

Annex L

Environmental
Management Programme
(EMP)

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1.1

INTRODUCTION

An Environmental Management Programme (EMP) is a set of guidelines and actions aimed at ensuring that construction and/or installation activities, and subsequent management of facilities, are undertaken in a manner that minimises environmental risks and impacts.

The following EMP has been prepared by ERM Southern Africa (Pty) Ltd, for RWPRoggeveld Wind Power (Pty) Ltd, hereafter referred to as RWPRWP, for the proposed construction and operation of a wind energy facility at the Roggeveld Wind Farm Site. This EMP addresses potential impacts associated with the installation, operation and decommissioning phases of the project.

The EMP is required in order to:

- assist in ensuring continuing compliance with South African legislation and RWP Environmental Health and Safety Policy (this policy is currently being developed for the Wind Energy industry);
- provide a mechanism for ensuring that measures identified in the EIA designed to mitigate potentially adverse impacts, are implemented;
- provide a framework for mitigating impacts that may be unforeseen or unidentified until construction is underway;
- provide assurance to regulators and stakeholders that their requirements with respect to environmental and socio-economic performance will be met; and
- provide a framework for compliance auditing and inspection programs.

The EMP will remain a draft document until after it has been updated with the conditions stipulated in the environmental authorisation.

The EMP specifies the following:

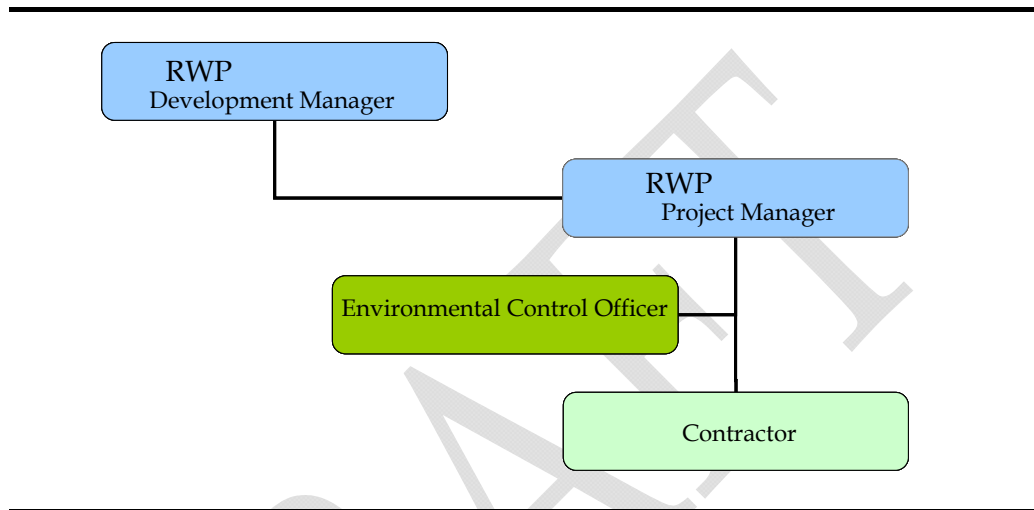
- roles and responsibilities for implementation of the EMP (*Section 1.2*);
- subsidiary plans and policies (*Section 1.3*);
- stakeholder engagement (*Section 1.4*);
- requirements for micro-siting of turbines (*Section 1.5*);
- permit requirements (*Section 2*);
- biological monitoring requirements for pre-construction, construction and operation (*Section 3*);
- mitigation and compliance monitoring measures (*Section 4*); and
- contractor compliance standards (*Section 5*)

1.2

ROLES AND RESPONSIBILITIES

The following section outlines the roles and responsibilities of those involved in the proposed installation, operation and decommissioning of the wind energy facility. An organogram showing reporting structures is provided in Figure 1.1.

Figure 1.1 Reporting Structures



1.2.1

RWP

RWP's Development Manager will have the ultimate responsibility for ensuring the measures outlined in the EMP are delivered and that the measures are implemented by their contractors and subcontractors. In this respect the Development Manager will review and approve contractor plans for delivery of the actions contained in the EMP during construction and ensure that during operation performance will be evaluated through monitoring and auditing.

Development Manager

The Development Manager's responsibilities will encompass the following:

- Liaison with the project engineers to ensure that the Wind Farm is designed to meet all the specified environmental parameters and legal requirements as specified in the EMP and Environmental Authorisation;
- Authority to stop works in emergency situations;
- Approval of method statements; and
- Liaison with authorities.

The Project Manager, Nicolas Rolland, or any other person appointed to the role, is responsible for the implementation of the EMP, and will report directly to the Development Manager on environmental, health and safety matters.

Project Manager

The Project Manager, Kilian Hagemann, or any other person appointed to the role, is the designated person responsible for the implementation of the EMP and therefore the person responsible for managing the environmental issues that arise during the construction phase of the project.

The Project Manager's main role is to regularly inspect and manage the construction activities on site in order to ensure compliance with the EMP. The Project Manager will liaise with the Environmental Control Officer (ECO) and Contractor and report to the Development Manager.

The Project Manager's responsibilities will encompass the following:

- Training of contractors on environmental matters (see *Section 1.4*);
- Inspect the site at least once every two weeks for the duration of the construction phase;
- Management of the contractors in terms of the EMP;
- Review of contractor method statements and ensure alignment with the EMP;
- Reporting on environmental problems to the Development Manager;
- Record keeping of:
 - environmental incidents;
 - contractors non-compliance to the EMP; and
 - contractor fines and penalties.
- Making recommendations or implementing actions relating to a contractor's failure to comply with the EMP, which may include enforcement of penalties and even contract termination and removal of contractor from the site;
- Recommend the suspension of work activities where such activities contravene the EMP requirements; and
- The authority to stop works in emergency situations when the Development Manager is not available and construction activities seriously threaten the environment.

The Project Manager will also be responsible for implementing the community engagement plan. The Project Manager will be required to participate in community meetings that will be held in affected communities prior to, during and upon completion of construction.

During the construction phase an Environmental Control Officer (ECO) will be responsible for ensuring the overall environmental and socio-economic objectives of the EMP are met. Specialists such as palaeontologists, bird

specialists etc. will be employed as required. When working on site, the ECO will report to the Project Manager.

1.2.2 *Environmental Control Officer*

RWP will appoint an independent Environmental Control Officer (ECO) prior to commencement of construction and throughout the construction phase of the project until such time as rehabilitation is complete and the site is ready for operation. The ECO shall hold a relevant environmental degree or diploma and have a few years of experience in ECO work.

The primary role of the ECO will be to monitor the construction activities and ensure that the mitigation measures of the EMP and Environmental Authorisation (EA) are implemented.

The ECO's responsibilities will encompass the following:

- Brief the Contractor on EMP requirements and site layout;
- Retain a copy of the EMP and EA and all records relating to monitoring and auditing on site, and keep these available for inspection;
- Visit the site at least once a day, particularly for the following activities:
 - Site clearance;
 - Excavation;
 - Turbine arrival, assembly and placement;
 - Set up of concrete batching; and
 - Establishment of all works areas including latrines and wash areas.
- Specific tasks of the ECO will include ensuring:
 - Sensitive areas are demarcated and cordoned off;
 - Activities are restricted to demarcated works areas;
 - No sensitive features are damaged or disturbed;
 - Any notifiable features (eg fossils or other heritage remains) are recorded and work stopped or redirected to avoid such areas, and the appropriate authorities informed;
 - All incidents are recorded in a logbook and appropriate remedial action taken;
 - Site visit reports are kept and feedback provided to the Project Manager as required; and
 - Liaise with DEA regarding implementation of the EMP, if and when required.

The ECO will be expected to be contactable telephonically in case of emergencies at all times.

1.2.3

Contractors and Site Personnel

During site preparation and construction, the contractor will be responsible for ensuring compliance with all relevant legislation as well as adherence to all environmental and socio-economic mitigation measures specified in the EMP. The contractor is also responsible under the contract for managing the potential environmental, socio-economic, safety and health impacts of all contracted activities whether these are undertaken by themselves or by their subcontractors. The contractor has overriding responsibility for the activities of all direct staff and subcontractors.

Adherence to the provisions of the EMP will be a condition of contract with the contractor. The contractor will need to demonstrate to RWP's satisfaction how compliance with the requirements of the EMP will be met. The contractor will also be expected to demonstrate commitment to the EMP at all levels in the contractor's management structure and will be required to identify individuals responsible for overall environment, socio-economic, safety and health management.

The contractor will be required to undertake regular environmental and socio-economic inspections and provide reports to RWP to monitor and evaluate performance against the measures and objectives established in the EMP. In this regard, the contractor's performance in complying with the EMP will be monitored and audited by the ECO, Project Manager and Development Manager.

1.3

ALLOCATION OF RESOURCES

Financial and personnel resources must be allocated to the implementation of the EMP, including provisions for contractor training and environmental awareness, contingencies to deal with environmental emergencies, monitoring and auditing. Such resources must be available during the operational and closure, as well as the construction phase.

Environmental requirements requiring cost allocation must be clearly identified the terms of reference for contractors and suppliers to ensure these service providers budget effectively.

1.4

TRAINING AND HSE AWARENESS

Training and awareness raising around HSE issues is essential for ensuring that the EMP is effectively implemented and that unforeseen HSE incidents are managed timeously and appropriately. The ultimate responsibility for HSE training and awareness raising rests with RWP.

It is suggested that the following be included in the approach to training and awareness raising:

- Induction course/briefing for all contractors including a description of RWP's expectations, specific responsibilities of wind farm workers with regard to HSE issues. The briefing will usually take the form of an on site talk and demonstration by the ECO. The education / awareness programme should be aimed at all levels of personnel within the contractor team;
- Refresher courses as and when required;
- Focused training sessions in relation to specific tasks, such as the erection of turbines; and
- Toolbox talks to alert workers to particular HSE concerns associated with their tasks for the day/period and to encourage generally responsible behaviour on site.

Courses should be provided by a qualified person and in a language and medium understood by contractors/employees.

1.5 DOCUMENTATION AND RECORD KEEPING

All documentation relevant to the implementation of the EMP during construction, operation and closure must be maintained on site in a structured and ordered manner. These documents should be distributed in a controlled manner to affected personnel and must also be made available for public / authority inspection, if requested.

The type of documents that should be managed and retained include, at minimum:

- Method statements;
- Policies and plans;
- Project specific HSE audit reports;
- Training material and records of attendance;
- Incident reports;
- Emergency preparedness and response procedures (in accordance with IFC Performance Standard 2);
- Monitoring reports; and
- Minutes of key meetings with service providers and project team members.

1.6 AUDITING AND REPORTING

Auditing by an external, independent auditor should be undertaken at the end of both the construction and rehabilitation phases, as well as annually

thereafter during operation. After each audit a report should be submitted to the DEA and other relevant authorities. The audit must cover compliance with any specific conditions included in the Environmental Authorisation as well as specific management and monitoring actions included in this EMP. The completed audit reports must be accurately dated and form part of the document control system. Report back to stakeholders should be undertaken after each audit.

A monthly audit should be undertaken by the independent ECO during construction and the resultant independent audit reports will be communicated with senior management within RWP and sent to the DEA and other relevant authorities as and when required.

1.7 REVISION OF THE EMP

This EMP has been formulated in draft so as to allow for appropriate changes and modifications subject to inclusion of final requirements as per the EA and specific measures identified during pre-construction monitoring. The EMP should be subject to review by senior management responsible for the project at the following stages of the project:

- Prior to the initiation of the construction phase (post pre-construction monitoring) to ensure that all relevant management actions have been included;
- Following the construction and rehabilitation phase and after the start of operation, to capture additional and unforeseen mitigation measures that are identified during these activities, and would be relevant to the operational phase;
- Prior to final decommissioning and closure.

1.8 SUBSIDIARY PLANS AND POLICIES

Environmental and socio-economic management issues at various stages in the life of the project from detailed design through to decommissioning, are governed or guided by a number of standards, including:

- those contained in South African legislation;
- those established by industry codes of practice;
- those required by RWP policy or manufactures specifications;
- those within relevant international standards (e.g. World Bank environmental guidelines, IFC Performance Standards, World Health Organisation, International Labour Organisation); and

- commitments made in the EIA.

Prior to construction a number of subsidiary plans, policies and monitoring programmes will be required to manage various activities or potential risks. These are summarised in *Box 1.1*.

Box 1.1 ***Summary of Subsidiary Plans, Policies and Programmes required for the EMP***

Policies, Plans and Programmes to be developed

- Environmental Policy
 - Recruitment Policy
 - Local Procurement Policy
 - Health and Safety Policy
 - Bat Monitoring Programme
 - Bird Monitoring Programme
 - Code of Conduct
 - Emergency Response Plan
 - Health and Safety Plan
 - Traffic Management Plan
 - Waste Management Plan
 - Spoil Management Plan
 - Community Development Trust Plan
 - Community Engagement Plan (CEP)
 - Recruitment Policy
 - Local Procurement Policy
-

1.9 ***STAKEHOLDER ENGAGEMENT***

RWP will continue to engage with stakeholders throughout project construction and operation. Communication with local communities and other local stakeholders will be a key part of this engagement process and will require RWP and the contractor to work closely during the construction period. Development of a Community Engagement Plan (CEP) will be important to facilitate this communication.

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

- To provide residents in the vicinity of the wind farm (e.g. neighbouring landowners/ farmers and other residents) 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 that may arise between RWP, the contractors and local people.

This engagement process can serve to inform the establishment and provisions of the Community Development Trust linked to the project.

1.9.1 *Grievance Procedure*

RWP should develop a grievance procedure to ensure fair and prompt resolution of problems that may arise 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 RWP and its contractors. The ECO should ensure that the grievance procedure is made accessible to the local community and other relevant stakeholder.

1.10 *MICRO-SITING OF TURBINES*

The preferred and Final Layout (Alternative 2) has been designed based on a combination of the sensitivity constraints mapping of the site identified by specialists during the EIA process and available wind resource mapping and data from RWP.

The turbine positions may be micro-sited based on additional site data from the following sources:

- detailed geotechnical investigations and surveys;
- pre-construction monitoring data; and
- specific site checks by ecologist and paleontological specialist.

Micro-siting will be done as part of the detailed site planning process to ensure that the environmental risks are minimised and the technical requirements of the project can be achieved. Micro-siting will ensure that the turbine positions will be located in areas not mapped or identified as high sensitivity and that any environmental constraints at the specific turbine positions and road alignments are identified, avoided or managed.

Layout Alternative 2 is considered the Final Layout as indicated in the EIR. Any potential change to the final turbine positions will be submitted to the Department of Environmental Affairs (DEA) before construction with an indication of the extent of change from the approved layout, and associated amendments in significance ratings of impacts where applicable.

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Activities undertaken during site preparation, construction and operation may require additional permits, over and above the Environmental Authorisation. RWP is responsible for ensuring that the necessary permits are in place in order to comply with national and local regulations. Additional permit requirements are described below.

2.1

HERITAGE

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.

Archaeology, Palaeontology and Meteorites

According to Section 35 (Archaeology, Palaeontology and Meteorites) and Section 38 (Heritage Resources Management) of the South African National Heritage Resources Act, palaeontological heritage impact assessments (PIAs) and archaeological impact assessments (AIAs) are required by law in the case of developments in areas underlain by potentially fossiliferous (fossil-bearing) rocks, especially where substantial bedrock excavations are envisaged, and where human settlement is known to have occurred during prehistory and the historic period. Depending on the sensitivity of the fossil and archaeological heritage, and the scale of the development concerned, the palaeontological, and archaeological impact assessment required may take the form of (a) a stand-alone desktop study, or (b) a field scoping plus desktop study leading to a consolidated report. In some cases these studies may recommend further palaeontological and archaeological mitigation, usually at the construction phase. These recommendations would normally be endorsed by the responsible heritage management authority, in this case Heritage Western Cape (HWC) and the South African heritage Resources Agency (SAHRA), to whom the reports are submitted for review. A cultural heritage, archaeological and palaeontological specialist report with mitigation and recommendations has been undertaken as part of the EIA and sent to the relevant authorities. Table 2.1 outlines when a permit is required depending on the sensitivity of the heritage resources.

Table 2.1 *Permitting requirements for fossil, built environment and Stone Age archaeology*

PERMIT APPLICATION SECTION 35 - FOSSILS, BUILT ENVIRONMENT FEATURES, SHIPWRECKS & STONE AGE ARCHAEOLOGY (Ref : NHRA 1999: 58):

(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;

**PERMIT APPLICATION SECTION 35 - FOSSILS, BUILT ENVIRONMENT
FEATURES, SHIPWRECKS & STONE AGE ARCHAEOLOGY (Ref : NHRA 1999: 58):**

- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
 - (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite.
-

Burial Grounds and Graves

A Section 36 permit application is made to the South African Heritage Resources Agency (SAHRA) which protects burial grounds and graves that are older than 60 years, and must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit. SAHRA must also identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with these graves and must maintain such memorials. A permit is required under the conditions listed in Table 2.2.

Table 2.2

Permitting requirements for burial grounds and graves older than 60 years to Heritage Western Cape (HWC) and historic burials to the South African Heritage Resources Agency (SAHRA)

**PERMIT APPLICATION SECTION 36 - BURIAL GROUNDS & GRAVES
(REF: NHRA 1999 : 60)**

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves
 - (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
 - (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals
 - (d) SAHRA or a provincial heritage resources authority may not issue a permit for The destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant
-

2.2 *BORROW PITS*

A borrow pit refers to an open pit where material (soil, sand or gravel rock) is removed for use at another location. RWP are likely to require the use of borrow pits for certain earthworks operations, such as the construction of roads, embankments, bunds, berms, and other structures.

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

2.3 *WATER USE*

There are licensing procedures that need to be followed for particular “water uses”. Water uses that may be of relevance to the development of wind farms and associated road construction include the following:

- Taking of water from a water resource, including a water course, surface water, estuary or aquifer (i.e. borehole)
- altering the bed, banks, course or characteristics of a water course; and/or
- impeding or diverting of a flow in a water course.

2.4 *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 to deliver turbine components 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 must be obtained from the relevant Provincial Authority. 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, 2009.

2.5 *ACCESS FROM THE N1- R354*

The site will be accessed via the R354. Some existing public roads may need to be upgraded (including the N1/R354 intersection) to facilitate the transport of the turbines and other construction materials to the site. Within the site area existing farm tracks will be used, some existing farm tracks will be up-graded and new gravel roads may be constructed to facilitate movement of construction and maintenance vehicles.

It is likely that there will be two or more site access roads including one accessing the south of the site from the R354 and one accessing the north of the site from the R354. There may also be a site access road accessing the centre of the site from the R354. In addition to site access roads there will be a network of access roads between each of the turbines. Site access roads will be up to 12 m wide with drainage trenches adjacent to the road.

2.6

AVIATION COMMUNICATIONS

Written approval or a permit must be obtained from the South African Civil Aviation Authority that the wind farm will not interfere with the performance of aerodrome radio Communication, Navigation and Surveillance (CNS) equipment, especially radar.

3.1 INTRODUCTION

Specific biological monitoring requirements that are required to be undertaken through the various phases of the Roggeveld Wind Farm have been identified through specialist studies and are identified in this section. Biological monitoring is required during the pre-construction, construction and operational phases of the project, particularly for birds and bats.

Table 3.1 provides a summary of what monitoring is required at the various phases of the development. RWP is responsible for ensuring that all monitoring measures described in this section are undertaken by appointing the relevant specialists where necessary.

Table 3.1 *Monitoring Requirements*

	Ecology	Bats	Birds
Pre-construction		X	X
Construction	X		
Operational	X	X	X

3.2 PRE-CONSTRUCTION PHASE

Pre-construction monitoring is an essential requirement prior to construction in order to validate within reason that final turbine placement and arrangement, as well as mitigation and management measures as included in this EMP, will minimize potential impacts on birds, bats and other terrestrial ecological components and also in order to gain consequential knowledge for future wind farm projects to be developed in the country. A year of monitoring prior to wind farm development, design and construction is a legal requirement in Europe for wind farm development.

3.2.1 *Ecological Monitoring (excluding Bats and Birds)*

Monitoring Impacts on Rare or Endangered Plant Species

There are a number of listed plant species which may occur at the site. Monitoring should occur pre-construction to identify listed species within areas that will be impacted by the development. The following recommendations are made in this regard:

- preconstruction surveys of the turbine sites is recommended in order to avoid impacts on listed species and rare edaphic habitats and should be marked so that they can be relocated to an adjacent similar environment at the appropriate time.

- Number and identities of all species translocated should be recorded.
- Relocated individuals should be marked and monitored for at least a year after transplanting to establish the success rate of the relocation exercise.

3.2.2

Bat Monitoring

Due to the large extent of the site and the relative diversity of habitats, two different monitoring regimes are recommended for the current wind energy project:

Pre-construction passive monitoring:

- By means of installing a few passive ultrasonic recorders for bats designed for long-term out-door usage.
- Data from these machines can be downloaded monthly for a monitoring period of one calendar year.

Monitoring should be conducted along the length of the Roggeveld Wind Farm site for a full year across seasons to straddle the times that bats migrate (predicted to be April/May and August/September) and during mid-summer (November to February) to reasonably inform the sitings of turbines and to determine if additional mitigation measures shall be implemented. Monitoring should be done over extended periods within each season, e.g. several weeks at 3-4 days per week. Research on seasonal and diurnal activity rhythms is sorely needed for all of the bat fauna in South Africa.

Bat activity should be assessed with detectors placed at ground level, as well as at least 30 m above ground. The pre-construction 60 m wind measuring masts are important monitoring points and allow for elevated sampling to record bats that may fly at heights similar to that of the rotor reach.

It is assumed that most bat detectors have a detection range of approximately 20 - 30m, therefore, many monitoring sites would be required to cover the site completely. However, this will not be financially feasible. Therefore, it can be predicted that 6 monitoring stations should adequately allow for a refined impact assessment and to adequately inform turbine sitings over the proposed approximately 16km site length. The final number of monitoring points will be determined closer to the study.

Various passive monitoring systems are available and NSS will investigate the most technically and cost efficient ultrasonic recording equipment for the Job if appointed. Such systems include:

- ANABAT SD2 (Titley Electronics PO Box 19Ballina NSW 2478, Australia info@titley.com.au, <http://www.titley.com.au/batdetection.htm>) that

enables the remote downloading of echolocation data would allow the collection of data over extended periods.

- Song Meter SM2BAT Terrestrial Ultrasonic Recorder (http://www.wildlifeacoustics.com/sm2_bats.php)

The sound data will be recorded and saved into several files. These sound files (usually .WAV files) will be analysed using sound analysis software, such as Bat Sound Pro, Bat Scan 9, Sonobat, etc.

In order to supplement the information obtained from passive monitoring regular bat netting will take place at key habitat features during the year. Any bats that are captured by the mist nets will be weighed, measured (e.g. forearm length, noseleaf dimensions, etc.), photographed and released. Release calls will be recorded for comparison with the passive data.

Voucher specimens or samples will only be taken, if there is doubt with regard to the species type (as approved by an existing Cape Nature permit). All appropriate data collected will undergo statistical analysis for input into the monitoring report.

3.2.3

Bird Monitoring

A long term monitoring programme has been recommended to confirm the potential impacts on birds and to identify additional mitigation measures that may be required to ameliorate these impacts. Pre-construction bird monitoring is recommended to extend over the course of a year (ideally) or for at least six months prior to construction to provide an understanding of bird densities, presence and abundance and movement patterns and potential impacts of the wind facility. The primary aims of a long-term pre-construction monitoring programme are to determine the densities of birds resident within the impact area, document patterns of bird activity and movements in the vicinity of site, monitor patterns of bird activity and movement in relation to weather conditions, time of day and season and share key findings with the industry and other relevant stakeholders to ensure that the collective knowledge and understanding of the interface between South African birds and wind energy development is advanced as quickly and accurately as possible.

Pre-construction monitoring would determine the need for any additional mitigation requirements to be implemented during the construction or operational phases of the development and should be undertaken in the 6-12 months preceding construction.

Avian densities

A set of at least 10 walk-transect routes, each of at least 1000 m in length, should be established in areas representative of all the avian habitats present within a 10 km radius of the centre of the Roggeveld site. Each of these should

be walked at least once every two months over the 6-12 months preceding construction. The transects should be walked after 06h00 and before 09h00, and the species, number and perpendicular distance from the transect line of all birds seen should be recorded for subsequent analysis and comparison. In addition:

- The cliff-lines within or close to the development area should be surveyed for cliff-nesting raptors at least every six months using documented protocols (Malan 2009).
- Known large eagle nest sites should also be checked twice annually for signs of occupation and breeding activity.
- All sightings of key species at or near the site (Table 6.1 of Annex G of EIR) should be carefully plotted and documented.

Bird activity monitoring

Monitoring of bird activity in the vicinity of the Wind Farm by should be done over a 2-3 day period at least every two months for the 6-12 months preceding construction. Each monitoring day should involve:

- Half-day counts of all priority species flying over or past the wind farm impact area (see passage rates below, and note the stipulated use of radar as a companion to active pre-construction monitoring)
- Opportunistic surveys of cranes (and bustards) and raptors seen when travelling around the Roggeveld site.

Passage rates of priority bird species

Counts of bird traffic over and around the proposed Wind Farm should be conducted from suitable vantage points (and a number of these should be selected and used to provide coverage of avian flights in relation to all areas of the wind farm), and extend alternately from an hour before dawn to midday, or from midday to an hour after dusk, so that the equivalent of four full days of counts is completed each count period. This should provide an adequate (if minimal) sample of bird movements around the facility in relation to a representative cross-section of conditions and times of day, for all seasons of the year.

Once in position at the selected count station, the observer should record (preferably on a specially designed data sheet) the date, count number, start-time and conditions at start - extent of cloud cover, temperature, wind velocity and visibility - and proceed with the count. The counts should detail all individuals or flocks of the stipulated priority bird species, all raptors, and any additional species of particular interest or conservation concern, seen flying within 500 m of the envisaged or actual periphery of the wind farm. Each record should include the following data: time, updated weather assessment, species, number, mode of flight (flapping, gliding, soaring), flight activity (commuting, hunting other), direction of flight, vertical zoning

relative to the envisaged or actual turbine string (low – below the rotor arc, medium – within the rotor arc, medium-high - within c.100 m of the upper rotor arc, high – >100 m above the upper rotor arc), and horizontal zoning relative to the envisaged or actual turbine array (near – through the turbine string or within the outer rotor arc, middle – within c.100 m of the outer rotor arc, distant - >100 m beyond the outer rotor arc). The time and weather conditions should again be noted at the end of each count.

3.3 CONSTRUCTION PHASE

Mammals, reptiles and amphibians are most likely to be exposed to impacts during the construction phase of the Roggeveld Wind Farm primarily through loss of habitat and impacts associated with construction vehicles and workforce. This section describes the biological monitoring measures that should be undertaken during the construction phase.

3.3.1 Ecological Monitoring (excluding Bats and Birds)

In general, during the construction phase, monitoring should be used to ensure that the development takes place within the guidelines provided by this document to ensure that construction minimises or avoids impacts on adjacent natural vegetation, fauna and ecosystems. This monitoring could be undertaken by the ECO.

Monitoring Loss of Habitat and Habitat Fragmentation

Habitat loss and fragmentation is primarily a concern during the construction phase since this is when the majority of disturbance will take place. Specific areas that should be monitored include:

- Any deviations from the final construction plan, including the location, extent and nature of vegetation impact and transformation.
- The location and extent of temporary lay-down areas, these should be included in the sweeps for alien species.
- Any inadvertent or otherwise unintended destruction of natural vegetation and the remediation steps taken to encourage the recovery of the impacted areas.
- Monitoring frequency would need to be high, daily or weekly during the construction phase. During the operational phase monitoring could be conducted on an ad-hoc basis coincide with maintenance activities that may impact natural vegetation, such as servicing of the turbines.
- During the operational phase, it is recommended that a fire monitoring system is set in place to record the date, extent and source of all fires at the site. Fire is a key ecological driver in fynbos vegetation and the extent to which the development impacts the fire regime at the site should be established so as to better inform long-term fire management at the site.

Monitoring Impacts on Sensitive Environments

The sensitive environments at the site require specific attention to avoid and mitigate negative impacts to these areas. Sensitive areas include rare edaphic environments as well as drainage lines, seeps and wetlands. These areas will be particularly vulnerable to negative impact during the construction phase when the major infrastructure associated with the development is laid down. During the construction phase, monitoring should largely be directed towards enforcement to ensure that these areas are not negatively impacted. As such, monitoring of these aspects should be on a continuous basis. During the operational phase there are not likely to be many activities which pose a direct risk to these areas. Specific recommendations include:

- Before roads are constructed, their proposed routes should be inspected on foot and all wetlands and riparian areas mapped and recorded on a GPS. Where planned roads traverse wetlands, these should be rerouted so as to avoid the wetlands. The services of an ecologist trained in the field may be required to accurately identify and delineate the wetlands.
- Where roads traverse rivers and drainage lines, the sites should be monitored to ensure that the presence of the road is not resulting in erosion or the deposition of large amounts of silt.
- The state of vulnerable wetlands near to roads should be recorded, preferably during the late wet season. A repeat photography method is suggested as a simple yet cost effective manner for monitoring wetland state. It is important to note that near and close-up pictures would be required to adequately assess changes in wetland state.

Monitoring Impacts on Rare or Endangered Plant Species

There are a number of listed plant species which may occur at the site. Monitoring should occur pre-construction to identify listed species within areas that will be impacted by the development. The following recommendations are made in this regard:

- Number and identities of all species translocated should be recorded.
- Relocated individuals should be marked and monitored for at least a year after transplanting to establish the success rate of the relocation exercise.

Monitoring Direct Faunal Impacts

Particularly during the construction phase but also during the operational phase, direct faunal impacts are a concern of the development. Monitoring during the construction phase should be used to ensure that human-animal interactions are kept to a minimum and during the operational phase to assess the extent to which animal populations are vulnerable to or recover from the negative effects of the development.

- The traffic on the access and service roads poses a significant risk to many animals, particularly during the construction phase when traffic volumes on the roads are likely to be heavy. Any fauna accidentally killed during construction or maintenance activities should be reported and a log of such mortalities maintained. Where possible the species killed should be identified and recorded as well. Monitoring should be on an ad-hoc basis, as incidents occur.
- The activities of construction staff should be monitored to ensure that undesirable activities such as hunting, illegal collecting of plants, seeds or any other biological material does not occur, and that fires outside of the designated and demarcated areas do not occur. Any incidents or transgressions relating to these aspects should be logged, as well as the remedial steps taken to rectify the situation.
- As part of mitigation, monitoring studies on potentially vulnerable species or groups of species such as tortoises, by students or universities could be encouraged and funded. There is a general paucity of knowledge on the ecological impacts of renewable energy facilities in South Africa and better knowledge will enable improved understanding of the nature of impacts as well as improve mitigation strategies.

3.4 OPERATIONAL PHASE

Birds and bats are likely to be impacted during the operational phase of the Roggeveld Wind Farm, primarily through collisions with the wind turbines or electrocutions with existing power lines. This section describes the monitoring measures to be undertaken during the operational phase of the Roggeveld Wind Farm. The monitoring requirements presented here may be modified based on the results of pre-construction monitoring and should therefore be regarded as provisional.

3.4.1 Ecological Monitoring (Excluding Birds and Bats)

During the operational phase, monitoring should be focused on ensuring that there are no residual impacts such as soil erosion and alien plant invasion resulting from the construction phase, and on reducing the day to day impact of the Roggeveld Wind Farm.

Operational monitoring can be undertaken by the ECO on a monthly basis throughout the first year after construction (or more frequently after storm or extended rainfall events to check for erosion). After the first year, monitoring of rehabilitation measures could be checked twice annually for the next two years, and thereafter operational monitoring could be restricted to annual checks.

Specific aspects to be monitored during operation by the ECO would include:

Disturbance of sensitive habitat during maintenance:

Habitat damage caused by movement of vehicles and equipment during turbine or infrastructure maintenance activities.

Erosion

As erosion has been identified as one of the major risks associated with the development, there should be strong focus on monitoring the development, presence and persistence of erosion at the site. Specific recommendations include:

- An erosion monitoring system is set in place to record the location and extent of all erosion sites in the vicinity of the roads and wind turbines. The results should be recorded and stored in a manner that they can be used in a GIS.
- The erosion monitoring system should record the measures taken to address existing erosion problems, their success and the occurrence of new erosion sites.
- Sweeps specifically for erosion problems should be made after large storms or heavy rainfall events as these are likely to be the trigger events for erosion and control will be more easily affected while the problem is still of a small extent and low severity.
- Sweeps should be more frequent in the first year of construction as this is when the majority of problems are likely to manifest as the soil will still be loose and unvegetated. Particular attention should be paid to roads and other disturbed areas on slopes or vulnerable soil types.
- In terms of frequency, erosion should be checked at least quarterly, more often in the rainy season.

Alien Plant Invasion

The large amount of disturbance at the site is likely to render it highly vulnerable to alien plant invasion, particularly in the first few years post-construction. The roads and disturbed areas around the turbines are likely to be the major invasion foci. Monitoring for aliens should include the following:

- In a similar manner to erosion, an alien monitoring system should be set up which allows for the occurrence, persistence and treatment of alien plants to be monitored in a manner which allows the data to be interrogated in a GIS.

- Monitoring for alien plants could be done simultaneously with erosion monitoring and at a similar interval.
- The system should record the species present, their location, the control measures used and their success rate.

3.4.2 *Bat Monitoring*

The degree and type of post-construction monitoring will be dependent on pre-construction monitoring programme results.

Identifying spatial patterns of bat fatalities among turbines within a facility is important for developing mitigation strategies to reduce or eliminate fatalities. For example, if fatalities are concentrated at specific turbines, then turbine specific mitigation strategies, such as curtailment, removal, or relocating the turbine, may reduce bat fatalities; however, if fatalities are broadly distributed, then facility-wide mitigation strategies must be considered.

3.4.3 *Bird Monitoring*

The primary aims of long term bird monitoring during the operational phase of the Wind Farm are similar to those of the pre-construction monitoring (see *Section 3.2.3*). In addition, monitoring during the operational phase seeks to register and as far as possible document the circumstances surrounding all avian collisions with the turbines for at least a full calendar year after the facility becomes operational.

Avian densities

A set of at least 10 walk-transect routes, each of at least 1000 m in length, should be established in areas representative of all the avian habitats present within a 10 km radius of the centre of the Roggeveld site. Each of these should be walked at least 6-12 months after the wind farm is commissioned. The transects should be walked after 06h00 and before 09h00, and the species, number and perpendicular distance from the transect line of all birds seen should be recorded for subsequent analysis and comparison.

In addition:

- The cliff-lines within or close to the development area should be surveyed for cliff-nesting raptors at least every six months using documented protocols (Malan 2009).
- Known large eagle nest sites should also be checked twice annually for signs of occupation and breeding activity.
- All sightings of key species (*Table 6.1 of Annex G of EIR*) on site should be carefully plotted and documented.

Bird activity monitoring

Monitoring of bird activity in the vicinity of the Wind Farm should be done over a 2-3 day period at least once per quarter for a full calendar year starting at least six months after the Wind Farm is commissioned. Each monitoring day should involve:

- Half-day counts of all priority species flying over or past the wind energy facility impact area; and
- Opportunistic surveys of cranes (and bustards) and raptors seen when travelling around the Roggeveld site.

Passage Rates of Priority Bird Species

Counts of bird traffic over and around the operational wind farm should be conducted from suitable vantage points (and a number of these should be selected and used to provide coverage of avian flights in relation to all areas of the wind farm), and extend alternately from an hour before dawn to midday, or from midday to an hour after dusk, so that the equivalent of four full days of counts is completed each count period. This should provide an adequate (if minimal) sample of bird movements around the facility in relation to a representative cross-section of conditions and times of day, for all seasons of the year. Details regarding specific measures to be undertaken post construction are identical to those listed for monitoring of passage rates of priority bird species during the pre-construction phase as described in *Section 3.2* above.

Avian collisions

Collision monitoring should have two components: (i) experimental assessment of search efficiency and scavenging rates of bird carcasses on the site, and (ii) regular searches of the vicinity of the wind farm for collision casualties.

Assessing search efficiency and scavenging rates

The value of surveying the area for collision victims only holds if some measure of the accuracy of the survey method is developed (Morrison 2002). To do this, a sample of suitable bird carcasses (of similar size and colour to the priority species – e.g. Egyptian Goose *Alopochen aegyptiacus*, domestic waterfowl and pigeons) should be obtained and distributed randomly around the site without the knowledge of the surveyor, some time before the site is surveyed (e.g. Shaw *et al.* 2010a & b). This process should be repeated opportunistically (as and when suitable bird carcasses become available) for the first two months of the monitoring period, with the total number of carcasses not less than 20. The proportion of the carcasses located in surveys will indicate the relative efficiency of the survey method.

Simultaneous to this process, the condition and presence of all the carcasses positioned on the site should be monitored throughout the initial two-month period, to determine the rates at which carcasses are scavenged from the area, or decay to the point that they are no longer obvious to the surveyor. This should provide an indication of scavenge rate that should inform subsequent survey work for collision victims, particularly in terms of the frequency of surveys required to maximize survey efficiency and/or the extent to which estimates of collision frequency should be adjusted to account for scavenge rate (Osborn *et al.* 2000, Morrison 2002). Scavenger numbers and activity in the area may vary seasonally so, ideally, scavenge and decomposition rates should be measured twice during the monitoring year, once in winter and once in summer.

Collision victim surveys

The area within a radius of at least 50 m of the outer arc of the blades of each of the turbines at the facility should be checked regularly for bird casualties (Anderson *et al.* 1999, Morrison 2002). The frequency of these surveys should be informed by assessments of scavenge and decomposition rates conducted in the initial stages of the monitoring period (see above), but they should be done at least weekly for the first two months of the study, and surveys should commence as soon as possible after construction is completed. The area around each turbine, or a larger area encompassing the entire WEF, should be divided into quadrants, and each should be carefully and methodically searched for any sign of a bird collision incident (carcasses, dismembered body parts, scattered feathers, injured birds). All suspected collision incidents should be comprehensively documented, detailing the precise location (a GPS reading), date and time at which the evidence was found, and the site of the find should be photographed with all the evidence *in situ*. All physical evidence should then be collected, bagged and carefully labelled, and refrigerated or frozen to await further examination. If any injured birds are recovered, each should be contained in a suitably-sized cardboard box. The local conservation authority (in this case CapeNature, failing this inform the monitoring project specialist) should be notified and requested to transport casualties to the nearest reputable veterinary clinic or wild animal/bird rehabilitation centre. In such cases, the immediate area of the recovery should be searched for evidence of impact with the turbine blades, and any such evidence should be fully documented (as above).

Mitigation and compliance monitoring measures required to be undertaken by the developer, RWP or the ECO, are presented in this section under the following headings:

- Pre-Construction Planning Phase;
- Construction Phase; and
- Operational Phase.

Mitigation and compliance monitoring measures listed in this section must be implemented by RWP during the various phases of the project. These measures are based on best practice and specialist recommendations to minimise impacts on the Roggeveld site.

A separate document, containing Contractor Compliance Standards has been drafted in order to clearly identify the roles and responsibilities of contractors appointed during the various phases of the project. These standards should be included as part of the contract documentation between RWP and the contractor, and RWP is responsible for ensuring the Contractor Compliance Standards are fully implemented by the contractor.

4.1 PRE-CONSTRUCTION PLANNING PHASE

In order to ensure compliance with environmental legislation and best practice guidelines the following actions are applicable to the pre-construction planning phase for the wind farm. The persons responsible for implementation of the actions are listed in the table below, the majority of which are the responsibility of RWP.

Key activities during the pre-construction planning phase will include:

- Pre-construction monitoring
- Micro-siting of the turbines based on geotechnical and detailed site checks by archaeologist and ecologist
- Notification of DEA of any changes to the final turbine layout and additional mitigation / management measures, where needed;
- Drafting of subsidiary plans, policies and procedures;
- Developing with the contractor the following:
 - A Site Layout Plan
 - Method Statements

These activities are described in more detail in the matrix below.

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
1.	Stakeholder engagement	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.	Notices sent to relevant parties on the stakeholder database. List of those to whom it was sent on file	ERM	Within 12 days from the issuing of the Environmental Authorisation.
2	Permit Requirements	Ensure compliance with legal and other permitting requirements.	2.1	Ensure that all relevant legal requirements have been met.	Permits	RWP	Prior to construction
3	Finalisation of EMP and Contractor Compliance Standards	Update EMP with EA conditions and other mitigation measures from monitoring	3.1	Incorporate additional mitigation measures specified by DEA in the EA into the EMP and Contractor Compliance Standards.	EMP and Contractor Compliance Standards	RWP	Prior to construction
4	Notification to DEA: Director of Compliance Monitoring	Ensure that DEA are notified of commencement date.	4.1	Notify DEA prior to commencement of construction.	Proof of Communication	RWP	14-days in advance of commencement of construction or as required by DEA.
		Keep DEA informed of any aspects of non-compliance with EMP or EA	4.2	Notify DEA with reasons if any provisions of the EMP or EA cannot be implemented, and provide alternative	DEA notification	RWP	Prior to construction
		Keep DEA informed of current contact details of applicant	4.3	Notify DEA of any change of contact details of the applicant	DEA notification	RWP	Prior to construction
		Provide Site Layout Plan to DEA	4.4	Submit the detailed Site Layout Plan to DEA prior to construction (see section 5.1 below)	DEA notification	RWP	Prior to construction
		Keep DEA informed of contact details of ECO	4.5	Submit the name and contact details of the appointed ECO prior to construction	DEA notification	RWP	Prior to construction
		Submit copies of all permits to DEA	4.6	Copies of all permits and written approvals obtained by relevant authorities (as required) should be submitted to DEA and shall include but not necessarily limited to: <ul style="list-style-type: none"> Removal of protected plants Non-interference with aerodrome communications (from SACAA) Permit to transport abnormal loads (Road Traffic Act) Approval from SAHRA relating to disturbance of heritage features 			
5.	Site Layout Plan	Ensure detailed site layout minimises environmental	5.1	Prepare a detailed Site Layout Plan that demarcates the following:	Final Site Layout Plan	RWP	Prior to construction

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
		and social risks and complies with EMP		<ul style="list-style-type: none"> • Turbine positions, lay down areas, cables, substation locations, roads, etc • Borrow pits, spoil heaps, cut and fill areas • No Go areas, including sensitive features such as ridges, drainage lines, vegetation patches • Stormwater drainage measures • Waste disposal and storage areas • Offices, works areas and ablutions • Cement/concrete batching • Storage of materials and equipment • Vehicle maintenance and storage 			
6.	Subsidiary plans	Develop Subsidiary Plans to minimise environmental and social risks	6.1	<p>The following subsidiary plans will be required prior to construction:</p> <ul style="list-style-type: none"> • Health and Safety Plan • Traffic Management Plan • Transport Study • HIV Policy and Awareness Plan • Rehabilitation Plan • Policy for assessing all damages and losses • Community Development Trust • Recruitment Policy • Procurement Policy • Code of Conduct • Grievance Procedure <p>These are referred to below, where relevant.</p>	Subsidiary plans	RWP	Prior to construction
7.	Health and Safety	Ensure the health and safety of site personnel during construction.	7.1	<p>A Health and Safety Plan must be developed prior to the commencement of construction to identify and avoid work related accidents. This shall include:</p> <ul style="list-style-type: none"> • Safety zones from residences, roads, right of way • Buffer zone to minimise electromagnetic interference with communication (eg microwave, radio and television) 	<p>Health and Safety Documentation</p> <p>Final Site Layout Plan</p>	RWP	Prior to construction

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			7.2	<p>transmissions)</p> <ul style="list-style-type: none"> • Chemical ablation facilities • Approval from the South African Civil Aviation Authority that the wind farm will not interfere with the performance of aerodrome radio Communication, Navigation and Surveillance equipment. Such approval must be submitted to the Director of Environmental Impact Evaluation. <p>Turbines must be spaced in accordance with minimum standards for minimising safety risks, with turbines at least a turbine and a half's length from each other.</p>	Final Site Layout Plan		
8	Socio-Economic Impact: Community Development	Enhance benefits associated with the Community Development Trust	8.1	Establish a Community Development Trust for the advancement of local development needs; specifically at the farm and local municipality levels.	Community Development Trust As per DoE minimum requirements	RWP	Prior to and during operation.
			8.2	Projects would be identified in collaboration with the land owners and their farm workers to improve their general living conditions and access to better living standards.			
			8.3	Projects will be identified in collaboration with the local Municipality and community representatives to ensure alignment with the key needs identified through the Integrated Development Planning process.			
			8.4	Ensure projects are aligned with RWP's policies.			
9	Procurement of Services and Tender Procedures	Ensure that procurement of local, regional and national services is maximised	9.1	Establish a procurement policy which sets reasonable targets for the procurement of goods and services from South African residents /suppliers, particularly local residents as far as possible.	Procurement policy	RWP	Prior to construction

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			9.2	Procurement should advertise tenders in local and national newspapers.	Local and national advertisements		
			9.3	Procurement processes should identify and invite bids from local suppliers.	Invited bids from local suppliers		
			9.4	Adopt transparent adjudication process for local suppliers.	Demonstrate transparent process of adjudicating tenders		
10.	Employment & Recruitment	Ensure that employment of local people is maximised	10.1	Work closely with relevant local authorities, community representatives and organisations to ensure that the use of local labour and is maximised and stipulate this as part of contractors contract.	Meeting minutes	RWP	Prior to construction
			10.2	All skill requirements to be communicated to the local communities via appointed people prior to the commencement of the construction phase.	Meeting minutes / advertisements		
			10.3	Work closely with the wind turbine suppliers to provide the requisite training to the workers.	Training material and records of training		
			10.4	Ensure that the appointed project contractors and suppliers have access to Health, Safety, Environmental and Quality training as required by the project.			
11.	Social Ills and disruption	To limit, where possible, social ills brought about by the construction and operation of the renewable energy facility	11.1	Develop an induction programme, including a Code of Conduct, for all workers.	Code of Conduct	RWP	Prior to construction
			11.2	All workers will agree to the Code of Conduct and be aware that contravention of the Code could lead to dismissal.	Code of Conduct		
			11.3	A grievance procedure will be established whereby complaints are recorded and responded to.	Grievance Procedure		

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			11.4	A HIV Policy and Awareness Plan must be developed and implemented.	HIV Policy		
			11.5	Ensure contractor does not undertake recruitment of casual labour to be done at the project site (to avoid workers camping and queuing at the site)			
12.	Disruption to and loss of agricultural land	Minimise disruption to agricultural activities and loss of agricultural land	12.1	All directly affected and neighbouring farmers will be able to lodge grievances with RWP using the Grievance Procedure.	Code of Conduct	RWP	Prior to construction
			12.2	RWP to design the infrastructure layout in a manner that limits the footprint of the facility and all associated infrastructure.	Grievance Procedure		
			12.3	RWP to plan construction activities to minimise disruption of farming practices eg notifying farmers in advance of site clearance to allow prior harvesting for instance.	Final Site Layout Plan		
13.	Property Prices and Desirability of Property	Minimise the negative impacts on property prices.	13.1	Design site layout in a manner that limits the footprint of the facility and all associated infrastructure.	Final Site Layout Plan	RWP	Prior to construction
			13.2	Prepare a site Rehabilitation Plan that will be implemented post construction and as part of the decommissioning phase.	Rehabilitation Plan		
			13.3	All directly affected and neighbouring farmers will be able to lodge grievances with RWP using the Grievance Procedure.	Grievance Procedure		
14.	Traffic Impact	Minimise negative effects associated with the increase in traffic.	14.1	A Transport Study must be undertaken at least three months prior to construction to determine the most appropriate route from port to site.	Transport Study	RWP	Prior to construction
			14.2	RWP will develop a Traffic Management Plan including strict controls over driver training, vehicle maintenance, speed restrictions,	Traffic Management Plan		

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			14.3	appropriate road safety signage, and vehicle loading and maintenance measures. RWP will develop a policy and procedure for assessing all damages and losses (e.g. damage to property, injury or death of people or livestock) resulting from project vehicles.	Policy		
			14.4	All necessary transportation permits will be applied for at this stage and obtained from the relevant authorities, including permits for abnormal loads. Oversee development of permits required by contractors.	Permits		
15.	Damage or Destruction of Cultural Heritage Interests	Avoid damage or destruction of cultural heritage aspects	15.1	A field survey must be undertaken, informing the micro-siting of turbines in the final layout design prior to construction.	Final Site Layout Plan	RWP	Prior to construction
			15.2	A policy of minimal intervention should be adopted. Abandoned buildings must be made no-go areas for construction crews.			
			15.3	Although some roads would require upgrading, the re-use of existing farm tracks is desirable.			
			15.4	Any use of buildings of heritage value and identified in the heritage report contained in the EIA will be subject to approval by heritage and planning authorities.	Photographs and ECO report Approval from heritage and planning authorities		
16.	Waste and effluent	Prevent soil and/or groundwater contamination from waste and effluent.	16.1	A suitable area for waste skips must be selected, away from water courses, and included in the site layout plan.	Waste Management Plan	RWP	Prior to construction
17.	Soil compaction and	Minimise soil compaction	17.1	Roads should be upgraded where possible and	Final Site Layout Plan	RWP	Prior to construction

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
	erosion	and erosion		only essential roads should be built e.g. between turbines.			
18.	Loss of Vegetation	Minimise impacts associated with vegetation loss	18.1	Contract an ecologist to undertake additional site assessments to confirm presence of unique or priority species of concern in the development footprint (<i>See section 3</i>)	Appropriate contractor for monitoring	RWP	Prior to construction
			18.2	Avoid, if possible, placement of turbines in areas of High or Very High Sensitivity, or in areas where significant impacts on listed or priority species may arise	Final Site Layout Plan		
			18.3	Define and select a road alignment that minimises impacts on areas classified as Very High Sensitivity. In addition, the preferred road alignment should be assessed by a botanist before construction to ensure that rare, protected or endangered species are not impacted by the road and any alternative deviations or routes are identified.			
			18.4	Laydown areas and other infrastructure requirements should be minimised and sites selected with the assistance of a botanist to ensure they are sited in areas with lowest conservation value and/or where listed species are absent.			
			18.5	Undertake botanical surveys during pre-construction planning to confirm the feasibility of search and rescue of rare plant species that may occur in the wind farm footprint, and the identification of areas earmarked for construction disturbance containing plants that can be relocated and used for rehabilitation			
		Minimise vegetation impacts related to location and use of borrow pits	18.7	Alternative sources of aggregate should be considered and should include the option of sourcing aggregate from nearby borrow pits (of			

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			18.8	similar soil and vegetation type ie quartzite) in preference to opening new quarries on the Roggeveld site. Consideration should be given to the option of several smaller borrow pits versus one or two large ones. The primary goal should be to use as much rock material from turbine foundations in preference to opening new borrow pits and to limit the quantity required from new borrow pits. Where importing aggregate is not feasible, several borrow pit locations should be selected based on the technical requirements of the project and an appropriately qualified botanist/ecologist should visit the sites to assess the site options.			
			18.9	Borrow pit sites should be carefully selected to avoid rare edaphic habitats such as quartz or gravel patches which often contain rare dwarf succulents.			
19.	Faunal Impacts	Minimise impacts to onsite fauna	19.1	Consideration could be given to liaising with research institutions to undertake long-term monitoring of fauna (<i>See section 3</i>)	Final Site Layout Plan Appropriate contractor for monitoring	RWP	Prior to construction
20.	Disturbance of bat habitat and collision	Mitigate the potential impact on bats	20.1	Keep road development and off road vehicle use to a minimum and upgrade existing roads rather than developing new road infrastructure.	Final Site Layout	RWP	Prior to construction
			20.2	Minimise blasting requirements and coordinate blasting events to minimise the number of events required.			
			20.3	All project infrastructure, i.e. turbines, substation and masts etc, should be located away from water bodies, cave roosts or any			

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			20.4	areas considered to be of high bat conservation importance that may be found during pre-construction monitoring. Avoid the placement of turbines in the valleys between the ridges.	Appropriate contractor for monitoring		
			20.5	Bat specialist appointed to undertake pre-construction long-term monitoring (<i>See section 3</i>)			
21.	Disturbance of avifauna habitat and collision	Mitigate the potential impact on avifauna	21.1	Bird specialist appointed to undertake pre- and post-construction long-term monitoring (see <i>Section 3</i>).	Final turbines selected	RWP	Prior to construction
			21.2	On-site demarcation of 'no-go' areas should be identified during pre-construction monitoring to minimise disturbance impacts associated with the construction of the facility			
			21.3	Burying all transmission lines between turbines underground (as proposed); and increasing visibility of all overhead transmission lines			
			21.4	The bird specialist should assess the need for additional mitigation measures based on pre-construction monitoring results. These measures should be agreed by the relevant parties including DEA, the ornithologist and the developer.			
22.	Visual Impacts	Minimise visual impacts	22.1	On-site infrastructure should be grouped together as far as possible	Final Site Layout Plan and building designs	RWP	Prior to commencement of construction.
			22.2	The design of the buildings must be compatible in scale and form with buildings of the			

PRE-CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			22.3	<p>surrounding area, preferably using the regional Karoo architectural style. All yards and storage areas to be enclosed by masonry walls;</p> <p>Signage related to the enterprise must be discrete and confined to the entrance gates. No other corporate or advertising signage, particularly billboards, will be permitted; and</p>			

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4.2

CONSTRUCTION PHASE

In order to ensure compliance with environmental legislation requirements and NEMA best practice the following actions are applicable to the construction phase and are the responsibility of RWP. Standard construction phase compliance standards that need to be implemented by the contractor are contained in Section 5.

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			
1.	Compliance with EMP and ROD	Confirm RWP commitment to adherence to EMP and Contractor Compliance Standards	1.1	Ensure that the EMP; Contractor Compliance Standards and EA are available at the site throughout construction and implemented by the contractor.	Copy of signed EMP and EA with subcontractor	RWP	Prior to construction
			1.2	An audit report must be undertaken by an independent auditor at the end of the construction and rehabilitation phase, and shall be submitted to DEA.			
		1.3	The audit report shall indicate the date of the audit, name of auditor; and outcome of audit in terms of compliance with the environmental authorisation and conditions of the EMP.				
2.	Health and Safety	Ensure the health and safety of subcontractors and site users	2.1	A Health and Safety Plan must be developed prior to the commencement of construction to identify and avoid work related accidents. This plan must be adhered to by the appointed construction contractors and meet Occupational Health and Safety Act (OHSAct), Act 85 of 1993, requirements.	Signed Health and Safety Plan	RWP	During construction
			2.2	Potentially hazardous areas must be clearly demarcated (i.e. unattended foundation excavations).	Signage		
			2.3	Appropriate Personal Protective Equipment (PPE) must be worn by all construction personnel. This shall include the use of ear protection in areas where the 8-hour ambient noise levels exceed 75dBA.	Signed Health and Safety Plan		
3.	Dust and emissions	Limit fugitive dust and exhaust emissions	3.1	Dust abatement should be implemented especially during windy conditions and in areas prone generation of airborne dust . This shall include wetting of road surfaces and covering of stockpiled and transported materials.	ECO records	RWP	During construction
			3.2		Grievance procedure		

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	Vehicles travelling on unpaved or gravel roads must not exceed a speed of 40 km/hr.	documentation/logbook		
			3.4	Stockpiles of dusty materials must be enclosed or covered by suitable shade cloth or netting to prevent escape of dust during loading and transfer from site.			
			3.5	Vehicles are to be kept in good working order and serviced regularly to minimise emissions.			
				All directly affected and neighbouring farmers and local residents must be able to lodge grievances with RWP using the Grievance Procedure regarding dust emissions that could be linked to the project.			
4.	Noise pollution	Avoid disturbing surrounding land-users	4.1	Vehicles must to adhere to speed limits on site, and not exceed 40km/hr	Signage on site	RWP	During construction
			4.2	A grievance procedure will be established whereby complaints are recorded and responded to.	Grievance procedure logbook		
5.	Vegetation loss	Prevent unnecessary disturbance and damage to natural vegetation and topsoil loss	5.1	Minimise extent of vegetation clearing to absolute minimum and demarcate areas of sensitive vegetation as no go areas during construction.	Onsite observation and record	RWP	During construction
			5.2	Unless otherwise agreed to with ecology specialist, exclude construction activities from areas mapped as Very High Sensitivity, as well as wetlands and drainage lines, quartz and gravel patches and rock pavements (small areas (10's of meters) of flat rock-sheet) that are found to contain rare and endemic species). These areas should also be considered as No-Go areas.			
			5.3	Roads which must traverse drainage lines should be built in a manner which does not disrupt the natural flow of water in the drainage line and also does not promote bank erosion.			
			5.4	Revegetation of road verges on steep slopes, temporary lay down areas and other impacted areas is strongly recommended and should be undertaken in accordance with a Rehabilitation Plan. However, any rehabilitation that takes place should be restricted to transplanting plants from areas that will be permanently lost into areas that need to be rehabilitated or			

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			
			5.5	protected from erosion. No plants should be brought onto the site for rehabilitation purposes. Such measures would also reduce the fragmentation effects of the development and encourage the natural spread of fires at the site. Furthermore, given the undifferentiated nature of the shallow soils on the ridge, the potential for natural revegetation of borrow pits should be maximised by back-filling them with natural rock and soil, contouring appropriately to avoid steep slopes, and revegetating with plants removed from other construction areas on the Roggeveld ridge.			
			5.6	Where unique plants are found with potential for translocation the ECO or botanist should liaise with Kirstenbosch Gardens or other nurseries to investigate the potential of translocating some species into horticultural collections or collecting seed of some of the rare or uncommon species.			
			5.7	Educate all contractors as to the importance of the undisturbed conservations areas and prohibitions on fires, and collection of plant material.			
6.	Traffic Impact	Mitigate traffic impacts	6.1	The traffic management plan will be adhered to including adherence to speed limits and 'rules of the road'.	Traffic Management Plan	RWP	During construction
			6.2	During construction, arrangements and routes for abnormal loads must be agreed in advanced with the relevant authorities and the appropriate permit must be obtained for the use of public roads.			
			6.3	Schedule delivery of turbines outside of peak traffic hours, if any.			
			6.4	Notify affected farm owners of date and time of turbine delivery to minimise effects on farm activities.	Proof of notification of farmers		
			6.5	All directly affected and neighbouring farmers and local residents will be able to lodge grievances with RWP using the Grievance Procedure regarding dangerous driving or other traffic violations that could be linked to the project.	Grievance Procedure		
7.	Damage or	Minimise damage to	7.1	Cuttings for the access roads should be inspected by a suitably	ECO report and	RWP	Prior to and

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			
	Destruction of Cultural Heritage Interests	cultural heritage interests		qualified palaeontologist, as it would be an economical transect for representative sampling.	photographs		throughout construction
			7.2	Trenches and excavations should be inspected by a palaeontologist and a report submitted to HWC and SAHRA.	Palaeontologist Report and HWC Response		
			7.3	Any substantial excavations, such as borrow pits opened for road making, providing material for berms, footings of turbines or any other construction, similarly need to be checked by a qualified palaeontologist for material of potential scientific importance.			
			7.4	Should any human burials, archaeological or palaeontological materials (fossils, bones, artefacts etc.) be uncovered or exposed during earthworks or excavations, they must immediately be reported to Heritage Western Cape and/or SAHRA as required and the appropriate process followed.	Palaeontologist Report and HWC Response		
			7.5	A policy of minimal intervention should be adopted. Abandoned buildings must be made no-go areas for construction crews.	Final Site Layout Plan		
8.	Socio-cultural issues	Minimize impacts associated with influx of jobseekers.	8.1	RWP code of conduct developed prior to the construction phase must be adhered to.	Code of conduct must be available on site.	RWP	During construction
			8.2	The HIV Policy and Awareness Plan developed prior to the commencement of construction must be adhered to by RWP employees.	HIV policy must be available on site.		
			8.3	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; the contractor should make the necessary arrangement to facilitate these visits.	ECO Report	Contractor	
9.	Faunal Impacts	Mitigate impacts on fauna	9.1	Poaching or hunting should be strictly forbidden and control poaching by banning dogs on site and enclosing worker compounds.	ECO Report and photographic evidence	RWP	During construction
			9.2	Fauna must have 'right of way' on the roads. Slow moving animals such as tortoises which may be in the way, should be placed at the side of the road in the direction the animal was seen travelling.			

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			
			9.3	All vehicles must stick to designated and prepared roads and a speed limit (up to 40 km/hr - lower for heavy vehicles) must be enforced.	Road signage and ECO reports & grievance logs		
			9.4	No harvesting or collecting of plants, seeds, animals or their parts to be allowed.	Worker training & awareness records		
			9.5	No fires must be allowed at the site, other than within demarcated areas within a defined camp area with adequate provision for fire control. No dogs or other pets allowed at the site. All staff at the site to remain within the compound at night. Poaching or hunting must be strictly forbidden. The construction camp and other temporary storage areas must be fenced-off to reduce human-wildlife interactions. It should be mandatory for staff of RWP to attend an environmental briefing and training session with respect to the guidelines outlined in this EMP.	Training material and records of training		
10.	Bird Habitat Loss: Destruction, Disturbance and Displacement	Minimise disturbance to birds	10.1	Containing the construction footprint to a bare minimum, and similarly maintaining noise disturbance to a minimum - the latter with particular reference to blasting on the ridge-top associated with foundation excavations.	ECO Report	RWP	During blasting
			10.2	Ideally, blasting should not be conducted during the breeding seasons of affected priority species and the number of blasting events required should be minimized by synchronizing multiple, neighbouring blasts into as few events as possible			
11	Bat Disturbance and Displacement	Minimise disturbance to birds	11.1	Blasting near identified bat areas should be minimised (if it cannot be avoided) during early summer (November/ December), during the peak breeding season and during the coldest winter months (June/ July/ August) when bats go into a state of prolonged torpor and may not be able to escape and disperse.	ECO Report	RWP	Blasting
			11.2	Depending on the findings of pre-construction monitoring, the			

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			
			11.3	need for ultrasonic deterrent devices may need to be considered If any caves with substantial bat roosts are identified during pre-construction monitoring works, a buffer of at least 500m should be maintained around the caves, with little or no development occurring within this buffer			
12.	Visual Impacts	Minimise visual impacts	12.1		ECO Report	RWP	Throughout construction
			12.2	The extent of the construction camp and stores should be limited in area to only that which is essential;			
			12.3	Disturbed areas rather than pristine or intact landscape areas should preferably be used for the construction camp.			
			12.4	Measures to control wastes and litter should be included in the contract specification documents;	Evidence in contract specification documents.		
			12.5	Provision should be made for rehabilitation/ re-vegetation of areas damaged by construction activities and not required during operation of the wind farm.	ECO Reports		
			12.6	Borrow pits for the construction (which would be identified in the detailed civil engineering phase), would be subject to permits from the relevant authorities. Borrow pits on the site would be rehabilitated and re-vegetated according to the botanist's recommendations.			
13.	Waste and effluent	Minimise impacts due to waste and effluent production	13.1	All waste must be separated into skips for recycling, reuse and disposal.	ECO Report	RWP	Throughout construction
			13.2	Vegetative material must be kept on site and mulched after construction to be spread over the disturbed areas to enhance rehabilitation of the natural vegetation.			
			13.3	Effluent from temporary staff facilities must be collected in storage tanks, which must be emptied by a sanitary contractor.			
			13.4	Effluent from concrete washings from the on-site batching plant must be contained within a bunded area.			

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			
			13.5	All solid and liquid waste materials, including any contaminated soils, must be stored in a bunded area and disposed of by a licensed contractor.			
			13.6	Effluent and stormwater run-off must be discharged away from any water courses.			
			13.7	Steel off-cuts must be re-used or recycled, as far as possible.			
			13.8	Materials that cannot be re-used or recycled must be placed in a skip and removed from site to a licensed municipal disposal site.			
14.	Spoil Material	Reuse spoil material where possible and minimize the impacts of spoil material that cannot be reused.	14.1	A Spoil Management Plan must be developed prior to the commencement of construction and implemented to identify and avoid spoil material related impacts.	Signed Spoil Management Plan	RWP	During Construction
			14.2	The purpose of the SMP is to: <input type="checkbox"/> identify the environmental management issues associated with the sourcing, handling, transportation, stockpiling, disposal and reuse of spoil and fill material; <input type="checkbox"/> document and describe the systems and procedures developed to mitigate environmental impacts; and <input type="checkbox"/> ensure site personnel are aware of the environmental obligations and work procedures.			
			14.3	The objectives of the SMP are to: <input type="checkbox"/> establish procedures and criteria for spoil/fill material handling, transportation and movement, stockpiling, reuse and disposal; <input type="checkbox"/> protect the environment by preventing or minimising adverse impacts in relation to air quality, noise, contamination and local amenity; <input type="checkbox"/> ensure that appropriate environmental systems and controls are implemented during material management activities; <input type="checkbox"/> achieve sustainable use of resources by maximising the reuse of earthen materials generated on site; and <input type="checkbox"/> mitigation of environmental impacts of other road construction activities by prioritising the reuse of surplus spoil in ways that mitigate these other activities (e.g. use in noise mounds or to achieve flatter embankment batter slopes).			

4.3

OPERATIONAL PHASE

In order to ensure compliance with environmental legislation requirements and recommendations specified by specialists during the EIA process, the following generic and specific requirements are applicable during the operational phase of the Roggeveld Wind Farm. It is likely that DEA will require a separate operational EMP prior to the start of operation which should be informed by pre-construction and construction monitoring results and other new information from geotechnical studies or technological improvements. The operational mitigation and monitoring measures specified here provide a foundation for further development of the Operational EMP.

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			
1.	Visual impacts	Minimize the visual impacts during the operation phase.	1.1	Signage related to the wind farm must be discrete and confined to entrance gates. No advertising will be permitted.	Photographic evidence	RWP	Throughout operation
			1.2	Footprint of the facilities, as well as parking and vehicular circulation, should be clearly defined.			
2.	Health and Safety	Maintain health and safety standards	2.1	Regular maintenance of turbines and all other infrastructure must be undertaken to ensure optimal functioning and reducing the chance of gearbox failure.	Inspection records	RWP	Throughout operation
			2.2	Regular inspections of the turbine foundations, towers, blades, spinners and nacelle must be undertaken in order to check for early signs structural fatigue.			
3.	Dust and emissions	Limit fugitive dust and exhaust emissions.	3.1	Vehicles travelling on unpaved or gravel roads should not exceed a speed of 40 km/hr.	Signage	RWP	Throughout operation
4.	Waste and Effluent	Prevent soil and groundwater pollution	4.1	Used oil stored on site must be stored in an impervious container, within a bunded area.	Photographic evidence	RWP	Throughout operation
			4.2	General waste must be removed from site by a licensed contractor.	Waste manifest documents		
			4.3	Areas disturbed during construction will be re-vegetated with indigenous vegetation to prevent erosion.	Photographic evidence		
5.	Traffic	Minimise traffic impacts	5.1	During operation, if abnormal loads are required for maintenance, the appropriate arrangements will be made to obtain the necessary transportation permits and the route	Permits	RWP	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			
			5.2	<p>agreed with the relevant authorities to minimise the impact of other road users.</p> <p>All internal and access roads that will be used by RWP during the operational phase of the project will be maintained by RWP throughout the life of the project.</p>	Inspection reports		
6.	Damage or Destruction of Cultural Heritage Interests	Minimise damage to cultural heritage interests	6.1	A policy of minimal intervention should be adopted. Abandoned buildings must be made no-go areas for workers.	Monitoring data	RWP	Throughout operation
7.	Loss of Topsoil, Soil Compaction and Erosion	Minimise erosion	7.1	Long-term monitoring to be undertaken (see <i>Section 3</i>).	Monitoring reports and photographic evidence	RWP	Biannually
			7.2	Temporary laydown areas will be re-vegetated with indigenous vegetation.			
			7.3	Erosion control measures should be initiated as soon as signs of erosion problems become apparent.			
			7.4	Should any erosion develop which cannot be remedied by simple erosion control measures, then the services of a rehabilitation and erosion control consultant with experience in semi-arid zones should be brought in to provide guidance.			
8.	Loss of Vegetation	Minimise impacts associated with loss of vegetation	8.1	Minimise requirement for vegetation clearing and soil disturbance	ECO reports	RWP	Throughout operation
			8.2	Since nutrient-poor soils are an important characteristic of most fynbos soils, it is recommended that fill and construction material is sourced locally at the site and specifically that no shale or mudstone from below the ridges is used on the quartzite ridges. The use of a different substrate would inhibit natural vegetation recovery as well as facilitate the spread of alien plants at the site.			
			8.3	Natural re-vegetation of disturbed areas such as road verges should be encouraged. Seed of indigenous species collected on site could be used to revegetate cleared areas.			
			8.4	No foreign plant material should be brought onto the site, this specifically includes such items as hay bales.			

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			
			8.5	All alien plants observed at the site should be removed on a regular basis. Monitoring checks for alien plants and alien clearing if required should be conducted on a quarterly basis.	ECO Reports		
			8.6	Alien species should be controlled in the appropriate manner as determined by a botanist as incorrect control measures can exacerbate invasion problems. Clearing methods should aim to keep disturbance at a minimum.			
			8.7	A Fire Management Policy and guidelines will be developed to ensure that the operation of the Wind Farm is compatible with the long-term fire ecology of the site.	Fire Management Policy		
9.	Fauna	Minimise impacts to fauna on site	9.1	Poaching or hunting should be strictly forbidden and control poaching by banning dogs on site and enclosing worker compounds.	ECO reports and photographic evidence	RWP	Throughout operation
			9.2	Fauna must have 'right of way' on the roads. Slow moving animals such as tortoises which may be in the way, should be placed at the side of the road in the direction the animal was seen travelling.			
			9.3	All vehicles must stick to designated and prepared roads and a speed limit (up to 40 km/hr) must be enforced.			
			9.4	No harvesting or collecting of plants, seeds, animals or their parts to be allowed.			
			9.5	It should be mandatory for staff of RWP to attend an environmental briefing and training session with respect to the guidelines outlined in this EMP.	Training material and records of training		
10.	Bird Habitat Loss: Destruction, Disturbance and Displacement	Minimise disturbance to birds	10.1	Minimizing the disturbance impacts associated with the operation of the facility, by scheduling maintenance activities to avoid disturbance in sensitive areas (identified during monitoring)	Maintenance schedules	RWP	Throughout operation
11.	Birds: Avian collisions	Loss of habitat-disturbance or destruction and monitor potential injury to avifauna and	11.1	Implementing a rigorous monitoring programme (see Section 3) and findings of the proposed monitoring schedule should be implemented.	Monitoring reports	RWP	Initial 12 to 24 month period at which time whether or not additional monitoring is
			11.2	Lighting on the turbines to kept to a minimum (but in line	Inspection reports		

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			
		fatalities		with aviation regulations), coloured red or green and intermittent.			required.
12.	Bat disturbance habitat loss	Limit loss of bat habitat	12.1	Maintenance activities should be kept within the immediate vicinity of the turbines and associated infrastructure.	ECO Report		
			12.2	A Site Maintenance and Rehabilitation Plan must be implemented to restore disturbed areas and maintain bat habitat.			
13.	Bat collisions and barotrauma	Monitor fatalities	13.1	Long-term monitoring to be undertaken	Monitoring reports	RWP	Initial 12 to 24 month period at which time whether or not additional monitoring is required.
			13.2	A register must be maintained of injuries to bats, complaints or queries received as well as any action taken.	Register of collisions/ injured bat species		
			13.3	Undertake feasible mitigation measures identified informed by monitoring.			
14.	Tourism Impacts	Enhance tourism impacts	14.1	Work with the Local Municipality and local tourism organisations to raise awareness about the wind farm.	Brochures and posters	RWP	Throughout operation
			14.2	Information brochures and posters will be made available at the local libraries to provide more information about the wind farm. These should be presented in the appropriate languages to maximise the benefits.			
15.	Electromagnetic Interference	Prevent EMI effects	15.1	Should EMI be shown to be a problem, mitigation measures might include the replacement of receiving aerial installations, replacement by satellite dishes or the provision of a private transmitter.	Installation reports	RWP	Throughout operation
			15.2	RWP have committed to correct any EMI problems should they be shown to be the cause of the wind farm.			
16.	Shadow flicker	Assess potential shadow flicker impacts	16.1	A shadow flicker study will be undertaken if the final layout results in turbines being located within 10 blade diameters of any dwellings or buildings within which people work.	Shadow flicker study	RWP	Throughout operation
17.	Notification of landowners	Inform landowners on maintenance activities	17.1	Landowners should be informed at least 48 hours in advance of scheduled maintenance activities to ensure that provision can be made to avoid conflicting land uses and to ensure	Notification of landowners	RWP	Prior to maintenance activities.

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			
				access to the site (eg relocate grazing animals form the area)			

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A detailed decommissioning and rehabilitation plan should be developed prior to decommissioning of the Wind Farm. This plan should include, but should not be limited to, conditions regarding removal of infrastructure, management of waste and/or contaminated soil, dust suppression and re-vegetation.

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The following Contractor Compliance Standards have been drafted for use by any Contractors appointed by RWP during the construction of the Roggeveld Wind Farm. Guidelines for Contractors developed for the Cape Metropolitan Council by Ninham Shand (2002) and relevant to the expected construction phase of wind farm were extracted and modified as the basis for this schedule of Contractor Compliance Standards. The Contractor appointed will use these as a basis for guiding all construction activities. RWP will retain overall responsibility during all stages of any construction activity and ensure that all construction activities are in compliance with the EMP. The contractors shall with due care and diligence execute and complete the works in accordance with the provisions of the Contractor Compliance Standards and any other requirements set out by RWP.

Identification of targets helps to identify the desired outcome of implementing the management measure can assist in deriving an audit report.

As far as possible, the contractor compliance standards are set out in accordance with the following phasing, typical of a construction project:

- Pre-Construction Planning;
- Construction; and
- Post-Construction.

PRE- CONSTRUCTION PLANNING PHASE

Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
1.	EMP and Contractor Compliance Standards legally binding on contractor	Contractor compliance with EMP	1.1	<p>Contractor requirement to implement the EMP and Contractor Compliance Standards is legally binding through the contract with RWP.</p> <p>Contractor to keep copy of EMP and Contractor Compliance Standards on site and to provide ECO with a copy.</p>	EMP provisions relevant to contractor	Contractor	Prior to construction
2.	General Environmental Protection- Method Statements	Contractor activities comply with approved method statements to minimise impacts to the environment	2.1	<p>The contractor shall prepare the following method statements:</p> <ul style="list-style-type: none"> • Access routes: Location of proposed access routes, rehabilitation of temporary access routes • Blasting (if required): details of all methods and logistics • Camp establishment: layout and preparation; method of installing fences for no go areas; working areas and construction camp areas • Cement/concrete batching (if applicable): Location, layout, and preparation of cement/ concrete batching facilities including methods employed for mixing concrete and management of run off water • Contaminated water: including containment of runoff and disposal of polluted water • Dust control methods • Clearance of vegetation: method during site establishment • Earthworks: method for control of erosion during bulk earthwork operations, and method of undertaking earthworks, including hand excavation and spoil management • Emergency: response to possible emergencies on site • Environmental awareness: logistics for environmental awareness for contractors' employees and management staff • Fire and hazardous substances: handling and storage of hazardous wastes; emergency spillage procedures and compounds to be used; emergency procedures for fire; use of herbicides and other poisonous substances; • Fire and fuel spills: methods of refuelling vehicles; methods for cleaning up fuel spills; refuelling of construction vehicles • Rehabilitation: methods for disturbed areas, and revegetation after construction is complete • Solid waste management: solid waste control and removal of waste from the site • Sources of material: details of materials to be imported to the site • Traffic safety measures: entry and exit off public roads 	Method statements	Contractor	Prior to construction

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
3.	Health and Safety	Ensure the health and safety of site personnel during construction.	3.1	A Health and Safety Plan developed by RWP must be adhered to.	Health and Safety Documentation and Method Statements Final Site Layout Plan	Contractor	Prior to construction
			3.2	Buffer zones around roads, houses, and any other structures must be observed.			
4.	Construction site layout plan	General environmental protection	4.1	<p>The contractor shall provide input into the Site Layout Plan to be presented to the DEA by RWP for approval prior to starting construction activities. This plan shall take account of provisions of the EMP and this Contractor Compliance Standards and shall demarcate the different works areas including:</p> <ul style="list-style-type: none"> • Turbine positions, lay down areas, cables, substation locations, roads, etc. • All buildings and structures including;; contractors' camp and lay down areas, site offices, laboratory, fuel stores, toilets and ablutions, construction materials stores, vehicle and equipment stores, wash bays and solid waste storage and disposal sites • Works areas such as batching plants (if required) • Roads and access routes • Gates and fences • Essential services (permanent and temporary water, electricity and sewage and substation) • Rubble and waste rock storage and disposal sites • Firebreaks • Excavations and trenches, borrow pits, rubble and waste rock storage and disposal sites and topsoil stockpiles. • Features and plants to be conserved. • No Go areas (e.g. ecological sensitive areas, and cultural heritage site) 	<p>Layout plan shows different work areas.</p> <p>Plan approved by DEA</p>	Contractor and ECO	Prior to construction
5.	Procurement and Tender	Ensure that procurement of local, regional and national services is maximised:	5.1	Establish a Procurement Policy which sets reasonable targets for the procurement of goods and services from South African residents /suppliers, particularly local residents as far as possible.	Procurement Policy	Contractor	Throughout construction
			5.2	Procurement should advertise tenders in local and national newspapers.	Local and national advertisements		
			5.3	Procurement processes should identify and invite bids from local suppliers.	Invited bids from local suppliers		
			5.4	Adopt transparent adjudication process for local suppliers.	Demonstrate transparent process of adjudicating		

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
					tenders		
6.	Employment & Recruitment	Ensure that employment of local people is maximised	6.1	No employment will take place at the entrance to the site. Only formal channels for employment will be used.	Recruitment Policy	Contractor	Prior to construction
			6.2	All skill requirements to be communicated to the local communities via appointed people prior to the commencement of the construction phase.	Evidence of recruitment		
			6.3	Work closely with the wind turbine suppliers to provide the requisite training to the workers.	Training material and records of training		
			6.4	Ensure that the appointed project contractors and suppliers have access to Health, Safety, Environmental and Quality training as required by the project.			
7.	Good community relations	Minimise raised expectations in local community and limit social disruption	7.1	Information boards: containing background information on the construction activity and the relevant contact details for complaints shall be erected near the entrance to the site.	Large info board erected at the site and correct information provided (contact details)	Contractor	Prior to construction
			7.2	Notification of onset of construction: Notify Employer, relevant authorities and local community in writing as well as verbally of the onset of construction activities, including contact details for complaints.	Proof of notification of onset of construction to RWP, relevant authorities and local community		
			7.3	Community liaison assistants to inform the local community members of the recruitment process and onset of construction and schedule.	Recruitment records of community liaison assistance		
8.	Social Ills and disruption	To limit, where possible, social ills brought about by the construction and operation of the renewable energy facility	8.1	Develop an induction programme, including a Code of Conduct, for all workers. All workers will agree to the Code of Conduct and be aware that contravention of the Code could lead to dismissal.	Code of Conduct	Contractor	Prior to construction
			8.2	HIV Policy and Awareness Plan developed by RWP must be adhered to.	HIV Policy and Awareness Plan		
9.	Traffic Impact	Minimise negative effects associated with the increase in traffic.	9.1	All necessary transportation permits will be applied for at this stage and obtained from the relevant authorities, including permits for abnormal loads.	Permits	Contractor	Prior to construction
10.	Damage or Destruction of Cultural Heritage Interests	Avoid damage or destruction of cultural heritage aspects	10.1	Construction work must not commence until turbines have been micro-sited and final positions are fixed and checked	Archaeological study and approval	Contractor	Prior to construction

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			10.2	Adhere to buffers around sensitive features set out in the EMP.			
11.	Waste and effluent	Prevent soil and/or groundwater contamination from waste and effluent.	11.1	A suitable area for waste skips must be selected, away from water courses, and included in the site layout plan.	Waste Management Plan	Contractor	Prior to construction
12.	Loss of Vegetation	Minimise impacts associated with vegetation loss	12.1	Ensure that infrastructure and construction activities are confined to previously disturbed areas as far as possible.	Final Site Layout Plan	Contractor	Prior to construction
			12.2	Avoid the development of new roads where possible to minimise impact to natural vegetation.			
			12.3	Temporary construction lay-down areas should be sited on croplands, preferably in flat areas. No natural vegetation should be transformed for temporary activities.			
			12.4	Restricting service roads and underground cabling for the turbines to previously disturbed lands, avoiding natural vegetation.			
			12.5	Prior to construction, the exact layout of the turbines and associated lay-down areas must be inspected by an ecologist and if necessary adjusted to avoid unnecessary impact.			
13.	Faunal Impacts	Minimise impacts to onsite fauna	13.1	Measures to minimise habitat loss listed above should be implemented to minimise impacts to fauna.	As above	Contractor	Prior to construction
14.	Bat Habitat Loss: Destruction, Disturbance and Displacement	Mitigate impacts on bats	14.1	Install passive ultrasonic recorders for bats designed for monitoring and long-term outdoor usage.	Monitoring data	Contractor	Prior to construction
			14.2	Identify spatial patterns of bat fatalities among turbines.	Monitoring data		
			14.3	Keep road development to a minimum where possible, upgrade existing roads rather than developing new road infrastructure.	Final Site Layout Plan		
			14.4	Project infrastructure to be located away from waterways, known cave roosts or any areas considered to be of bat conservation importance specifically identified bat sensitive areas in the EIR.	Final Site Layout Plan		
CONSTRUCTION PHASE							
Activity		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
#	Description of Activity		#	Commitment / Actions Required / Key Controls			
1.	Compliance with EMP	Confirm contractors commitment to adherence to EMP.	1.1	Ensure that the EMP and Environmental Authorisation are available at the site during installation.	Copy of signed EMP and Environmental Authorisation.	Contractor	Outset of construction
			1.2	Ensure that equipment is in place to meet EMP requirements and Contractor Compliance Standards.	Checklist of EMP requirements		
			1.3	Signed commitment from subcontractors to compliance with EMP and Contractor Compliance Standards.	Copy of signed EMP with subcontractor		
2.	Health and Safety	Ensure the health and safety of subcontractors and site users	2.1	A Health and Safety Plan developed by RWP must be adhered to by the appointed construction contractors and meet Occupational Health and Safety Act (OHSAct), Act 85 of 1993, requirements.	Signed Health and Safety Plan	Contractor	During construction
			2.2	Potentially hazardous areas must be clearly demarcated (i.e. unattended foundation excavations).	Signage	ECO	
			2.3	Appropriate PPE must be worn by all construction personnel.	ECO Reports		
			2.4	No smoking to be allowed near the fuel storage area and notices depicting "No Smoking", "No Naked Lights" and "Danger" to be erected at the fuel storage site.	Signed Health and Safety Plan	Contractor	
3.	General environmental damage	Environmental awareness training of workers	3.1	The contractor will be required to employ a full-time ECO at the construction site until rehabilitation is complete.	ECO on site full-time	ECO	Prior to construction
			3.2	The contractor or his representative (e.g. ECO) shall provide training and guidance to site workers before commencing work on relevant components of the EMP, including any new site workers taken on during the course of work.	Proof of training of workers / Signed attendance register	Contractor	
			3.3	Workers shall understand the dos and don'ts of working on the site and controls on causing environmental damage. This should include notification of regulations on harvesting wild fauna and flora from the surrounding area, damage to cultural heritage, littering, use of formal latrines, sexual engagement with locals, etc.	Information posters displayed in social areas on site		
			3.4	Information posters should be put up in worker eating areas depicting typical prohibited activities that should be complied with on and off site.			

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
4.	Construction area maintenance	General Environmental Protection	4.1	Construction area to be kept neat and clean at all times.	Camp clean and neat	Contractor	During construction
			4.2	Refuse and waste storage to be positioned away from buildings.	Refuse stored away from buildings		
			4.3	Drip trays to be inspected and emptied daily and closely monitored during rain events.	Drip trays emptied daily & monitored		
5.	Access roads	General environmental protection and control of nuisances	5.1	Access to the site and works area shall use existing roads or tracks wherever possible.	ECO Report	Contractor and appointed engineer	During construction
			5.2	Induction and training shall include the use of permitted roads and highlight prohibition of making new tracks.	Proof of training of workers / Signed attendance register		
			5.3	All temporary access roads shall be rehabilitated to the satisfaction of the Engineer.	ECO Report		
			5.4	Erect and maintain marker pegs or painted stones along the boundaries of work areas, access roads or tracks to prevent unauthorised movement outside designated areas.	Site pegged and marked		
			5.5	Mud and sand deposited onto public roads shall be cleared regularly.	Site well maintained		
			5.6	Upgrading of access roads should limit activities as far as possible within the existing confines of the road	Deviations of road alignment avoided		
			5.7	Implement dust control measures where windblown dust can create a nuisance.	Dust control implemented & no grievances noted		
			5.8	The contractor shall repair any damage caused to the existing access road as a result of construction activities.	No damage visible and any damage repaired		
			5.9	Install and maintain appropriate traffic warning signs.	Traffic warning signs		
			5.10	Trained and equipped flagmen shall be used in the event that construction activities (e.g. delivery of abnormal loads) may create a traffic hazard on public roads.	Flagmen contracted for turbine delivery		
6.	Fencing and site access	Minimise impacts to human health and safety	6.1	Access to the site should be off-limits to the public at all times.	Site suitably fenced	Contractor	Throughout construction
			6.2	Fencing shall be maintained throughout construction.	Public access restricted.		

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			6.3	Temporary fencing shall be removed and loose wire removed from the site.			
7.	Fire protection	Fire prevention.	7.1	No fires are allowed around the construction area.	Adequate fire fighting equipment with the contractor Appropriate signage	Contractor	During construction
			7.2	Adequate fire fighting equipment must be available on site and maintained in good working order.			
			7.3	Welding, gas cutting or cutting of metal will only be permitted in an area designated as safe by the contractor.			
			7.3	Smoke free areas should be declared and appropriate signage erected.			
8.	Damage or Destruction of Cultural Heritage Interests	Minimise damage to cultural heritage interests	8.1	Ensure that trenches and excavations are checked by a palaeontologist.	ECO reports	Palaeontologist	Prior to and throughout construction
			8.2	No turbines located in areas of high sensitivity.	Final turbine micro-siting	Contractor	
			8.3	Heritage Western Cape and SAHRA to be notified immediately if a burial/human remains is uncovered during the construction of the wind farm.	Minutes/ communications		
			8.4	Workers access to old farmhouses should be forbidden in order to minimise vandalism.	ECO reports		
			8.5	The construction activities will be undertaken in accordance with a schedule that will be developed by RWP.	Construction schedule		
9.	Refuse, waste (refers to all solid waste, including installation debris, timber, cans etc.) and effluent	Limit the potential for site pollution and the accumulation of waste materials on site. Prevent soil and/or groundwater contamination from waste and effluent.	9.1	Minimise, reduce, reuse and recycle waste material where possible. All waste must be separated into clearly marked skips for recycling, reuse and disposal.	Waste manifest documents Relevant documentation for waste disposal must be prepared and filed (e.g. certificates of safe disposal). Visual inspection of site-ECO Report.	Contractor	Throughout construction
			9.2	Steel off-cuts will be re-used or recycled, as far as possible.			
			9.3	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.			
			9.4	All solid and liquid waste that cannot be reused or recycled will be placed in a skip and must be removed off site and disposed of at a			

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
				licensed municipal disposal site. Any hazardous waste must be removed by a licensed waste disposal operator.			
			9.5	Disposal of any waste and/or construction debris by burning or burying to be forbidden.			
			9.6	The skips shall be kept in a sheltered place and covered to prevent contents blowing out.			
			9.7	Effluent and stormwater run-off will be discharged away from any water courses (e.g. drainage lines). Effluent from construction site offices and staff facilities will be collected in storage tanks, which will be removed by a licensed sanitary contractor.			
			9.8	Effluent from the batching plant (if applicable) will be contained within a bunded area and not be allowed to drain into water courses. Effluent will be recycled or removed.			
			9.9	Effluent from temporary staff facilities will be collected in storage tanks, which will be emptied by a sanitary contractor.			
10.	Solid waste management	Limit the potential for site pollution and the accumulation of waste materials on site.	10.1	The contractor shall set up a solid waste control and removal system in accordance with the Waste Method Statement.	ECO Reports	Contractor and ECO	During construction
			10.2	Bins shall be emptied on a daily basis and shall not be left in an overflowing state.			
			10.3	Waste and litter shall be disposed of in scavenger and weatherproof bins stored in a fenced and covered area.			
			10.4	Waste shall be collected and removed from the site at least once a week			
			10.5	Hazardous waste to be separated from general waste stream.			
			10.6	Waste disposed of in suitable landfill site to be confirmed and approved by the regulatory authority.			
			10.7	Workers must clean up the contractor's camp and work areas once a week.			
			10.8	If recycling facilities available, the contractor is encouraged to separate waste into glass, paper and tins and dispose of these at recycling			

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			10.9	depots. No waste, including plastic waste, is to be burned on site			
11.	Pollution controls from ablution facilities	Minimise environmental impacts from toilet facilities for temporary workers	11.1	Adequate ablution facilities must be provided for staff.	Adequate toilets provided with toilet paper	Contractor and ECO	During construction
			11.2	Excretion or urination will be prohibited other than at provided facilities.	Site layout plan		
			11.3	Facilities for washing hands to be provided as part of or immediately next to all toilet facilities.	Toilets kept clean and no sign of sewage spills		
			11.4	Toilet facilities to be situated at least 50m away from water courses or drainage lines.			
			11.5	Discharge of waste from toilets and burial of waste is strictly prohibited.			
			11.6	Ensure no spillage occurs when toilets cleaned or emptied.			
			11.7	Portable toilets shall be properly secured to prevent toppling in wind.			
			11.8	At least 1 toilet per 20 workers to be provided.			
			11.9	Toilets to be maintained in hygienic state and serviced and emptied regularly. Toilet paper to be provided.			
12.	Concrete Works	Prevent contamination of soil and groundwater through management of concrete	12.1	If concrete is to be batched on site the following measures apply:	Waste documentation and visual inspection of site- ECO Report	Contractor	During construction
			12.2	Excess or spilled concrete or aggregate to be confined within the work area and then removed to a licensed landfill site.			
			12.3	Concrete to be mixed on mortar boards or in bunded area, away from drainage channels and water courses.			
			12.4	Visible remains of the mixing of concrete, either solid or from washings, to be physically removed and disposed of as waste at a licensed landfill site.			
13.	Earthworks	Minimise impact of earthworks on general	13.1	All earthworks shall be undertaken in such a manner so as to minimise the extent of any impacts caused by such activities and shall be limited	ECO Report	Contractor and appointed engineer	During construction

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
		environment	13.2	to demarcated areas. No earthworks equipment shall be allowed outside demarcated areas unless permitted by the engineer.			
14.	Impact on Surface and Groundwater	Minimise impacts on surface and groundwater	14.1	Soil stockpiles will be protected from wind or water erosion through placement, vegetation or appropriate covering.	Site inspection and photographic evidence	Contractor	Throughout construction phase
		14.2	Proper drainage controls such as culverts, cut-off trenches will be used to ensure proper management of surface water runoff to prevent erosion.				
		14.3	Cleared or disturbed areas will be rehabilitated as soon as possible to prevent erosion.				
		14.4	Fuel, oil and used oil storage areas will have appropriate secondary containment (ie bunds).				
		14.5	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.				
		14.6	Construction vehicles and equipment will be serviced regularly and provided with drip trays, if required.				
		14.7	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.				
		14.8	Works including foundations for the turbine and substation will be a minimum of 20 m from any watercourse.				
15.	Loss of Topsoil, Soil Compaction and Erosion	Minimise erosion and loss of topsoil	15.1	Restrict removal of vegetation and soil cover to the development footprint.	Site inspection and photographic evidence- ECO Report	Contractor	Throughout construction phase
		15.2	Implement soil conservation measures such as stockpiling top soil for remediation of disturbed areas. Topsoil storage should be as brief as possible and rehabilitation areas must be fenced off to protect plants until plant communities are adequately developed.				
		15.3	Proper drainage controls such as culverts, cut-off trenches will be used to ensure proper management of surface water runoff to prevent				

PRE- CONSTRUCTION PLANNING PHASE							
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			15.4	erosion. Soil stockpiles should be vegetated or appropriated covered to reduce soil loss as a result of wind or water to prevent erosion.			
			15.5	Disturbed areas will be rehabilitated as soon as possible to prevent erosion.			
			15.6	Construction vehicles will remain on designated and prepared roads.			
			15.7	Work areas will be clearly defined and demarcated to avoid unnecessary disturbance of areas outside the development footprint.			
			15.8	Construction vehicles will remain on designated and prepared roads.			
16.	Dust and emissions	Limit fugitive dust and exhaust emissions.	16.1	Vehicles travelling on gravel roads should not exceed a speed of 40km/hr.	Site inspections	Contractor	During construction
			16.2	Where appropriate, dust abatement measures should be implemented to restrict airborne dust, especially during windy conditions.			
			16.3	Containers for dusty materials will be enclosed or covered by suitable tarpaulins / nets to prevent escape of dust during loading and transfer from site.			
			16.4	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.			
			16.5	Vehicles are too kept in good working order and serviced regularly to minimise emissions.	Service records.		
			16.6	Any complaints received from neighbours or site users must be reported to the RWP Project Manager and measures must be taken to limit dust.	Grievance procedure documentation/logbook		
17.	Noise pollution	Avoid disturbing surrounding land-users.	17.1	Vehicles and equipment used on site must be in good condition and serviced regularly.	Service and maintenance records for equipment and vehicles.	Contractor	During construction
			17.2	Mechanical equipment with lower sound power levels must be selected to ensure that permissible occupation noise-rating limit of 85 dBA is not exceeded.	ECO Report		

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			17.3	Construction workers and personnel must wear hearing protection equipment when the 8-hour ambient noise levels exceed 75dBA.			
			17.4	Vehicles must to adhere to speed limits on site, and not exceed 40km/hr.	Signage on site		
18.	Vegetation loss	Prevent unnecessary disturbance and damage to natural vegetation and topsoil loss.	18.1	Subcontractors are to use existing roads and tracks as far as possible and construction vehicles must stick to the designated and prepared roads.	Photographic evidence ECO report	Contractor	Throughout construction
			18.2	Topsoil must be set aside to facilitate re-vegetation.	Site inspection		
			18.3	No vegetation should be collected for fire wood or other uses.			
			18.4	During construction in areas classified as high sensitivity areas, a botanist or ecologist will be consulted to ensure micro-siting of turbines minimises damage to or loss of sensitive flora.	Final Site Layout Plan	Ecologist or botanist RWP	
			18.5	Clear demarcation during the construction phase of all undisturbed sensitive areas that are not within the direct footprint of the wind farm to ensure that there is no uncontrolled access by construction vehicles and labourers.	Signage	Contractor	
			18.6	Rehabilitation or ecological restoration during and after the construction phase will be undertaken with indigenous plants with input from a botanist with experience in restoration of semi- arid areas.	Rehabilitation reports	Contractor	
			18.7	Remove alien vegetation from disturbed areas.	ECO Report	Contractor	
			18.8	Distribution of the unusual Aloe species encountered at the site should be mapped and all individuals treated with caution until such time as its identity can be confirmed. Until the identity of the species is confirmed, the species and habitats should be removed or impacted. Should the Aloe prove to be a previously unknown species, then the area where the species is found to occur should receive an increased level of conservation protection.		Ecologist	
			18.9	Borrow pits, if required, should be constructed in previously disturbed areas and restricted to areas of quartzite rather than the sandstone-dominated areas to the southeast of the site;			

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			18.10	Soil disturbance should be kept to an absolute minimum.			
			18.11	Where vegetation loss will occur before construction a qualified botanist is to ensure that rare, protected or endangered species are not being impacted by the road and if necessary identify alternative routes or relocate plants to a similar nearby environment.			
			18.12	All contractors must undertake training provided by RWP to educate them on the importance of the undisturbed conservations areas.	Training attendance records		
19.	Bird Habitat Loss Destruction, Disturbance and Displacement	Minimise impacts on birds	19.1	Habitat loss and disturbance can be mitigated during the construction phase by on-site demarcation of 'no-go' areas. These areas should be identified during pre-construction monitoring.	Photographic evidence ECO Report	Contractor	Throughout construction
20.	Bat Habitat Loss: Destruction, Disturbance and Displacement	Mitigate impacts on bats	20.1	Minimise blasting requirements and coordinate blasting events to minimise number of events required.	Site Layout Plan	Contractor	Throughout construction
			20.2	Caution should be taken to ensure construction footprints are kept to an absolute minimum, including storage of materials, stockpiling etc.	Site Layout Plan		
			20.3	Construction activities should avoided as far as possible during early summer (November to February) when it is peak bat breeding season and young bats may not be able to leave the roost.	ECO Report		
			20.4	Construction activities (particularly blasting) should be minimised during the coldest winter months (June/ July/ August), when bats go into a state of prolonged torpor and may not be able to escape the roost.			
			20.5	Should any caves be indentified on site during pre-construction bat monitoring, a buffer of at least 500 m should be implemented around such as cave, with no development occurring within this buffer zone	Monitoring records		
21.	Traffic Impact	Mitigate traffic impacts	21.1	The Traffic Management Plan will be adhered to including adherence to speed limits and 'rules of the road'.	Traffic Management Plan and ECO reports	Contractor	During construction
22.	Socio-cultural issues: Influx of job seekers	Minimize impacts associated with influx of jobseekers and labour.	22.1	RWP code of conduct and HIV Policy developed by RWP must form part of contractual agreement and must be adhered to.	Code of conduct and HIV policy must be available on site.	Contractor	During construction

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
			22.2	No recruitment of workers shall be permitted at the site	Employment records	Contractor	During construction
			22.3	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; the contractor should make the necessary arrangement to facilitate these visits.	Employment records	Contractor	During construction
23.	Loss of Agricultural Land	Minimise loss to agricultural land	23.1	Ensure compliance with construction plans and worker 'Code of Conduct' developed by RWP.	Photographic evidence and ECO report	Contractor	During construction
			23.2	Any damage to vegetation will be rehabilitated in accordance with mitigation proposed for the rehabilitation of natural vegetation.			
			23.3	Ensure that the gates are closed at all times and that any damage to the infrastructure is repaired immediately or compensated for.			
			23.4	Animals will be able to continue grazing on the land between the wind turbines; the area should be treated as one of the grazing camps.			
			23.5	Any damage to vegetation will be rehabilitated in accordance with mitigation proposed for the rehabilitation of natural vegetation.			
24.	Faunal Impacts	Mitigate impacts on fauna	24.1	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.;	ECO reports and photographic evidence	Ecologist	During construction
			24.2	Clear demarcation during the construction phase of all undisturbed sensitive areas that are not within the direct footprint of the wind energy facility to ensure that there is no uncontrolled access by construction vehicles and labourers.			
			24.3	All vehicles must stick to designated and prepared roads.			
			24.4	Temporary construction lay-down or assembly areas should be sited on transformed areas.			
			24.5	Rapid regeneration of plant cover must be encouraged by setting aside topsoil during earthmoving and replacing onto areas where the re-establishment of plant cover is desirable to prevent erosion.			
			24.6	Control poaching by banning dogs on site and enclosing worker compounds.			
			24.7	Fauna must have 'right of way' on the roads. Slow moving animals			

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
				such as tortoises which may be in the way, should be placed at the side of the road in the direction the animal was seen travelling.			
			24.8	All vehicles must stick to designated and prepared roads and a speed limit (up to 40 km/hr) must be enforced.			
			24.9	No fires should be allowed at the site anywhere other than within demarcated areas within the compound.			
			24.10	No dogs or other pets belonging to the contractor should be allowed at the site.			
			24.11	All staff at the site should remain within the compound at night.			
			24.12	No harvesting or collecting of plants, seeds, animals or their parts should be allowed.			
			24.13	Poaching or hunting should be strictly forbidden.			
			24.14	Littering should be strictly forbidden and waste generated by staff or at the compound should be disposed of in an appropriate manner, preferably off-site.			
			24.15	The compound and other temporary lay-down areas should be fenced-off to reduce human-wildlife interactions.			
			24.16	All chemical, fuel and oil spills should be cleaned up in the appropriate manner.			
			24.17	It should be mandatory for all contractors to attend an environmental briefing and training session with respect to the guidelines outlined in the EIR and this EMP.	Training material and records of training		
25.	Visual Impacts	Minimise visual impacts	25.1	Measures to control wastes and litter should be included in the contract specification documents and contractor must agree to these.	ECO report	Contractor	Throughout construction
			25.2	Rehabilitate/ re-vegetate areas damaged by construction activities.		Botanist	
			25.3	Borrow pits for the construction (which have not been identified), would be subject to permits from the relevant authorities. Borrow pits on the site are to be rehabilitated and re-vegetated according to the botanist's recommendations.			

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
POST 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			
1.	Temporary site closure	General environmental protection	1.1	<p>During temporary site closure ensure:</p> <p><u>Fuels and flammables:</u></p> <ul style="list-style-type: none"> Fuel is stored in low volumes No leak, outlet secure / locked and adequate ventilation present Bund is empty Fire extinguishers serviced and accessible Area secured from accidental damage, e.g. vehicle collision Emergency contact numbers are displayed. Safety office checks the stores prior to closure of the site <p><u>Safety</u></p> <ul style="list-style-type: none"> All trenches secured and fencing and barriers in place Notice boards applicable and secured Emergency and management contact details displayed Security persons briefed and have facility for contact. Fire hazards identified and precautions taken to limit risks e.g. wood stockpiles, fuels Inspection schedule and log by security or contracts staff <p><u>Erosion</u></p> <ul style="list-style-type: none"> Wind and dust mitigation in place Slopes and stockpiles at stable angle Re-vegetated areas watering schedule in place <p><u>Water contamination and pollution</u></p> <ul style="list-style-type: none"> Cement and material stores secured Refuse bins and toilets emptied and secured Bunds clean and treated Drip trays empty and secure All structures secured against wind damage 	Temporary site closure complies with the specified provisions.	Contractor	During any temporary site closures
2.	Permanent Construction site closure	General environmental protection	2.1	<p>All equipment, storage containers, temporary fencing, temporary services, fixtures and solid waste shall be removed from site at the end of construction. Specific measures include:</p> <ul style="list-style-type: none"> Clear and completely remove from site all equipment, storage containers, temporary fencing, temporary services, fixtures and any other temporary works. 	ECO Report	Contractor	Following permanent site closure

PRE- CONSTRUCTION PLANNING PHASE							
Aspect		Objective	Actions to be undertaken to Mitigate Environmental Impact		Parameters for Monitoring	Responsibility	Frequency / Timing
#	Description of Aspect		#	Commitment / Actions Required / Key Controls			
				<ul style="list-style-type: none"> • Ensure that all access roads utilised during construction are returned to a usable state and/or a state no worse than prior to construction. • Clear the site of all inert waste and rubble, including surplus rock, foundations and batching plant aggregates (if applicable). • Remove from site all domestic waste and dispose of in the approved manner at a registered waste disposal site. 			

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