activity and is legislated in terms of the Mineral and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA) and the NEMA. A mining permit will be obtained from the Department of Mineral Resources (DMR) prior to the establishment of borrow pits on the site.

3.3 WATER USE

The Project Company has submitted a Water Use Licence Application (WULA) for potential water uses associated with the development. Water uses that may be of relevance include the following:

- Section 21 (a): Taking water from a water resource, including a water course, surface water, estuary or aquifer (i.e. borehole);
- Section 21 (c): Impeding or diverting the flow of water in a watercourse; and
- Section 21 (i): Altering the bed, banks course and characteristics of a watercourse.

In accordance with *Condition 28* of the original Environmental Authorisation (Ref: *12/12/20/1783*), the licence is required prior to the construction phase.

3.4 VEGETATION CLEARANCE

Before the clearing of the site, a permit to clear the site and relocate species of concern is required from CapeNature. This requires the walk-through report as well as the identification and quantification of all listed and protected species within the development footprint. Where large numbers of listed species are affected a site inspection and additional requirements may be imposed by CapeNature as part of the permit conditions. All documentation associated with this process needs to be retained and the final clearing permit must be kept at the site.

There are no listed tree species present at the site and a permit from the Department of Agriculture, Forestry and Fisheries (DAFF) to clear protected trees is therefore not required.

3.5 ABNORMAL VEHICLE LOADS

Wind turbine components will be delivered to site using road transport and due to the size of the components; the vehicles used for delivery will be considered abnormal loads in terms of the Road Traffic Act (Act No. 29 of 1989).

A permit for a vehicle carrying an abnormal load will be obtained from the relevant Provincial Authority prior to the transport of abnormal loads. The vehicle must comply with the Administrative Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads, issued by the Department of Transport.

4 MITIGATION AND MONITORING MEASURES

Mitigation and monitoring measures are presented in this section under the following headings:

- Planning and Design Phase (pre-construction);
- Construction Phase;
- Operational Phase; and
- Decommissioning Phase.

Mitigation and monitoring measures presented in the tables below have been prescribed by the EMP of the original EIA, the EA and specialist recommendations.

4.1 PLANNING AND DESIGN PHASE (PRE-CONSTRUCTION)

The following actions listed in *Table 4.1* are applicable to the planning and design phase of the Perdekraal East Wind Farm.

This table includes actions that may have been completed historically or are in progress given that the Project Company is currently in the planning and design phase. For this reason, the status of each action item has been included in this table, different to subsequent project phases.

Table 4.1 Environmental Mitigation and Monitoring Measures – Planning and Design Phase (pre-construction)

PLANNING AND DESIGN PHASE								
Aspect		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**	**Status**
#	**Description of Aspect**		**#**	**Commitment / Actions Required / Key Controls**				
General								
1.	Compliance to the EA (Ref: *12/12/20/1783*)	Notify all registered Interested and Affected Parties of Environmental Authorisation.	1.1	Notify all registered I&APs and key stakeholders of the Environmental Authorisation opportunity and appeal procedure.	Proof of Notification	Project Company	Within 5 days from the issuing of the Environmental Authorisation.	I&APs were notified of the granting of the EA on the 9th January 2012.
		Ensure compliance with legal and other permitting requirements.	1.2	Ensure that all relevant legal EA requirements have been met.	Inclusion of Mitigations Measures	Project Company	Prior to construction	In process
		Incorporate any additional mitigation measures recommended by specialists during micro-siting into the EMPr.	1.3	Update and resubmission of EMPr with mitigation measures detailed in the monitoring and walkthrough reports and management plans undertaken prior to construction.	Submission of EMPr to DEA	Project Company	Prior to construction	Subject of this document
2.	Compliance to the Amendment EA (Ref: *12/12/20/1783/2/AM1*)	Compliance with the conditions of the Amendment EA	2.1	A copy of the final development layout map must be made available for comments by registered I&APS and the applicant must consider such comments.	Proof of Notification to I&APs Comments and Responses Report	Project Company	Prior to construction	Stakeholders and registered I&APs were provided with the final development layout map for a 30 day commenting period from 13th November 2015 to 13th December 2015 (*Annex A*). Comments and

PLANNING AND DESIGN PHASE								
Aspect		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**	**Status**
#	**Description of Aspect**		**#**	**Commitment / Actions Required / Key Controls**				
								responses are attached as *Annex B* and minutes of a workshop held between Mainstream, EWT and Cape Nature attached as *Annex C*.
			2.2	Once amended, the final development layout map must be submitted to the DEA for written approval prior to commencement of the activity.	Proof of Submission of Final Development Layout Map	Project Company	Prior to construction	Please refer to Figure 1.2
			2.3	A shapefile of the approved development layout must be submitted to the DEA within two months from the date of the decision of the Amendment EA.	Proof of Submission of Final Development Layout Map	Project Company	Prior to construction	Shapefile has been submitted to DEA.
			2.4	The applicant must notify all registered I&APs in writing and within 12 days of the date of the Department's decision in respect of the amendments made as well as the provision regarding the submission of appeals.	Proof of Notification	Project Company	12 days after receipt of Amendment EA	I&APs were notified of the granting of the EA on the 12th December 2014.
3.	Waste and Effluent	Prevent soil and/or groundwater contamination from waste and effluent.	3.1	A suitable area for the storage of waste must be selected (away from water courses) and included in the site layout plan when this information becomes available.	Final Design	Project Company	Prior to construction	To be undertaken with the building plan approvals following financial close.
Biophysical Impacts								
4.	Impact on Surface and Groundwater	General conditions to manage	4.1	A stormwater management plan must be developed for the site to	Stormwater Management	Project Company	Prior to construction	Stormwater management plan

PLANNING AND DESIGN PHASE								
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing	Status
#	Description of Aspect		#	Commitment / Actions Required / Key Controls				
		potential impacts on surface and groundwater through appropriate design measures		ensure compliance with applicable regulations and to prevent off-site migration of contaminated stormwater or increased soil erosion. The stormwater management plans should form part of the EMPr.	Plan			has been developed (*Annex M*) and mitigation / management measures are included in this EMPr.
			4.2	Existing drainage must not be altered, especially in sensitive areas.	Final Design	Project Company	Prior to construction	To be undertaken during final design.
			4.3	Stormwater run-off will be discharged away from water courses (drainage channels, streams or dams).	Final Design	Project Company	Prior to construction	To be undertaken during final design.
			4.4	Construction must include appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and ground water flows. Drainage measures must promote the dissipation of stormwater run-off.	Final Design	Project Company	Prior to construction	To be undertaken during final design.
			4.5	Internal access roads must be located to minimize stream crossings. All structures crossing streams must be located and constructed so that they do not decrease channel stability or increase water velocity.	Final Design	Project Company	Prior to construction	To be undertaken during final design.
			4.6	All streams, rivers, pans, wetlands, dams and their catchments and other environmental sensitive areas must be protected from the	Final Design	Project Company	Prior to construction	To be undertaken during final design.

PLANNING AND DESIGN PHASE								
Aspect		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**	**Status**
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				direct or indirect spillage of pollutants. Diverting the runoff through a sand oil grease trap may be an option; however this will need to be assessed at the time of the detailed design phase.				
		Minimise impacts on surface and groundwater as a result of <u>erosion</u> through implementation of stormwater management measures	4.7	Implement energy dissipater structures where concentrated flows occur as a result of the development	Final Design	Project Company	Prior to construction	To be undertaken during final design.
			4.8	Implement gabion erosion control structures in the natural drainage lines where erosional features become evident	Final Design	Project Company	Prior to construction	To be undertaken during final design.
			4.9	Design road networks such that diffuse surface flows are promoted and the accumulation of high energy surface flows are prevented. This could be achieved by including surface cross drains at regular intervals, by constructing road to natural ground level or by incorporating adequate drainage in the form of culverts.	Final Design	Project Company	Prior to construction	To be undertaken during final design.
			4.10	Roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated.	Final design	Project Company and MC	Prior to construction	To be undertaken during final design.
		Minimise impacts on surface and groundwater as a result of <u>sedimentation</u> through	4.11	Implement appropriate measures to trap sediment at sources where areas are going to be disturbed (e.g. construction materials laydown area). Mitigation measures could include sediment	Final Design	Project Company	Prior to construction	To be undertaken during final design.

PLANNING AND DESIGN PHASE								
Aspect		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**	**Status**
#	**Description of Aspect**		**#**	**Commitment / Actions Required / Key Controls**				
		implementation of stormwater management measures		fences and erosion control blankets.				
		Mitigation of the possible risk of flooding	4.12	Perform detailed flood risk assessment and develop a detailed stormwater management plan as part of detailed design phase	Flood Risk Assessment and Stormwater Management Plan	Project Company	Prior to construction	To be undertaken during final design.
			4.13	Implement free draining platforms (if required) for the substations and transformers to prevent the risk of flooding of infrastructure.	Final Design	Project Company	Prior to construction	To be undertaken during final design.
			4.14	The substation should be located outside the 1:100 year flood line, and should not lead to concentrated flows which could lead to erosion.	Final Design	Project Company	Prior to construction	Exact floodlines have not been delineated yet. The 1:100 flood lines will be determined prior to construction, during the detailed design phase. Should the substation be found to be located within the floodline, further micro-siting thereof would be required.
5.	Impact on Agricultural Land	Minimise disruption to agricultural activities and loss of agricultural land.	5.1	An agricultural impact assessment must be undertaken for the site prior to construction.	Proof of agricultural impact assessment	Project Company	Prior to construction	Completed, refer to *Annex F*.
			5.2	In terms of the development layout plan, areas of disturbance need to be minimised and contractors must be held to comply with the	Code of Conduct	Project Company	Prior to construction	This will form part of the contract documentation.

PLANNING AND DESIGN PHASE								
Aspect		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**	**Status**
#	**Description of Aspect**		**#**	**Commitment / Actions Required / Key Controls**				
				minimal areas of disturbance in their contracts/specifications.				
6.	Impact on Flora	Minimise impacts to flora associated with the loss of vegetation through appropriate planning and design measures.	6.1	Adhere to the restrictions and exclusion zones incorporated into the Final Layout.	Final Layout	Project Company	Prior to construction	All exclusion zones as per the specialist reports have been adhered to as per the final development layout map.
			6.2	Underground cables and internal access roads must be aligned as much as possible along existing infrastructure to limit damage to vegetation and watercourses.	Final Layout	Project Company	Prior to construction	Existing roads and tracks will be used where possible, as is the case with the access road to the new project substation, where the existing farm road will be upgraded to four meters wide.
			6.3	As per the Environmental Authorisation, all turbines must be located at least 100 m from the edge of any highly sensitive areas (wetlands, vegetation and water resources).	Final Layout	Project Company	Prior to construction	All turbines have been located outside of gravel patches (where listed species are expected to occur) and riparian corridors and 250m from the centre of the Groot River.
			6.4	Existing road infrastructure must be used as far as possible for providing access to the proposed turbine positions. Where no road infrastructure exists, new roads should be placed within existing disturbed areas, as far as possible,	Final Layout	Project Company and MC	Prior to construction	The site will be accessed via a gravel road which connects to the R356 in the west, and the R354 in the east. An internal gravel road network

PLANNING AND DESIGN PHASE								
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing	Status
#	Description of Aspect		#	Commitment / Actions Required / Key Controls				
				or environmental conditions must be taken into account to ensure the minimum amount of damage is caused to natural habitats.				will be used by construction vehicles and will be retained throughout the lifetime of the facility.
			6.5	Temporary construction lay-down or assembly areas will be sited on transformed areas.	Final Detailed Design Layout	Project Company	Prior to construction	To be undertaken during final design.
			6.6	Develop the following management plans that must be implemented during construction and operation: • Stormwater Management Plan; • Alien Management Plan; • Plant Rescue and Protection Plan; • Restoration and Rehabilitation Plan; and • Open Space Management Plan.	Management Plans	Project Company	Prior to construction	These plans have been developed by Simon Todd Consulting and GroundTruth Water, Wetlands and Environmental Engineering and are attached as *Annex M – Anne Q*. The mitigation, management and monitoring measures have been included in this EMPr.
		Minimise impacts to flora associated with the loss of vegetation through appropriate alien invade plant management	6.6	Document alien species present at the site prior to construction	List of alien species	Project Company	Prior to construction	Mainstream will conduct a walk-through of the site prior to construction to identify and document alien species.
		Minimise impacts associated with vegetation loss	6.8	Identification of all listed species which may occur within the site, based on the SANBI SIBIS database	List of listed species	Project Company	Prior to construction	Simon Todd Consulting was appointed to conduct

PLANNING AND DESIGN PHASE								
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing	Status
#	Description of Aspect		#	Commitment / Actions Required / Key Controls				
		through implementation of the plant rescue and protection plan		as well as the specialist EIA studies for the site and any other relevant literature				a walk-through of the site during which listed and protected species encountered were documented (refer to *Table 1* of *Annex J*).
			6.9	A walk-through of the final development footprint by a suitably qualified botanist/ecologist. This should happen during the flowering season at the site which depending on rainfall is likely to be during spring to early summer (August-October).	Walk-through	Project Company	Prior to construction	Simon Todd Consulting was appointed to conduct a walk-through of the site from the 30th September to the 2nd October 2015 (refer to *Annex J*).
			6.10	A walk-through report which identifies areas where minor deviations to roads and other infrastructure can be made to avoid sensitive areas and important populations of listed species. The report should also contain a full list of localities where listed species occur within the development footprint and the number of affected individuals in each instance.	Walk-through report	Project Company	Prior to construction	Refer to Fauna and Flora Preconstruction Walk-Through Report attached as *Annex J*.
			6.11	A permit to clear the site and relocated species of concern is required from CapeNature before construction commences.	Permits	Project Company	Prior to construction	Based on the findings of the walk-through, the relevant permits will be applied for prior to construction
			6.12	Conduct a search and rescue	Search and	Project	Prior to construction	Mainstream will

PLANNING AND DESIGN PHASE								
Aspect		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**	**Status**
#	**Description of Aspect**		**#**	**Commitment / Actions Required / Key Controls**				
				operation of all listed species within the development footprint that cannot be avoided. Affected individuals should be translocated to a similar habitat outside of the development footprint and marked for monitoring purposes.	Rescue Operation Translocation	Company		conduct a Search and Rescue of the construction areas with the help of a qualified botanist prior to construction.
7.	Impacts on Fauna	Minimise impacts to onsite fauna through appropriate planning and design measures.	7.1	Adhere to the restrictions and exclusion zones incorporated into the Final Layout.	Final Layout	Project Company	Prior to construction	All exclusion zones as per the specialist reports have been adhered to as per the final development layout map.
			7.2	Where roads pass right next to water bodies, provision should be made for fauna (e.g. toads) to pass under the roads by using culverts or similar.	Final Design	Project Company	Prior to construction	To be incorporated with the final design.
			7.3	Bridge design must minimise impact to the riparian areas with minimal alterations to water flow and must be permeable to movement of fauna and flora.	Final Design	Project Company	Prior to construction	To be incorporated with the final design.
		Minimize the impact on the riverine rabbit due to habitat loss through appropriate planning and design measures	7.4	Implement *Phase 1: Initial Phase* of the Riverine Rabbit Monitoring Programme (*Annex H*): • Undertake a preliminary site visit to assess the extent and nature of potentially suitable habitat at the site, in the field. • Decide on the preliminary survey camera trap density and grid extent contingent on the above findings and known	Implementation of the Riverine Rabbit Monitoring Programme.	Project Company	Prior to construction	As per the Riverine Rabbit Monitoring ToR (Annex H) – 6 months pre-construction monitoring will begin once equipment is mobilized, expected Quarter 2 of 2016

PLANNING AND DESIGN PHASE								
Aspect		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**	**Status**
#	**Description of Aspect**		**#**	**Commitment / Actions Required / Key Controls**				
				Riverine Rabbit camera-trap sampling practice • Initiate an initial camera trapping campaign, for a minimum period of 2 weeks. • After the initial period, evaluate the images recorded. If rabbits are observed, initiate the second stage of monitoring, Observation Phase. If no rabbits are observed, move the cameras to new potential sites for at least 2 weeks. Repeat for at least 3 iterations or until such time as the cameras have been in the field for at least 3 months. • If no rabbits are observed after 3 months, the camera trapping campaign should be reviewed with the possibility of exiting the program or extending monitoring for another 3 months with the existing or a low-level monitoring design.				
			7.5	Implement *Phase 2: Observation Phase* of the Riverine Rabbit Monitoring Programme (*Annex H*): • Based on the occurrence of rabbits determined through the initial phase, decide on the monitoring protocol and establish a new camera trap	Implementation of the Riverine Rabbit Monitoring Programme.	Project Company	Prior to construction	Following the implementation and results of Phase 1.

PLANNING AND DESIGN PHASE								
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing	Status
#	Description of Aspect		#	Commitment / Actions Required / Key Controls				
				density and grid extent contingent on the findings as well as the proximity to the turbine layout, with an outlook towards construction and post-construction phase monitoring. • These new camera grids must be deployed for a minimum of six months at a fine-scale resolution in these target areas in order to develop a baseline of rabbit density and activity patterns within these areas.				
			7.6	Incorporate the Adamskraal and Groot River buffers in the final layout.	Final Layout	Project Company	Prior to construction	Turbines have been located outside of the 250m buffer from the centre of the Groot River Bed. Refer to the development layout map (*Figure 1.2*).
			7.7	Minimise habitat destruction by keeping laydown areas as small as possible, limit size/length of roads and development footprint to the minimum required	Final Design	Project Company	Prior to construction	To be incorporated with the final design
8.	Impacts on Avifauna	Mitigate the potential impact on avifauna associated with habitat disturbance and collisions.	8.1	Exclude development from within 500 m of the centre of the large dam on the farm Rietpoort.	Final Layout	Project Company	Prior to construction	Turbines have been located outside of the 500m buffer of the dam. Refer to the development layout map (*Figure 1.2*).
			8.2	Exclude development from within	Final Layout	Project	Prior to construction	Turbines have been

PLANNING AND DESIGN PHASE								
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing	Status
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				250 m of the centre of the Groot River bed.		Company		located outside of the 250m buffer from the centre of the Groot River Bed. Refer to the development layout map (*Figure 1.2*).
			8.3	Minimize the length of any new power lines installed i.e. the proposed 132 kV and 33 kV transmission lines, should be kept as short as possible.	Final Design	Project Company	Prior to construction	To be incorporated with the final design.
			8.4	Ensure that all new lines are marked with bird flight diverters. Bird-diverters must be fitted in place so that they do not drift along the line and be readily and cost effectivity installed. Diverters should be fitted in consultation with an avifaunal specialist.	Visual Inspection Final Design	Project Company, MC, ESO and ECO	Throughout construction	To be incorporated with the final design.
			8.5	All new power infrastructure must be adequately insulated and bird friendly in configuration (i.e. to prevent perching or roosting).	Final Design	Project Company	Prior to construction	To be incorporated with the final design.
			8.6	Ensure as far as possible, and as allowed for by the CAA, that lighting on the turbines is kept to a minimum and is coloured (red or green) and intermittent, rather than permanent and white, to reduce confusion effects for nocturnal migrants.	Final Design	Project Company	Prior to construction	To be incorporated with the final design.
			8.7	The overall construction footprint, including new road infrastructure,	Final Layout	Project Company	Prior to construction	The land take by the turbines, roads and

PLANNING AND DESIGN PHASE								
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				laydown areas, construction camps, O&M buildings and the new project substation, should be limited as far as possible as to minimize disturbance and overall habitat destruction.				infrastructure would take up approximately 22ha or 0.73 percent of the overall site area.
			8.8	The Site must be designed to discourage the use of infrastructure components as perching or roosting substrates by birds and bats.	Final Detailed Design	Project Company	Prior to construction	To be incorporated with the final design.
			8.9	Monitor the local avifauna pre-construction and implement appropriate additional mitigation as and when significant changes are recorded in the number, distribution or breeding behaviour of any of the priority species (i.e. Lanner Falcon and Martial Eagle), or when collision or electrocution mortalities are recorded.	Pre-Construction Avian Monitoring Plan	Project Company	Prior to construction	AVISENSE Consulting visited and surveyed the proposed site and surrounding areas on the 24th September 2015 in order to determine and suggest mitigation for location-specific construction-phase impacts on birds, immediately before the commencement of construction (refer to *Annex I*). Additional mitigation measures have been incorporated in this EMPr.
9.	Impact on Bats	Mitigate impacts on bats through	9.1	Maintain a 50 m buffer around the Groot and Adamskraal Rivers,	Final Layout	Project Company	Prior to construction	Turbines have been located outside of the

PLANNING AND DESIGN PHASE								
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing	Status
#	Description of Aspect		#	Commitment / Actions Required / Key Controls				
		habitat loss caused by destruction, disturbance and displacement.		their floodplains, and other Freshwater Ecological Protection Areas (FEPAs).				250m buffer from the centre of the Groot River Bed. Refer to the development layout map (*Figure 1.2*).
			9.2	All areas assessed as High Sensitivity must be considered as 'No-go' areas.	Final Layout	Project Company	Prior to construction	No-Go areas have been incorporated into the final development layout.
			9.3	Conduct 6 months of bat monitoring at height.	Pre-Construction Monitoring Report	Project Company	Prior to construction	IWS have been commissioned to undertake 6 months of bat monitoring at height for the months of February – July.
			9.4	Minimise artificial lighting at night, especially high-intensity lighting, steady-burning, or bright lights such as sodium vapour, quartz, halogen, or other bright spotlights. Lights should be hooded downward and directed to minimise horizontal and skyward illumination. All internal turbine nacelle and tower lighting should be switched off when unoccupied.These requirements exclude CAA light fixtures.	Final Design	Project Company	Prior to construction	To be incorporated with the final design.
			9.5	Turbines need to be approximately 250 m apart from blade tip to blade tip.	Final Layout	Project Company	Prior to construction	The minimum distance between turbines in the final development layout is approximately

PLANNING AND DESIGN PHASE								
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing	Status
#	Description of Aspect		#	Commitment / Actions Required / Key Controls				
								330m.
Socio-Economic Impacts								
10.	Health and Safety	Ensure the health and safety of site personnel through appropriate design and planning measures prior to construction.	10.1	A health and safety programme must be developed to protect both workers and the general public during construction, operation and decommissioning of the Wind Farm. The plan must also establish a safety zone for wind turbines from residences and occupied buildings, roads, rights-of-way and other public access areas that is sufficient to prevent accidents resulting from the operation of the wind turbines.	H&S Programme	Project Company	Prior to construction	H&S programme will be developed prior to construction.
			10.2	An Emergency Response Plan (ERP) must be developed prior to construction to provide procedures to be followed in the event of an emergency.	Emergency Response Plan	Project Company	Prior to construction	The ERP will be developed prior to construction, but following the submission of the Final EMPr
			10.3	Obtain approval from the South African Weather Services (WeatherSA) that the energy facility will not interfere with the performance of their equipment, especially radar, prior to commencement of the activity.	WeatherSA Approval	Project Company and MC	Prior to construction	Approval has been obtained. Refer to *Annex R*.
			10.4	Obtain a permit or approval from the South African Civil Aviation Authority that the wind facility will not interfere with the performance of aerodrome radio Communication, Navigation and	South African Civil Aviation Authority Approval	Project Company and MC	Prior to construction	Approval has been obtained. Refer to *Annex S*.

PLANNING AND DESIGN PHASE								
Aspect		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**	**Status**
#	**Description of Aspect**		**#**	**Commitment / Actions Required / Key Controls**				
				Surveillance (CNS) equipment especially the radar prior to commencement of the activity. The approval/permit must be submitted to the Director: Environmental Impact Evaluation.				
			10.5	Potential interference with public safety communication systems (e.g. radio traffic related to emergency activities) must be avoided.	Permits in line with the Electronic Communication Act (Act No. 36 of 2005)	Project Company and MC	Prior to construction	Mainstream have permits in line with the Electronic Communication Act (Act No. 36 of 2005) from Vodacom, MTN, Cell C, South African National Defence Force (SANDF) etc.
11.	Traffic Impact	Minimise negative effects associated with the increase in traffic through appropriate planning and design measures.	11.1	A transportation plan must be undertaken prior to construction to determine the most appropriate route to site.	Transport Study	Project Company and MC	Prior to construction	Please note that the preliminary transport study has been undertaken by ALE Heavylift South Africa (Pty) Ltd for the main routes and secondary routes to the Perdekraal East Wind Farm. A transportation plan will be finalised prior to construction, but following the submission of the Final EMPr.
			11.2	Develop a Traffic Management Plan including strict controls over driver training, vehicle maintenance, speed restrictions, appropriate road safety signage, and vehicle loading and maintenance measures.	Traffic Management Plan	Project Company and MC	Prior to construction	
			11.3	All necessary transportation permits to be applied for and	Transportation Permits	Project Company and	Prior to construction	Still to be undertaken prior to construction.

PLANNING AND DESIGN PHASE								
Aspect		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**	**Status**
#	**Description of Aspect**		**#**	**Commitment / Actions Required / Key Controls**				
				obtained from the relevant authorities prior to construction, including permits for abnormal loads.		MC		
12	Noise Impacts	Minimise impacts associated with noise generated by turbines through appropriate planning and design measures	12.1	All wind turbines should be located at a setback distance of 500m from any homestead and a day/night noise criteria level at the nearest residents of 45 dB(A) should be used to locate the turbines. The 500m setback distance can be relaxed if local factors, indicates that a noise disturbance will not occur.	Final Layout	Project Company	Prior to construction	A noise specialist will be consulted and his / her input will ensure approximate 500m condition conformity.
13.	Visual Impacts	Minimise visual impacts	13.1	A 250 m setback for the wind turbines from farm boundaries that are not part of the Project should be observed.	Final Layout	Project Company	Prior to construction	Refer to the development layout map. The turbines will be micro-sighted during the detailed final design which will ensure that the visual buffer of 250m is adhered to.
			13.2	The new project substation and O&M buildings should be located a maximum setback distance as possible from local district roads as per requirements of the Visual Impact Assessment.	Final Layout	Project Company	Prior to construction	The substation and O&M buildings are located approximately 190m from the local district road however this infrastructure will be grouped together to minimise the scatter of buildings across the site.

PLANNING AND DESIGN PHASE								
Aspect		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**	**Status**
#	**Description of Aspect**		**#**	**Commitment / Actions Required / Key Controls**				
			13.3	Cables to be located underground as far as possible and must be placed in disturbed footprint areas wherever possible	Final Layout	Project Company	Prior to construction	The wind turbines will be connected to one another and to the substation by means of underground medium voltage cables. These cables will run along the road network required to connect the turbines, the placing of these cables will therefore not increase the footprint of the facility.
			13.3	The design of the buildings to be compatible in scale and form with buildings of the surrounding rural area, and with the regional architecture.	Final Layout	Project Company	Prior to construction	To be incorporated during final design.
			13.4	All yards and storage areas to be enclosed by masonry walls.	Final Layout	Project Company	Prior to construction	To be incorporated during final design.
			13.5	The roads should generally follow the grain of the land, and their alignments fine-tuned to fit the topography.	Final Layout	Project Company	Prior to construction	To be incorporated during final design.
			13.6	A lighting engineer must be consulted to assist in the planning and placement of light fixtures (excluding CAA light fixtures) to reduce visual impacts.	Final Layout	Project Company	Prior to construction	To be undertaken during final design.
14.	Damage or Destruction	Avoid damage or	14.1	Avoid disturbance or damage to	Final Layout	Project	Prior to construction	To be undertaken

PLANNING AND DESIGN PHASE								
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing	Status
#	Description of Aspect		#	Commitment / Actions Required / Key Controls				
	of Cultural Heritage Interests	destruction of cultural heritage aspects		buildings and structures by maintaining 500 m buffers around the on-site dwellings.		Company and MC		during final design.
			14.2	Maintain a 200 m buffer zone around cemeteries or graves onsite. Graves should only be marked close to the time of the construction when the site has been "handed over" to the MC.	Final Layout	Project Company	Prior to construction	A 200m buffer zone has been established around graves. Refer to the final development layout.
			14.3	Clearly demarcate 'No-go' areas before construction commences (using fencing and appropriate signage).	Visual Inspection	Project Company	Prior to construction	To be undertaken prior to construction
			14.4	Any changes to turbine layout which results in a sensitive buffer area being transgressed will require additional survey work to ensure that no sites are directly impacted and/or to identify the need for an excavation permit.	Survey Report	Project Company, MC, ESO and ECO	Throughout construction	Paleontological and heritage walk-throughs of the site have been conducted and reports compiled (*Annex K* and *Annex L*) as part of the pre-construction. Recommendations in these reports have informed the final development layout.
			14.5	The archaeologist must have sight of the final layout including detailed turbine pad footprints and access roads (indicating width) prior to construction commencing.	Final Layout submission to ACO Associates	Project Company	Prior to construction	The archaeologist was provided with the final development layout which incorporated the recommendations of the walk-through.
15.	Socio-Economic Impacts	Enhance community	15.1	Implement measures to enhance local community benefits (such as	Community Development	Project Company	Prior to operation	To be undertaken during construction

PLANNING AND DESIGN PHASE								
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing	Status
#	Description of Aspect		#	Commitment / Actions Required / Key Controls				
		benefits and ensure that employment of local people is maximised and procurement of local, regional and national services is maximised.		community shareholding schemes and trusts) outlined in the Implementation Agreement (IA) between the Department of Energy (DoE) and Project Company.	Trust Documentation			and operation.
			15.2	Establish a recruitment and procurement policy in consultation with the MC which sets reasonable targets for the employment of South African and local residents/ suppliers (originating from the local municipality) and promote the employment women as a means of ensuring that gender equality is attained. Criteria will be set for prioritising, where possible, local (local municipal) residents/suppliers over regional or national people/suppliers. The MC will be required to recruit and procure in terms of the Project Company's recruitment and procurement policy.	Recruitment Policy	Project Company	Prior to construction	To be undertaken prior to construction
			15.3	A 'Code of Conduct' will be developed prior to construction for all workers directly related to the project, and will be included in the contract documentation.	Code of Conduct	Project Company	Prior to construction	Code of Conduct will be developed during the Contractor tender process.
			15.4	Work closely with relevant local authorities, community representatives and organisations to ensure that the use of local labour and procurement is maximised.	Meeting Minutes	Project Company	Prior to construction	To be undertaken prior to construction.

4.2 *CONSTRUCTION PHASE*

The following requirements are applicable during the construction of the Perdekraal East Wind Farm.

Table 4.2 Environmental Mitigation and Monitoring Measures – Construction Phase

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
General Conditions							
1.	Compliance with the EA (Ref: 12/12/20/1783) and EMPr	Confirm the Project Company's and MC's commitment to the EA and Final EMPr.	1.1	Ensure that the EMPr is available at the site.	Copy of signed EMPr on Site	Project Company, MC, ESO, and ECO	Prior to construction
			1.2	Signed commitment from subcontractors to compliance with EMPr.	Copy of signed EMPr on Site	Project Company, MC, ESO, and ECO	Prior to construction
			1.3	Appoint an independent ECO, who has expertise in the field, for the construction phase. The ECO will have the responsibility to ensure that the mitigation/rehabilitation measures and recommendations referred to in the original Environmental Authorisation are implemented and to ensure compliance with the provisions of the EMPr.	Appointment of ECO	Project Company, MC, ESO, and ECO	Prior to construction
			1.4	Once appointed, the name and contact details of the ECO must be submitted to the *Director: Compliance Monitoring* of the DEA.	Record of Correspondence with DEA	Project Company, MC, ESO, and ECO	Prior to construction
			1.5	The ECO shall keep records of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.	Visual Inspection	Project Company, MC, ESO, and ECO	Throughout construction
			1.6	A detailed incident (including spillage of bitumen, fuels, chemicals, or any other material) and complaint register must be kept on site indicating how these issues were addressed, what rehabilitation measures were taken and what preventative measures were implemented to avoid re-occurrence of incidents/complaints.	Incident and complaint register	Project Company, MC, ESO, and ECO	Throughout construction
			1.7	The ECO must maintain the following on site: • A daily site diary;	Site Diary	Project Company, ESO and ECO	Throughout construction

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
				• Copies of all reports submitted to the DEA; and • A schedule of current site activities including the monitoring of such activities.			
			1.8	The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the Site is ready for operation.	Contract Documentation	Project Company and ECO	Throughout construction
			1.9	Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.	Records	Project Company and ECO	Throughout construction
			1.10	Notify DEA prior to commencement of the activity.	Proof of Notification	Project Company	14-days in advance of commencement of construction
		Construction Audit Requirements	1.11	All documentation e.g. audit/monitoring/ compliance reports and notifications, required to be submitted to the DEA must be submitted to the *Directorate: Compliance Monitoring* at the Department.	Records of Submission of ECO Reports	Project Company and ECO	During construction and prior to operation
			1.12	The Project Company must submit an environmental audit report upon completion of the construction and rehabilitation activities.	Environmental Audit Report	Project Company and ECO	Upon completion of construction and rehabilitation activities.
			1.13	The environmental audit report must: • Be complied by an independent environmental officer (i.e. the ECO); • Indicate the date of the audit, the name of the auditor and the outcome of the audit; • Evaluate compliance with the requirements of the approved EMPr	Environmental Audit Report	Project Company and ECO	Upon completion of construction and rehabilitation activities.

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
				and the Environmental Authorisations; • Include measures to be implemented to attend to any non-compliances or degradation noted; • Include copies of any approval granted by other authorities relevant to the development for the reporting period; and • Highlight any outstanding environmental issues that must be addressed, along with recommendation for ensuring there issues are appropriately addressed.			
2.	Pollution of the environment caused by construction waste.	Limit the potential for site pollution and the accumulation of waste materials on site. Refuse and waste refers to all solid waste, including construction debris, timber, cans etc.	2.1	An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate.	Waste Management Policy	Project Company, MC and ESO	Throughout construction
			2.2	All general waste that cannot be reused or recycled will be placed in a skip and must be removed off site and disposed of at a licensed municipal disposal site in terms of section 20(b) of the National Environmental Management: Waste Act, 2008 (Act 59 of 2008).	Waste Manifest	Project Company, MC and ESO	Throughout construction
			2.3	All waste must be separated into clearly marked skips for recycling, reuse and disposal.	Waste Management Policy Visual Inspection	Project Company, MC and ESO	Throughout construction
			2.4	Vegetative material will be kept on site and mulched after construction to be spread over the disturbed areas to enhance rehabilitation of the natural vegetation, provided that they are free of seed-bearing alien invasive plants.	Rehabilitation Plan	Project Company, MC and ESO	Throughout construction

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			2.5	Any hazardous waste must be removed by a licensed waste disposal operator.	Waste Management Policy Waste Disposal Certificate	Project Company, MC and ESO	Throughout construction
			2.6	Hazardous substances must not be stored where there could be accidental leakage into surface or groundwater.	Waste Management Policy Visual Inspection	Project Company, MC and ESO	Throughout construction
			2.7	The MC shall not dispose of any waste and/or construction debris by burning, dumping or burying. In addition, no temporary storage of any materials may take place outside the designated laydown area.	Waste Management Policy Visual Inspection	Project Company, MC and ESO	Throughout construction
			2.8	Skips must be placed within proximity of the turbines during construction.	Waste Management Policy Visual Inspection	Project Company, MC and ESO	Throughout construction
			2.9	The skips shall be kept in a sheltered place and covered to prevent contents blowing out.	Waste Management Policy Visual Inspection	Project Company, MC and ESO	Throughout construction
			2.10	Temporary ablutions will be located in convenient locations around the Site, and must be cleaned regularly by a licenced sanitary contractor. All temporary ablutions must be removed from the site when the construction phase is completed	Waste Management Policy Visual Inspection	Project Company, MC and ESO	Throughout construction
			2.11	Effluent from the cement batching plant must be contained within a bunded area and not be allowed to drain into water courses. Effluent will be recycled or removed.	Waste Management Policy Waste Disposal Certificates Visual Inspection	Project Company, MC and ESO	Throughout construction
			2.12	Excess or spilled concrete should be confined to the batching plant and work locations, and be disposed of as waste at a licensed landfill site.	Method Statement Waste Disposal Certificate Visual Inspection	Project Company, MC and ESO	Throughout construction
			2.13	The visible remains of the mixing of	Waste Disposal	Project Company,	Throughout construction

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
				concrete, either solid or from washings, shall be physically removed and disposed of as waste at a licensed landfill site.	Certificate Visual Inspection	MC and ESO	
			2.14	All excess aggregate shall also be removed from site.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			2.15	A monitoring system must be put in place to detect any leakage of spillage of hazardous substances during transportation, handling, use and storage. In this regard, precautionary measures must be put in place to limit the possibility of oil and other toxic liquids from entering the soil and water system.	Daily inspection of vehicles and machinery	Project Company, MC and ESO	Throughout construction
			2.16	Where required, bunds will need to be constructed for fuel, oil, used oil and chemical storage areas. Bunds must be appropriately surfaced and have sufficient volume to accommodate any leaks as per the requirements of SABS 089:1999 Part 1.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			2.17	Spill containment and clean up kits will be available onsite and clean-up from any spill will be appropriately contained and disposed of to a licensed landfill by a licensed operator.	Visual Inspection	Project Company, MC and ESO	Throughout construction
Biophysical Impacts							
3.	Impact on Surface and Groundwater	Minimise impacts on surface and groundwater due to run-off, erosion, spills of hazardous substances etc.	3.1	Necessary precautions should be implemented during the construction phase at which stage temporary surface diversion berms should be considered as a means of deflecting flows away from the disturbed areas.	Method Statement	Project Company, MC, ESO and ECO	Throughout construction
			3.2	Stabilise all earthen berm structures by specifying adequate compaction and re-vegetating.	Method Statement	Project Company, MC, ESO and ECO	Throughout construction

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			3.3	Establish earthen berms where necessary to protect infrastructure against flooding.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
			3.4	Fuel, oil, used oil and chemicals must not be stored where there can be accidental leakage in to surface or ground water.	Method Statement Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
			3.5	Vehicle maintenance areas, chemical storage areas and cement batching plants must not be located within 350 m of a drainage line with or without an extensive floodplain.		Project Company, MC, ESO and ECO	Throughout construction
			3.6	Workshop areas will be lined to prevent subsurface ingress of contaminants and drainage from these areas will not be allowed to drain into water courses.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
			3.7	Construction vehicles and equipment will be serviced regularly and provided with drip trays, if required.	Maintenance records	Project Company, MC, ESO and ECO	Throughout construction
			3.8	Only remove natural vegetation where necessary and maintain the natural flow resistance across the site and decrease flood peaks.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
			3.9	Monitor natural drainage lines and dams for erosion and sedimentation during construction and notify engineers immediately of issues in order to implement erosion control measures.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
4.	Impact on Soils	Minimise erosion, loss of topsoil and soil compaction during construction activities	4.1	Restrict removal of vegetation and soil cover to the development footprint	Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
			4.2	Soil stockpiles must be protected from wind or water erosion through placement, vegetation or appropriate covering.	Method Statement	Project Company, MC, ESO and ECO	Throughout construction
			4.3	Excavations/trenches should be backfilled slightly higher than the natural ground level to accommodate some degree of settlement of the backfill material.	Rehabilitation Plan Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
			4.4	Exercise good excavation practises during the construction phase. Backfill and compact all material to acceptable standards as soon as possible after construction and facilitate re-vegetation of all disturbed areas as soon as possible after backfilling.	Method Statement	Project Company, MC, ESO and ECO	Throughout construction
			4.5	Construction vehicles will remain on designated and prepared roads.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
			4.6	Clearly demarcate 'No-go' areas before construction commences.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
			4.7	Maintain, where possible, the natural vegetation cover and facilitate re-vegetation of disturbed areas to stabilise the soil against erosion.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
			4.8	Foundations and trenches must be backfilled with originally excavated materials as far as possible. Excess excavation materials must be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
			4.9	Borrow materials must only be obtained from authorised and permitted sites.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
			4.10	Anti-erosion measures such as silt fences must where necessary be installed in disturbed areas.	Engineering Design	Project Company, MC, ESO and ECO	Throughout construction
5.	Impact on Fauna	Mitigate potential impacts on fauna, including the riverine rabbit, associated with construction activities.	5.1	During construction in areas classified as high sensitivity areas, an ecologist should be consulted to ensure micro-siting of turbines minimises damage to or loss of sensitive habitat.	Appointment of ecologist	Project Company, MC, ESO and ECO	Throughout construction
			5.2	Dogs which are not required for security purposes must be banned from the site in order to control poaching. Worker compounds must be enclosed.	Health and Safety Policy	Project Company, MC, ESO and ECO	Throughout construction

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
			5.3	Hunting at the site by construction personnel is strictly prohibited.	EHS Policy	Project Company, MC, ESO and ECO	Throughout construction
			5.4	Clearly demarcate 'No-go' areas in terms of fauna before construction commences.	Visual Inspection	Project Company, MC, ESO and ECO	Prior to construction
			5.5	Implement *Phase 3: Evaluation Phase* of the Riverine Rabbit Monitoring Programme (*Annex H*): Monitor within each target area for at least 6 months. Monitoring should be linked to activity and construction patterns at the site, so that sites are only monitored when there is construction activity in the vicinity	Implementation of the Riverine Rabbit Monitoring Programme	Project Company, ECO, EWT and Ecology Specialist	Throughout construction
			5.5	Share the monitoring data and results must with the EWT and CapeNature on an annual basis or at their request, through a progress report	Progress Report submitted to EWT and Cape Nature	Project Company	Annually
			5.5	Construction traffic must be limited to a speed of 40km/h and speed bumps should be constructed at high risk sites (i.e. at water crossings)	Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
6.	Impact on Avifauna and Bats	Minimise impacts on birds and bats during construction activities as a result of habitat loss, destruction and displacement.	6.1	Adhere to the "No-Go" areas incorporated into the Final Layout (500 m from the centre of the large dam on the farm Rietpoort and 250m from the centre of the Groot River bed).	Visual Inspection	Project Company, MC, ESO and ECO	Throughout construction
			6.2	Continuous monitoring of the two transmission lines for existing and new avian nesting species, up to 10km from the site boundary, must be conducted throughout the construction and operational phases of the project.	Avian Monitoring Plan	Project Company, MC, ESO and ECO	Throughout construction
			6.3	Avian monitoring reports must be submitted to the relevant provincial environmental department, Birdlife South	Submission of Avian Monitoring Reports	Project Company	Quarterly during construction

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
				Africa, the EWT, Cape Nature and the DEA on a quarterly basis.			
			6.4	Minimise disturbance and destruction of farm buildings on site.	Visual Inspection	Project Company and MC	Throughout construction
7.	Impact on Flora	Prevent unnecessary disturbance and damage to natural vegetation during construction activities i.e. clearing through implementation of the plant rescue and protection plan	7.1	The ECO is to provide permission prior to any vegetation being cleared for development.	Written Permission	MC and ECO	Daily
			7.2	Clearing of vegetation should be undertaken as the work front progresses – mass clearing should not occur unless the cleared areas are to be surfaced or prepared immediately afterwards.	Visual Inspection	MC, ESO and ECO	Weekly
			7.3	All areas to be cleared should be demarcated with construction tape, survey markers or similar	Visual Inspection	MC, ESO and ECO	During clearing activities
			7.4	All construction vehicles should work only within the designated area	Visual Inspection	MC, ESO and ECO	Throughout construction
			7.5	Plants suitable for translocation or for use in rehabilitation of already cleared areas should be identified and relocated before general clearing takes place.	Visual Inspection	MC, ESO and ECO	Prior to clearing areas
			7.6	Any listed species observed within the development footprint that were missed during the preconstruction plant sweeps should be translocated to a safe site before clearing commences	Records of translocation	MC, ESO and ECO	As necessary
			7.7	Many listed species are also sought after for traditional medicine or by collectors and so the ECO should ensure that all staff attend environmental induction training in which the legal and conservation aspects of harvesting plants from the wild are discussed	Training Materials and Records of Training	MC, ESO and ECO	Prior to and throughout construction
			7.8	The ECO should monitor construction	ECO Audit Reports	ECO	Throughout construction

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
				activities in sensitive habitats such as gravel patches or near rivers and wetlands carefully to ensure that impacts to these areas are minimized.			
			7.9	Clearing of vegetation is not allowed within 32m of any wetland, within 1:100 year floodlines or on slopes steeper than 1:3, unless permission is granted by the ECO for specifically allowed construction activities in these areas.	Visual Inspection Written Permission	MC and ECO	Weekly
		Prevent unnecessary disturbance and damage to natural vegetation from infestation by alien plant species	7.10	Where cleared areas will be exposed for some time, these areas should be protected with packed brush, or appropriately battered with fascine work. Alternatively, jute (Soil Saver) may be pegged over the soil to stabilise it.	Visual Inspection	MC and ECO	Weekly
			7.11	Cleared alien vegetation must not be dumped on intact or adjacent vegetation during clearing, but stored temporarily in a demarcated area prior to mulching (provided that they are free of seed-bearing alien invasive plants) or disposal at a licenced waste disposal facility.	Waste Disposal Manifest Visual Inspection of Storage Area and Mulching	Project Company, MC and ESO	Throughout construction
			7.12	Cleared areas that have become invaded can be sprayed with appropriate herbicides provided that these are such that break down on contact with the soil. Residual herbicides should not be used.	Method Statement	MC and ECO	Weekly
			7.13	Although organic matter is frequently used to encourage regrowth of vegetation on cleared areas, no foreign material for this purpose should be brought onto site. Brush from cleared areas should be used as much as possible. The use of manure or other soil	Visual Inspection	MC and ECO	Weekly

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
				amendments is likely to encourage invasion.			
			7.14	Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material such as building sand or dirty earth-moving equipment.) Stockpiles should be checked regularly and any weeds emerging from material stockpiles should be removed.	Visual Inspection	MC and ECO	Weekly
			7.15	Alien vegetation regrowth on areas disturbed by construction must be controlled throughout the entire site during the construction period.	Visual Inspection	MC and ECO	Monthly
			7.16	The alien plant removal and control method guidelines should adhere to best-practice for the species involved. Such information can be obtained from the DWAF Working for Water website.	Method Statement	MC and ECO	Monthly
			7.17	Pesticides may not be used. Herbicides may be used to control listed alien weeds and invaders only.	Method Statement	MC and ECO	Monthly
			7.18	Document alien plant distribution during construction	Alien plant distribution map within priority areas	ESO and ECO	Every third month during construction
			7.19	Document and record alien control measures implemented	Record of clearing activities	ESO and ECO	Every third month during construction
			7.20	Review and evaluation of control success rate	Decline in documented alien abundance over time	ESO and ECO	Biannually
8.	Impact on Agricultural Land	Minimise loss of agricultural land as a result of construction activities.	8.1	Minimise the damage caused by construction activities to the farmland by ensuring strict compliance with construction plans and worker 'Code of Conduct'.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			8.2	Any damage to vegetation will be	Implementation of the	Project Company,	Throughout construction

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
				rehabilitated in accordance with mitigation proposed for the rehabilitation of natural vegetation.	Rehabilitation Plan	MC and ESO	
			8.3	All access routes, existing or newly constructed and utilized during the construction and / or maintenance of the Site should be restored to its original state after construction.	Implementation of the Rehabilitation Plan Visual Inspection	Project Company, MC and ESO	Throughout construction
			8.4	All service routes that will be used to gain access to the Site for maintenance purposes must be covered in gravel or compressed in order to limit degradation and erosion.	Implementation of the Rehabilitation Plan Visual Inspection	Project Company, MC and ESO	Throughout construction
9.	Rehabilitation	Restore any degradation caused by construction activities through implementation of the revegetation and rehabilitation plan. Rehabilitation methods include reapplication of topsoil, mulching, seeding, transplanting and use of soil savers (*Annex* P).	9.1	Rehabilitation of disturbed areas must be undertaken as soon as possible after completion of construction activities to reduce the amount of habitat converted at any one time and to speed up the recovery of natural habitats.	Implementation of the Rehabilitation Plan Visual Inspection	Project Company, MC, ESO and ECO	After construction and prior to operation
			9.2	Fence off rehabilitation areas to protect plants until plant communities are adequately developed.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout rehabilitation
			9.3	Topsoil Management: • Topsoil should be retained on site in order to be used for site rehabilitation. • No more than the top 10cm of topsoil must be stored and used for rehabilitation. • Stripped topsoil should be placed directly onto an area being rehabilitated • If direct transfer is not possible, the topsoil should be stored separately from other soil heaps until construction in an area is complete. The soil should not be stored for a long time and should be	Method Statements Visual Inspection	Project Company, MC, ESO and ECO	Throughout rehabilitation

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
				used as soon as possible (used within a month and should not be stored for longer than three months) • If topsoil is stored on a slope then sediment fencing should be used downslope of the stockpile.			
			9.4	Mulching [(1)]: • Do not mix standing woody vegetation with the soil during clearing activities. • Use the cleared vegetation whole or shredded by hand or machine to protect the soil in disturbed areas and promote the return of indigenous species. • Where there is a low shrub or grass layer, this material can be cleared and mixed as part of the topsoil as this will aid revegetation and recovery when it is reapplied. • No harvesting of vegetation may be done outside the area to be disturbed by construction activities.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout rehabilitation
			9.5	Seeding: • Indigenous seeds may be harvested for purposes of re-vegetation in areas that are free of alien or invasive vegetation, either at the site prior to clearance or from suitable neighbouring sites (best candidate for seedling at the site is the Ruschia spinose) • No seed of alien or foreign species should be used or bought onto the site.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout rehabilitation

(1) Mulching is the covering of soil with a layer of organic matter. There are few areas present at the site which would justify the collection of material for mulching as the standing biomass is too low and areas with a higher biomass are generally restricted to drainage lines which would be largely avoided by the development footprint.

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
			9.6	Transplants: • Plants for transplant should be removed from areas that are going to be cleared. • Succulent shrubs and geophytes are the most suitable candidates for transplant (Ruschia spinose). • Transplants should be placed within a similar environment from where they came in terms of aspect, slope and soil depth. • Transplants must remain within the site and may not be transported off the site.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout rehabilitation
			9.7	Use of soil savers to stabilise the soil surface: • Soil savers must be pegged down to ensure that is captures soil and organic matter flowing over the surface. • Soil saver may be seeded directly once applied as the holes in the material catch seeds and provide suitable microsites for germination. Alternatively, fresh mulch containing seed can be applied to the soil saver.	Visual Inspection	Project Company, MC, ESO and ECO	Throughout rehabilitation
		Restore any degradation caused by construction activities through site maintenance following construction activities	9.8	Ensure that all equipment and materials used or created on Site for or during construction activities are removed after construction. The construction site shall be cleared and cleaned to the satisfaction of the Site Manager and ECO.	Visual Inspection	Project Company, MC, ESO and ECO	After construction and prior to operation
			9.9	All excess construction equipment and excess aggregate, gravel, stone, poles, concrete and the like will be removed from the site upon completion of the work	Visual Inspection	Project Company, MC, ESO and ECO	After construction and prior to operation
			9.10	No discarded materials of any nature shall be buried.	Visual Inspection	Project Company, MC, ESO and ECO	After construction and prior to operation

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
10.	Impact on Air Quality	Limit fugitive dust and exhaust emissions during construction activities.	10.1	Vehicles travelling on gravel roads should not exceed a speed of 40km/h.	Method Statement Health and Safety Policy	Project Company, MC and ESO	Throughout construction
			10.2	Dust suppression techniques must be used before and during surface clearing, excavation, or blasting activities on all exposed surfaces. Such measures may include wet suppression, chemical stabilisation, the use of a wind fence, covering surfaces with straw chippings and re-vegetation of open areas.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			10.3	Containers for dusty materials will be enclosed or covered by suitable tarpaulins / nets to prevent escape of dust during loading and transfer from site.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			10.4	Where necessary, stock piles of soil must be covered by suitable shade cloth or netting to prevent erosion, fugitive dust and to prevent the escape of dust during loading and transfer from site.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			10.5	Vehicles are to be kept in good working order and serviced regularly to minimise emissions.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			10.6	Any complaints received from neighbours or site users must be reported to the Site Manager.	Grievance Register	Project Company, MC and ESO	Throughout construction
Socio-Economic Impacts							
11.	Noise Pollution	Avoid disturbing surrounding stakeholders / landowners during construction.	11.1	Construction staff must be given training in how to minimise noise impacts.	Training Records	Project Company, MC and ESO	Throughout construction
			11.2	Vehicles and equipment used on site must be fitted with silencers, be in good condition and serviced regularly.	Service and Maintenance Records	Project Company, MC and ESO	Throughout construction
			11.3	Construction activities will be maintained as far as possible between 07:00am and midnight (12:00pm), Monday to Saturday,	Visual Inspection	Project Company, MC and ESO	Throughout construction

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
				particularly for turbines that are in proximity to the residence. Should work be required at the weekends or at night, this must be in accordance with the regulations of the Department of Labour.			
			11.4	Mechanical equipment with lower sound power levels must be selected to ensure that permissible occupation noise-rating limit of 85 dBA is not exceeded.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			11.5	Construction workers and personnel must wear hearing protection where the 8-hour ambient noise levels exceed 75dBA.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			11.6	Noise from the turbines at the identified noise sensitive areas must be less than 45 dBA limit for rural areas presented in SANS10103.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			11.7	Ensure that the National Noise Control Regulations and SANS10103:2008 are adhered to and reasonable measures to limit noise from the Site are implemented.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			11.8	Affected stakeholders must be given prior warning before undertaking noisy activity such as blasting.	Proof of Notification	Project Company, MC and ESO	Throughout construction
			11.9	A grievance procedure will be established whereby complaints are recorded and responded to.	Grievance Register	Project Company, MC and ESO	Throughout construction
12.	Health and Safety	Ensure the health and safety of subcontractors and site users during construction of the Wind Farm.	12.1	Implementation of the Health and Safety Plan in accordance with Occupational Health and Safety Act (OHSA) (No. 85 of 1993), requirements.	Signed Health and Safety Plan as part of contract documentation	Project Company, MC and ESO	Prior to construction
			12.1	Any blasting to be undertaken at the site must be in accordance with Municipal By-Laws and the necessary approvals must be obtained prior to the activity.	Copy of approvals on site	Project Company, MC and ESO	Prior to blasting activities.

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
			12.2	Signage must be erected at appropriate points to warn of turning traffic and the construction site.	Visual inspection	Project Company and MC	To be undertaken during construction
			12.2	Safety representatives, managers and workers must be trained in Health, Safety, Environment and Quality.	Training Records	Project Company, MC and ESO	Throughout construction
			12.3	Potentially hazardous areas must be clearly demarcated (i.e. unattended foundation excavations).	Visual Inspection	Project Company, MC and ESO	Throughout construction
			12.4	Appropriate PPE must be worn by construction personnel.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			12.5	No open fires for cooking or heating must be allowed on site.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			12.6	Work closely with the wind turbine suppliers to provide the requisite training to the workers. The training provided will focus of development of local skills.	Training Records	Project Company	Prior to construction
			12.7	Adequate firefighting equipment must be available on site and in good working order.	Method Statement	Project Company, MC and ESO	Throughout construction
			12.8	Welding, gas cutting or cutting of metal will only be permitted in areas designated as safe by the MC.	Method Statement	Project Company, MC and ESO	Throughout construction
			12.9	Road borders should be regularly maintained to ensure that vegetation remains short and that they therefore serve as an effective firebreak.	Method Statement	Project Company, MC and ESO	Throughout construction
13.	Traffic Impact	Manage construction vehicles and machinery to reduce the impact of traffic at the site and on the existing road network.	13.1	The Traffic Management Plan must be adhered to including adherence to speed limits and 'rules of the road'.	Implementation of the Traffic Management Plan	Project Company, MC and ESO	During construction
			13.2	All directly affected and neighbouring farmers and local residents will be able to lodge grievances with the Project Company using the Grievance Procedure regarding dangerous driving or other traffic violations	Grievance procedure and logbook of incidents/complaints and actions taken.	Project Company, MC and ESO	During construction

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
				that could be linked to the project.			
			13.3	A designated access point to the site must be created and clearly marked to ensure safe entry and exit.	Visual Inspection	Project Company, MC and ESO	During construction
			13.4	Signs must be placed along construction roads to identify speed limits (i.e. 40 km/hr), travel restrictions and other standard traffic control information.	Visual Inspection	Project Company, MC and ESO	During construction
			13.5	Where possible, construction vehicles to avoid travelling on the public roadway during the morning and late afternoon commute time, to reduce the impact on other road users.	Method Statement	Project Company, MC and ESO	During construction
14.	Socio-Economic Impacts	Minimize impacts associated with influx of jobseekers.	14.1	Include the 'Code of Conduct' in contract documentation.	'Code of Conduct' in contract documentation.	Project Company and MC	Throughout construction
			14.2	Develop and adhere to an HIV Policy.	Development and Implementation of an HIV Policy.	Project Company and MC	Throughout construction
			14.3	The construction workers (from outside the area) should be allowed to return home over the weekends or on a regular basis to visit their families.	Employment Records	Project Company and MC	Throughout construction
			14.4	Implement a grievance procedure that is easily accessible to local communities, complaints related to contractor or employee behaviour can be lodged and responded to.	Grievance Register	Project Company and MC	Throughout construction
15.	Impact on Cultural Heritage Interests	Minimise damage and/or destruction to archaeological and palaeontological finds during the construction phase	15.1	Identified graves that are determined by the archaeologist to be in close proximity to proposed construction activities where an impact may arise, must in terms of the authorisation be clearly marked so that they can be avoided.	Visual Inspection of marked graves	Project Company, MC, ESO and ECO	Prior to construction
			15.2	If any unmarked graves containing human remains are recognised during the	Visual Inspection and Photographic Records	Project Company, MC, ESO and ECO	Throughout construction

CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
				construction phase, the immediate area of the grave/human remains must be cordoned off and an archaeologist must be contacted to undertake a forensic investigation, and determine the action to be taken. Photographs of the material and its context should immediately be provided by the MC to assist the archaeologist with decision making			
			15.3	Alert ECO if fossil remains are found either on the surface or exposed by fresh excavations during construction.	Visual Inspection	MC, ECO	Throughout construction
			15.4	Should fossil material be discovered, this should be safeguarded (preferably in situ) and the ECO should alert Heritage Western Cape so that appropriate mitigation (e.g. recording, sampling or collection) can be taken by a professional palaeontologist (Heritage Western Cape contact details: Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za).	Communication with Heritage Western Cape	ECO	Throughout construction
16.	Visual Impact	Minimise visual impact during construction activities	16.1	The visual impact of the Site must be minimised by limiting areas of disturbance, controlling erosion, suppressing dust and restoring exposed soil as closely as possible to the original contour and vegetation.	Visual Inspection	Project Company, MC and ESO	Throughout construction
			16.2	Laydown areas and stockyards should be located in low visibility areas (e.g. valleys between ridges) and existing vegetation should be used to screen them from view where possible.	Final Detailed Design	Project Company, MC and ESO	Throughout construction
			16.3	Night lighting of the construction sites	Visual Inspection	Project Company,	Throughout construction

CONSTRUCTION PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
				should be minimised within the requirements of safety and efficiency.		MC and ESO	

4.3 OPERATIONAL PHASE

The following requirements are applicable during the operational phase of the Perdekraal East Wind Farm.

Table 4.3 Environmental Mitigation and Monitoring Measures – Operational Phase

OPERATIONAL PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
General Conditions							
1.	Compliance with the EA (Ref: 12/12/20/1783)	Adhere to the conditions prescribed in the EA	1.1	Fourteen days written notice must be given to the DEA that the operational phase will commence.	Record of Correspondence with the DEA	Project Company	14 days prior to operational phase
2.	Pollution of the environment caused by waste	Limit the potential for site pollution and the accumulation of waste materials on site. Refuse and waste refers to all solid waste, including construction debris, timber, cans etc.	2.1	Used oil stored on site must be stored in an impervious container, within a bunded area.	Photographic evidence	Project Company	Throughout operation
			2.2	Leakage/spillage of fuel or oil must be avoided at all times and must be cleaned up immediately. All contaminated soil/water must be disposed of at a licenced hazardous waste facility.	Waste manifest	Project Company	Throughout operation
			2.3	All waste at the site must be handled appropriately and kept in closed bins not accessible to fauna.	Visual Inspection	Project Company	Throughout operation
			2.4	General waste must be removed from site by a licensed contractor.	Waste manifest	Project Company	Throughout operation
			2.5	Areas around fuel tanks must be bunded or contained in an appropriate manner as per the requirements of SABS 089:1999 Part 1	Visual Inspection	Project Company	Throughout operation
			2.6	Leakage of fuel must be avoided at all times and if spillage occurs, it must be remedied immediately.	Spill Response Procedure	Project Company	Throughout operation
			2.7	Hazardous waste such as oils, oily rags, paint tins, bitumen etc. must be disposed of a licenced hazardous waste facility.	Hazardous Waste Disposal Certificates	Project Company	Throughout operation
			2.8	An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage.	Monitoring system	Project Company	Throughout operation
			2.9	Ensure that precautionary measures are in place to limit the possibility of oil and other		Project Company	Throughout operation

OPERATIONAL PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
				toxic liquids from entering the soil or stormwater system.			
			2.10	No wastewater or any potential pollutants should be discharged into the rivers or dams at the site		Project Company	Throughout operation
Biophysical Impacts							
3.	Impact on Surface and Groundwater	Minimise impacts on surface and groundwater due to run-off, erosion, spills of hazardous substances etc.	3.1	Monitor natural drainage lines and dams for erosion and sedimentation during operation and notify engineers immediately of issues in order to implement erosion control measures.	Visual Inspection	Project Company	Quarterly during operations
			3.2	Fuel, oil, used oil and chemicals used for maintenance purposes must not be stored where there can be accidental leakage in to surface or ground water.	Method Statement Visual Inspection	Project Company	Throughout operations
			3.3	No water must be extracted directly from the river. If water is required at the site, this should be obtained from existing dams or groundwater sources in accordance with the conditions of the WUL.	Records of water provision	Project Company	Throughout operations
3.	Impacts on Avifauna	Monitor potential impacts on avifauna during operation of the Wind Farm.	4.1	A register must be maintained of injuries to avifauna, complaints or queries received as well as any action taken.	Avian Monitoring Reports	Project Company	Continual monitoring for initial 24-month period. Ongoing monitoring programme to then be confirmed for the remainder of operational phase.
			4.2	Continuous monitoring of the two new transmission lines for existing and new nesting species, up to 10km from the site boundary, must be conducted throughout the operational phase of the project.	Avian Monitoring Reports	Project Company	
			4.3	The use of the transmission lines as nesting locations of priority species, including Lanner Falcon and Martial Eagle, should be monitored, and the possible impacts of the proposed WEF determined on the future breeding success of these species	Avian Monitoring Reports	Project Company	

OPERATIONAL PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
			4.4	Avian monitoring reports must be submitted to the relevant provincial environmental department, Birdlife South Africa, the EWT, Cape Nature and the DEA on a quarterly basis.	Submission of Avian Monitoring Reports	Project Company	Quarterly during operations
			4.5	Maintenance activities should where possible be scheduled to avoid disturbances to sensitive areas (identified through operational monitoring) during breeding season.	Maintenance schedules	Project Company	Throughout operation
5.	Impacts on Fauna	Monitor potential impacts on the Riverine Rabbit as a result of operation of the Wind Farm.	5.1	Implement *Phase 3: Evaluation Phase* of the Riverine Rabbit Monitoring Programme (*Annex H*): 6 months minimum monitoring of Riverine Rabbits within each target area.	Implementation of the Riverine Rabbit Monitoring Programme	Project Company, ECO and Ecology Specialist	First 6 months (minimum) of operation
			5.2	Following the 6 months of operational phase monitoring, the results should be evaluated and a decision taken as to whether the monitoring can be terminated or of there is any value in continuing the monitoring for an additional period not exceeding 6 months.	Implementation of the Riverine Rabbit Monitoring Programme	Project Company, ECO and Ecology Specialist	To be confirmed following Point 4.1
			5.3	Share the monitoring data and results must with the EWT and CapeNature on an annual basis or at their request, through a progress report	Progress Report submitted to EWT and Cape Nature	Project Company	Annually
			5.4	Following monitoring, develop a final report for the site which provides insight on the following issues: • Nature and extent of impact of construction and operational phase wind farm development on the local population of Riverine Rabbits. • Implications for the local and regional	Final Monitoring Report	Project Company	On completion of riverine rabbit monitoring

OPERATIONAL PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
				population of Rabbits. • Lessons learnt in terms of the monitoring protocol. • Lessons learnt and implications of wind farm development on Riverine Rabbits in South Africa and recommendations for future developments.			
		Minimise interactions between wildlife (snakes, reptiles and mammals) and the facility in terms of its staff, infrastructure and activities	5.5	Snakes encountered within the facility may pose a danger to staff and should be allowed to move off on their own in the case of snakes encountered on roads or other areas within the 'veld' or be removed unharmed to safety by a suitably qualified person in the case where these pose a danger to humans	Incident Log	Project Company and site personnel	Throughout operation
			5.6	All vehicles should give way to snakes, mammals and tortoises crossing roads. All vehicles should adhere to a low speed limit (<40km/h) and give way to all reptiles crossing the roads.	Speed Limit Signage at the site	Project Company	Throughout operation
			5.7	Resident fauna should not be habituated by feeding them scraps or other foodstuffs	HSE Policy	Site personnel	Throughout operation
			5.8	All incidents should be recorded on a log maintained by the Site Manager, so that additional mitigation measures can be implemented if there are any specific areas where regular incidents occur such as near river crossings.	Incident Log	Project Company Site Manager	Throughout operation
			5.9	If there is any post-construction trenching or similar activity at the site, any trenches and holes excavated should not be left open for extended periods. Trenches should have ramps of soil present where fauna can escape or should be excavated incrementally	Method Statement	Project Company	As necessary

OPERATIONAL PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
				so that they are used only as required and do not stand open for extended periods.			
6.	Impacts on Bats	Monitor potential impacts on bats during operation of the Wind Farm.	6.1	A register must be maintained of complaints or queries received as well as any action taken regarding bat mortality and/or injury.	Monitoring Reports	Project Company	Throughout operation
			6.2	Post-construction bat monitoring must be performed involving a 12-month study to determine the most effective cut-in wind speed for turbines at the Site. For this, different cut-in wind speeds (of e.g. 3, 5, 7, 9 and 11 m/s at 15.6 m) should be tested for groups of e.g. 20 randomly selected turbines. The lowest cut-in speed that demonstrates a statistically significant reduction in bat mortality would be selected as the default cut-in speed during periods of peak bat activity on site.	Monitoring Schedule and Reports	Project Company	During operations
			6.3	Bat fatalities should be monitored by week-long, monthly fatality searches along transects spaced 10 m apart across a 120 m x 120 m area around each turbine. For each encountered bat carcass, a record must be kept of the date, time, location, species, sex, age, estimated time and cause of death. Carcasses should also be photographed and used for searcher efficiency and (scavenger) carcass removal trials.	Bat carcass records	Project Company	During operations - monthly
			6.4	Develop an adaptive mitigation plan based on results from the post-construction monitoring. The results of the monitoring should be used to modify the cut-in speed and hours of curtailment of selected turbines.	Adaptive Mitigation Plan	Project Company	During operations, following results of the post-construction monitoring.
7.	Impact on Soils	Minimise erosion, the	7.1	Bi-annual monitoring of erosion in the	Monitoring Reports and	Project Company	During operations - biannually

OPERATIONAL PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
		loss of topsoil and compaction of soils during operations.		vicinity of the turbines, roads and other hard-standing surfaces will be conducted before and after the rainy season to ensure erosion sites can be identified early and remedied.	Visual Inspection		
			7.2	Increased sediment loads entering the dams should also be monitored. In addition, the discharge points from the laydown and substation areas should be monitored for signs of concentrated flows and erosion.	Monitoring Reports and Visual Inspection	Project Company	During operations - biannually
8.	Impact on Flora	Minimize impacts on vegetation by reducing the abundance of alien species within the site and maintaining non-invaded areas clear of aliens through implementation of the alien species management plan	8.1	Surveys for alien species should be conducted regularly. Every 6 months for the first two years after construction and annually thereafter. All aliens identified should be cleared.	Alien plant distribution map	Project Company	Every 6 months for 2 years and annually thereafter
			8.2	Where areas of natural vegetation have been disturbed by construction activities, revegetation with indigenous, locally occurring species should take place where the natural vegetation is slow to recover or where repeated invasion has taken place following disturbance.	Visual Inspection	Project Company	Biannually, but revegetation should take place at the start of the rainy season
			8.3	Areas of natural vegetation that need to be maintained or managed to reduce plant height or biomass, should be controlled using methods that leave the soil protected, such as using a weed-eater to mow above the soil level.	Visual Inspection	Project Company	As necessary
			8.4	No alien species should be cultivated on-site. If vegetation is required for aesthetic purposes, then non-invasive, water-wise locally-occurring species should be used.	Visual Inspection	Project Company	As necessary
			8.5	Document alien plant control measures implemented & success rate achieved	Records of control measures and their success	Project Company	Biannually

OPERATIONAL PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
					rate. A decline in alien distribution and cover over time at the site		
		Minimize impacts on vegetation through appropriate protection measures as per the plant rescue and protection plan (*Annex O*)	8.6	Access to the site should be strictly controlled and all personnel entering or leaving the site should be required to sign and out with the security officers	Site Access Register	Project Company	Throughout operation
			8.7	On-site employees, farm workers and visitors to the site will be educated about the conservation of vegetation. This will include strict guidelines for remaining on existing roads to avoid unnecessary destruction or damage to undisturbed and rehabilitated vegetation.	Training Records and Visual Inspection	Project Company	Throughout operation
			8.8	The collecting of plants must be strictly forbidden and signs stating so should be placed at the entrance gates to the site.	Visual Inspection of Signs	Project Company	Erect signage prior to operation
		Monitoring of rehabilitation measures as per the Revegetation and Rehabilitation Plan (*Annex P*)	8.9	Re-vegetated areas must be monitored every 6 months for the first 18 months following construction	Revegetation and Rehabilitation Monitoring Report	Project Company	Every 6 months for the first 18 months following construction
			8.10	Re-vegetated areas showing inadequate surface coverage (less than 10% within 12 months after re-vegetation) should be prepared and re-vegetated	Results of the Revegetation and Rehabilitation Monitoring Report	Project Company	As necessary
			8.11	Any areas showing erosion, should be re-contoured and seeded with indigenous grasses or other locally occurring species which grow quickly	Visual Inspection and Revegetation and Rehabilitation Monitoring Report	Project Company	As necessary
Socio-Economic Impacts							
9.	Health and Safety	Maintain health and safety standards throughout operations	9.1	Regular maintenance of turbines and all other infrastructure must be undertaken to ensure optimal functioning and reducing the chance of gearbox failure.	Maintenance Records	Project Company	Throughout operation

OPERATIONAL PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
			9.2	Regular inspections of the turbine foundations, towers, blades, spinners and nacelle must be undertaken in order to check for early signs structural fatigue.	Maintenance Records	Project Company	Throughout operation
			9.3	Ensure that the operation of the Site has minimal electromagnetic interference (EMI) (i.e. impacts to microwave, radio and television transmissions) and should comply with the relevant communication regulations.	Visual Inspection	Project Company	Throughout operation
			9.4	Access to the facility should be strictly controlled and all visitors and contractors must be required to sign-in.	Site Access Register	Project Company	Throughout operation
			9.5	Signage at the entrance should indicate that disturbance to fauna and flora is strictly prohibited.	Visual Inspection of Signs	Project Company	Throughout operation
			9.6	The fencing around the facility should consist of a single fence with electrified strands only on the inside of the fence and not the outside, at such a height that tortoises will not come into contact with the wires.	Visual Inspection	Project Company	Throughout operation
			9.7	Management of the facility should ensure that they have suitable equipment as well as trained personnel available to assist in the event of fire.	Visual Inspection of Fire Equipment Training Records and Certificates	Project Company	Throughout operation
10.	Visual Impacts	Minimise the visual impacts of the Wind Farm during the operation phase.	10.1	Signage related to the Site must avoid commercial messages, be discrete, and be confined to entrance gates unless they serve to inform the public about wind turbines and their function.	Visual Inspection	Project Company	Throughout operation
			10.2	All lighting, other than navigation lighting, must be down lighting to reduce the visual impact at night.	Visual Inspection	Project Company	Throughout operation

OPERATIONAL PHASE							
Activity		**Objective**	**Actions to be undertaken to Mitigate Environmental Impact**		**Parameters for Monitoring**	**Responsibility**	**Frequency / Timing**
#	**Description of Activity**		**#**	**Commitment / Actions Required / Key Controls**			
			10.3	The visual impact of the Site must be minimised by limiting areas of disturbance, controlling erosion, suppressing dust and restoring exposed soil as closely as possible to the original contour and vegetation.	Visual Inspection	Project Company	Throughout operation
			10.4	Laydown areas should be screened with vegetation where possible.	Visual Inspection	Project Company	Throughout operation
11.	Traffic Impacts	Minimise traffic associated with operations of the Wind Farm	11.1	During operation, if abnormal loads are required for maintenance, the appropriate arrangements will be made to obtain the necessary transportation permits and the route agreed with the relevant authorities to minimise the impact of other road users.	Permits	Project Company	Throughout operation
			11.2	All internal and access roads that will be used during the operational phase of the project must be maintained.	Maintenance records and visual inspection	Project Company	Throughout operation
12.	Noise Impact	Noise from the turbines at the identified noise sensitive areas must be less than 45 dBA limit for rural areas presented in SANS10103 (i.e. the homestead within proximity of wind turbine 51.	12.1	Noise levels should not be exceeded at the homestead.	Complaints Register	Project Company	Throughout operation
			12.2	Any complaints received regarding noise will be addressed and may require additional monitoring.	Complaints Register	Project Company	Throughout operation

4.4 *DECOMMISSIONING PHASE*

A detailed decommissioning and rehabilitation plan must be developed prior to decommissioning the Perdekraal East Wind Farm and associated infrastructure. This plan should include, but not be limited to, management of socio-economic aspects such as employment creation, removal, re-use and recycling of materials and vegetative rehabilitation to prevent erosion.

The decommissioning activities will be similar to construction activities and therefore recommendations outlined to manage construction phase impacts should be adhered to during decommissioning. Management actions should focus on the rehabilitation of disturbed areas and the removal of infrastructure.

4.5 *ADDITIONAL MANAGEMENT PLANS*

In accordance with prescribed conditions of the Environmental Authorisation, a variety of management plans have been developed as part of the EMPr (refer to *Part 4: Annex M – Annex Q)*. These are aimed at ensuring that construction and operation occurs in a responsible manner. The plans include:

- Stormwater Management Plan;
- Alien Invasive Plant Management Plan;
- Plant Rescue and Protection Plan;
- Restoration and Rehabilitation Plan; and
- Open Space Management Plan.

The relevant mitigation and management measures described by these plans are included in the tables above (*Table 4.1,Table 4.2*, and *Table 4.3*), however a brief summary of these plans is included in the sections that follow.

4.5.1 *Stormwater Management Plan*

GroundTruth Water, Wetlands and Environmental Engineering were appointed to carry out a desktop level study to assess the potential hydrological impacts and develop a conceptual stormwater management plan for the proposed Perdekraal East Wind Farm. The potential impacts and risks that the Wind Farm could have on the natural drainage features in the area are: erosion, sedimentation and flooding. The plan provides measures implemented that should be implemented during the planning and design phase and construction phase of the Site to reduce these potential impacts, as well as monitoring of the site to identify potential impacts on the natural systems as a result of potential altered flow patterns. These mitigation, management and monitoring measures have been integrated into this EMPr.

4.5.2 *Alien Invasive Plant Management Plan*

As per *Condition 47* of the EA, an Alien Invasive Management Plan has been developed by Simon Todd Consulting. The alien invasive plan management plan provides a framework for the management of alien and invasive plant species during the construction and operation of the Perdekraal East Wind Farm.

The Perdekraal East site is not currently significantly invaded by alien species, however alien species are likely to become problematic in areas which are disturbed or which receive runoff from the hardened surfaces of the site. Alien management at the site will include a clearing plan, methods for which include manual, chemical or biological clearing. In order to implement the alien plant management plan, a monitoring and control schedule is provided as a guideline on the frequency with which alien plants should be monitored and what parameters are likely to be important during construction (refer to Table 4.2) and operation (*Table 4.3*).

4.5.3 *Plant Rescue and Protection Plan*

The purpose of the Perdekraal East Plant Rescue and Protection Plan is to implement avoidance and mitigation measures to reduce the impact of the development of the Wind Farm on listed and protected plant species and their habitats during construction and operation.

The Plan provides measures that need to be implemented pre-construction, during construction and during operations. Measures include but are not limited to the identification of species of conservation concern, application for permits to clear the site and relocated these species, the appointment of an ECO and controlled access to the site. These measures have been included in this EMPr.

4.5.4 *Revegetation and Rehabilitation Plan*

The revegetation and rehabilitation plan developed by Simon Todd Consulting (October, 2015) in accordance with *Condition 51* of the EA ensures that areas cleared or impacted during construction activities are rehabilitated with a plant cover that reduces the risk of erosion from these areas as well as restores ecosystem function. The principles guiding this plan include:

The methodology and monitoring requirements for the revegetation and rehabilitation of the site following construction are included in *Table 4.2* and *Table 4.3* respectively.

4.5.5 *Open Space Management Plan*

The Open Space Management Plan (OSMP) provides a framework for the integrated management of the natural spaces within the Perdekraal East Wind Farm and ensures that the different plans are aligned.

As the issues at the site are likely to change over time, the OSMP should be evaluated on an annual basis for the three years of operation and then every three years or more regularly if required. Where specific problems arise, persons with relevant expertise should be brought in to advise the management of the site and update the OSMP.

5 PRE-CONSTRUCTION MONITORING

Pre-construction bird and bat monitoring was undertaken as required by *Condition 36* of the Environmental Authorisation (DEA Ref: *12/12/201783/2*). The monitoring programmes have included 12 months of avian monitoring (*Annex D*), and 18 months of bat monitoring (12 months near ground level, and 6 months at 80 m above ground level) (*Annex E*).

In addition, the Terms of Reference (ToR) for the Riverine Rabbit monitoring programme have been developed by EWT: Drylands Conservation Programme (*Annex H*). The results of the bird and bat monitoring programme and input from the Endangered Wildlife Trust (EWT) have informed the final layout and additional mitigation measures have been included in *Section 4.2, 4.3,* and *4.4* above for the planning and design, construction and operational phases.

A summary of the monitoring results as well as the ongoing bird, bat and Riverine Rabbit monitoring requirements are provided below.

5.1 PRE-CONSTRUCTION BIRD MONITORING

AVISENSE Consulting visited and surveyed the proposed site and surrounding areas on the 24th September 2015 in order to determine and suggest mitigation for location-specific construction-phase impacts on birds, immediately before the commencement of construction. The predicted avian community and its overall sensitivity to the construction of the proposed development did not vary between the original avian impact assessment, the Pre-Construction Avian Monitoring Report (*Annex D*), and the Avian Walkthrough Report (*Annex I*).

The most significant mitigation aspects include providing a 500 m buffer around the important wetland (farm dam) on Portion 1 of Rietpoort Farm 243 and providing a 250 m buffer on either side of the Grootriver to buffer the Acacia thicket along the length of the river. Continuous monitoring of the two transmission lines (33 kV and 132 kV) for existing and new nesting species, up to 10km from the site boundary, must also be conducted throughout the construction and operational phases of the project.

While the findings of the Avian Walkthrough Report were largely favourable for the development of the Wind Farm at the Perdekraal site, and at this stage there is no perceived need to change the proposed final layout for this development, should any impacts be detected either during construction or once the Site is operational that are deemed sufficiently detrimental to the regional avifauna, the Project Company must be prepared to apply mitigation options additional to those already listed here in order to mitigate the impact of development of the affected avifauna.

5.2 *PRE-CONSTRUCTION BAT MONITORING*

As specified by the South African Good Practice Guidelines for Surveying Bats in Wind Farm Developments (Sowler & Stoffberg 2012), long-term bat monitoring is required to predict impacts of a proposed WEF on bats, and to devise effective mitigation measures against these.

The Pre-Construction Bat Monitoring Report (*Annex E*) states that the site is rated as having a Low to Medium Sensitivity in terms of bats, with the areas of highest sensitivity being associated with the Groot and Adamskraal Rivers.

Mitigation measures and monitoring requirements of this report are included in this EMPr, and any additional findings of the at height monitoring will be incorporated into an amended EMPr.

5.3 *RIVERINE RABBIT MONITORING*

In response to the comments received on the development layout map from EWT and Cape Nature a workshop was held between ERM, the ecological specialist (Mr Simon Todd) the Project Company and these two organisations on the 20th January 2016 (refer to the meeting minutes attached as *Annex C*). The primary outcome of this workshop was that EWT will prepare a Terms of Reference (ToR) and methodology for a Riverine Rabbit Monitoring Programme for the Perdekraal East Wind Farm. The primary objectives of this monitoring programme are:

- To determine the occurrence of Riverine Rabbits on the site, and dependent on the outcomes, investigate the potential impact of the wind farm development on the Riverine Rabbit population through monitoring pre- and during-construction.

- Dependent on the results of the monitoring programme, develop appropriate recommendations for mitigation responses to minimize the impact on the species.

- Improve existing knowledge of the Riverine Rabbit and the potential impacts of renewable energy development on biodiversity and based on the outcomes, publish guidelines in conjunction with the developer and the EWT, for minimizing impacts on this species.

The four phased approach to the monitoring has been included in this EMPr (refer to *Table 4.1, Table 4.2* and *Table 4.3*) and is also attached as *Annex H*.

The implementation of the mitigation, management and monitoring measures outlined in this Final EMPr, provides a basis for ensuring that the potential positive and negative impacts associated with the construction and operation of the Perdekraal East Wind Farm are enhanced and mitigated.

It is imperative that these measures are included in contract documentation between the Project Company and its contractors and that regular compliance auditing is conducted.

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