MAINSTREAM RENEWABLE POWER

Amendment Report for the Application of a Substantive Amendment to the Environmental Authorisation issued for the development of the 140 MW Rietrug Wind Energy Facility, Sutherland, Northern Cape Province

Rietrug

DRAFT AMENDMENT REPORT

APPENDIX A:

Methodology for the impact assessment as well as the impact assessment for the original EA

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CONTENTS

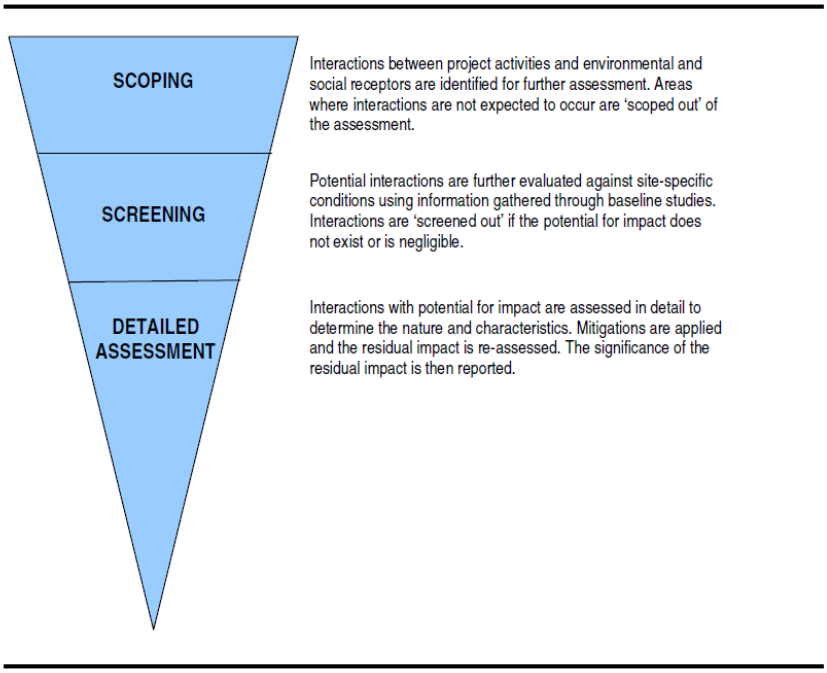
Assessment methodology used in the original EIA conducted by ERM (2011)

3.2 IMPACT ASSESSMENT METHODOLOGY

3.2.1 Impact Assessment Process

The following diagram (*Figure 3.2*) describes the impact identification and assessment process through scoping, screening and detailed impact assessment. The methodology for detailed impact assessment is outlined in *Section 3.2.2*, below.

Figure 3.2 Impact Assessment Process



3.2.2 Impact Assessment Methodology

The purpose of impact assessment and mitigation is to identify and evaluate the significance of potential impacts on identified receptors and resources according to defined assessment criteria and to develop and describe measures that will be taken to avoid or minimise any potential adverse effects and enhance potential benefits.

Impact Types and Definitions
An impact is any change to a resource or receptor brought about by the presence of a project component or by the execution of a project related activity. The evaluation of baseline data provides crucial information for the process of evaluating and describing how the project could affect the biophysical and socio-economic environment.

Impacts are described as a number of types as summarised in *Table 3.3*. Impacts are also described as *associated*, those that will occur, and *potential,* those that may occur.

Table 3.3 Impact Nature and Type

Nature or Type	Definition
Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Negative	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Direct impact	Impacts that result from a direct interaction between a planned project activity and the receiving environment/receptors (e.g. between occupation of a site and the pre-existing habitats or between an effluent discharge and receiving water quality).
Indirect impact	Impacts that result from other activities that are encouraged to happen as a consequence of the Project (e.g. in-migration for employment placing a demand on resources).
Cumulative impact	Impacts that act together with other impacts (including those from concurrent or planned future third party activities) to affect the same resources and/or receptors as the Project.

Assessing Significance

Impacts are described in terms of '*significance*'. Significance is a function of the **magnitude** of the impact and the **likelihood** of the impact occurring. Impact magnitude (sometimes termed *severity*) is a function of the **extent, duration and intensity** of the impact. The criteria used to determine significance are summarised in *Table 3.4*. Once an assessment is made of the magnitude and likelihood, the impact significance is rated through a matrix process as shown in *Table 3.5*.

Significance of an impact is qualified through a statement of the **degree of confidence**. Confidence in the prediction is a function of uncertainties, for example, where information is insufficient to assess the impact. Degree of confidence is expressed as low, medium or high.

Table 3.4 Significance Criteria

Duration	**Temporary** – impacts are predicted to be of short duration and intermittent/occasional. **Short-term** – impacts that are predicted to last only for the duration of the construction period. **Long-term** – impacts that will continue for the life of the Project, but ceases when the Project stops operating. **Permanent** – impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the Project lifetime.
Intensity	BIOPHYSICAL ENVIRONMENT: *Intensity can be considered in terms of the sensitivity of the biodiversity receptor (i.e. habitats, species or communities).* **Negligible** – the impact on the environment is not detectable. **Low** – the impact affects the environment in such a way that natural functions and processes are not affected. **Medium** – where the affected environment is altered but natural functions and processes continue, albeit in a modified way. **High** – where natural functions or processes are altered to the extent that it will temporarily or permanently cease. ***Where appropriate, national and/or international standards are to be used as a measure of the impact.*** *Specialist studies should attempt to quantify the magnitude of impacts and outline the rationale used.* SOCIO-ECONOMIC ENVIRONMENT: *Intensity can be considered in terms of the ability of project affected people/communities to adapt to changes brought about by the Project.* **Negligible** – there is no perceptible change to people's livelihood **Low** - People/communities are able to adapt with relative ease and maintain pre-impact livelihoods. **Medium** - Able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support. **High** - Those affected will not be able to adapt to changes and continue to maintain-pre impact livelihoods.
Impact Likelihood (Probability)	
Negligible	The impact does not occur.
Low	The impact may possibly occur.
Medium	Impact is likely to occur under most conditions.
High	Impact will definitely occur.

Once a rating is determined for magnitude and likelihood, the following matrix can be used to determine the impact significance.

Table 3.5 Significance Rating Matrix

SIGNIFICANCE RATING					
	LIKELIHOOD	Negligible	Low	Medium	High
MAGNITUDE	Negligible	Negligible	Negligible	Low	Low
	Low	Negligible	Negligible	Low	Low
	Medium	Negligible	Low	Medium	Medium
	High	Low	Medium	High	High

Table 3.6 Significance Colour Scale

Negative ratings	Positive ratings
Negligible	Negligible
Minor	Minor
Moderate	Moderate
Major	Major

Table 3.7 Significance Definitions

Significance definitions	
Negligible significance	An impact of negligible significance (or an insignificant impact) is where a resource or receptor (including people) will not be affected in any way by a particular activity, or the predicted effect is deemed to be 'negligible' or 'imperceptible' or is indistinguishable from natural background variations.
Low significance	An impact of minor significance is one where an effect will be experienced, but the impact magnitude is sufficiently small (with and without mitigation) and well within accepted standards, and/or the receptor is of low sensitivity/value.
Medium significance	An impact of medium significance is one within accepted limits and standards. The emphasis for medium impacts is on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that 'medium' impacts have to be reduced to 'low' impacts, but that medium impacts are being managed effectively and efficiently.
High significance	An impact of high significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. A goal of the EIA process is to get to a position where the Project does not have any high residual impacts, certainly not ones that would endure into the long term or extend over a large area. However, for some aspects there may be high residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a development. It is then the function of regulators and stakeholders to weigh such negative factors against the positive factors such as employment, in coming to a decision on the Project.

Once the significance of the impact has been determined, it is important to qualify the **degree of confidence** in the assessment. Confidence in the prediction is associated with any uncertainties, for example, where information is insufficient to assess the impact. Degree of confidence can be expressed as low, medium or high.

3.3 MITIGATION POTENTIAL AND RESIDUAL IMPACTS

It is expected that for the identified significant impacts, the project team will work with the client in identifying suitable and practical mitigation measures that are implementable. Mitigation that can be incorporated into the Project design in order to avoid or reduce the negative impacts or enhance the positive impacts will be developed.

Residual impacts are those impacts which remain once the mitigation measures have been designed and applied. Once the mitigation is applied, each impact is re-evaluated (assuming that the mitigation measure is effectively applied) and any remaining impact is rated once again using the process outlined above. The result is a significance rating for the residual impact.

3.4 SPECIALIST STUDY METHODOLOGY

The specialist study methodologies are summarised briefly below, it is important to note that the specialist findings in terms of site sensitivity were used to define a constraints map for the site and develop the Site Layout Alternative 2.

3.4.1 Flora

The study was carried out in three phases, namely, scoping, site visit and impact assessment. The study area was visited on 10 April 2010 (autumn) when only parts of Tonteldoosfontein and Welgemoed farms were surveyed.

A second visit took place from 8-10 December 2010 at the peak of the summer season when the remaining areas of Tonteldoosfontein, Scholtzenhof, Beerfontein and Nooitgedacht were surveyed. The site was traversed by vehicle and a Garmin ® GPS was used to track the route and record selected waypoints. Observations were made at the respective waypoints and recorded with a photographic record of the vegetation and selected plant species.

Particular attention was given to the possibility of finding endemic and 'Red Data' species. The impact assessment phase involved the determination of the nature of likely impacts of the development and recommendations on mitigation.

3.4.2 Fauna

The study was carried out in three phases, namely, scoping, site visit and impact assessment. The site was visited over two days on 20 and 21 November 2010. During the course of the site visit, as much of the property as possible was reconnoitered by driving the majority of accessible roads and tracks. The different landscape and vegetation units present were identified and related to satellite imagery of the property for mapping purposes.

Photographs of the site were taken and a large number of walk-through surveys were conducted across the property. Special attention was paid to potentially significant or sensitive habitats such as drainage areas, wetlands and rocky ridges. The species present were noted as was the nature and quality of the habitat at each site investigated. In particular the Riverine Rabbit (*Bunolagus monticularis*) is known to occur in the broad area and the site was assessed in terms of the availability of suitable habitat and the likely occurrence and abundance of the species at the site.

Any features that could be observed on the satellite imagery which indicated potentially important or unique ecological zones were identified on the ground and assessed. The impact assessment phase involved the determination of the nature of likely impacts of the development and recommendations on mitigation.

3.4.3 Birds

The study was carried out in three phases, namely, scoping, site visit and impact assessment. A literature review of bird and renewable energy facility interactions and bird species and avian habitats likely to occur in the study area was undertaken during the scoping phase of the assessment. This was followed by a site visit to ground-truth predicted habitats and birds present,
mainly by visiting as much of the inclusive area of the proposed development as possible, with an emphasis on sampling the avifauna in all of the primary habitats available. Two site visits were conducted, one focusing on the central and western portions of the development area on 4 to 10April2010 and one focusing on the eastern portions of the development area on 21 October 2010.

The impact assessment phase involved the determination of the nature of likely impacts of the development and recommendations on mitigation.

3.4.4 Bats

The study was carried out in three phases, namely, scoping, site visit and impact assessment. A literature review of bat and turbine interactions and bat species and habitats likely to occur in the study area was undertaken during the scoping phase of the assessment. During the site visit on 25 and 26 March 2010, bat activity was monitored for two nights using the Pettersson D240xultrasound detector, connected to a wave/MP3 recorder. The impact assessment phase involved the determination of the nature of likely impacts of the development and recommendations on mitigation.

3.4.5 Noise

The environmental noise impact investigation and assessment of the wind farm was conducted in accordance with Section 8 of SANS 10328. This procedure included amongst others, determining the existing residual (ambient) levels of noise within the study area through a site visit. As well as
calculating the expected rating level of noise due to the wind turbines on the identified noise sensitive land. The impact assessment phase involved the determination of the nature of likely impacts of the development and recommendations on mitigation

3.4.6 Visual

The Sutherland land parcels were plotted on maps and distance circles added in order to roughly determine the areas that would be visually affected by the proposed renewable energy facility for use during the field trip. A site visit was undertaken in July 2010. During the site visit numerous critical viewpoints were identified, particularly those relating to intersections of major roads, arterial and scenic routes, as well as settlements, including farmsteads.

Panoramic photographs were taken from these viewpoints as a record and to be used to determine the potential visibility of the renewable energy facilities during the VIA stage. A viewshed map was prepared using the site layout and the height of the turbines. This provides a good indication of the areas which will be visually affected by the proposed facility. Photomontages were produced showing turbines superimposed on the panoramic photographs.

The above assisted with the determination of the nature of likely impacts of the development and recommendations on mitigation. The area of focus of the visual impact assessment was the

preferred alternative (Site Layout Alternative 2) as the constraints identified by other specialists had reduced the size of the facility and acceptable turbine locations.

3.4.7 Heritage

Palaeontology

During the palaeontological desktop study the potentially fossiliferous rock units (groups, formations etc) represented within the study area are determined from geological maps. The known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region, and the specialist's field experience. This data is then used to assess the palaeontological sensitivity of each rock unit to development (Provisional tabulations of palaeontological sensitivity of all formations in the Western, Eastern and Northern Cape have already been compiled by J. Almond and colleagues; e.g. *Almond & Pether 2008*).

Heritage

A desktop study was conducted based on scientific publications related to archaeological work undertaken in the Study Area and other unpublished reports on the history of the region. An on site survey of heritage resources was conducted and heritage indicators (conservation-worthy buildings, archaeological sites and places celebrated as heritage) identified and mapped where appropriate. Locations of the proposed turbines were loaded onto handheld GPS receivers (set to the WGS84 datum) to facilitate the identification of the search area during field work component of the study. A site visit took place between 21 February and 01 March 2011. Walk and drive paths as well as site locations were recorded with GPS, as were locations of heritage resources. Heritage resources were photographed and described.

Definitions of heritage and criteria for assessment of heritage are indicated in the National Heritage Resources Act. The NHRA requires that cultural landscapes and areas of particular aesthetic and/or cultural heritage significance are included in the assessment.

Summary of Impact assessment table as included in the original Final EIA Report (ERM, 2012)

Impact on vegetation and fauna (Construction phase)

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Intensity	Likelihood	Significance of impact/risk = consequence x probability		Confidence level
							Without mitigation /management	With mitigation /management (residual risk/impact)	
Construction activities would result in a negative direct impact on the natural vegetation and fauna of the REF site.	**Loss of natural vegetation**	Negative	Site	Long-term	Medium-High	High	High	Medium	High
	Impact on Fauna	Negative	Site	Long-term	High	Likely	High	Medium	Medium

Impact on Vegetation and fauna (Operational phase)

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Intensity	Likelihood	Significance of impact/risk = consequence x probability		Confidence level
							Without mitigation /management	With mitigation /management (residual risk/impact)	
Operational activities would result in a negative direct impact on the natural vegetation and fauna of the REF site.	**Loss of natural vegetation**	Negative	Site	Long-term	Medium-High	High	Low	Low	High
	Impact on Fauna	Negative	Global	Long-term	Medium	Medium	High-Medium	Medium-Low	High

Impact on avifauna (birds) (Operational phase)

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Intensity	Likelihood	Significance of impact/risk = consequence x probability		Confidence level
							Without mitigation /management	With mitigation /management (residual risk/impact)	
Operation activities pose a collision risk to avifauna at the REF site.	**Mortality of birds as a result of collision with wind turbines and power lines**	Negative	Local	Long-term	Medium-	Likely	High-Medium	Medium	Medium

Impact on bats (Operational phase)

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Intensity	Likelihood	Significance of impact/risk = consequence x probability		Confidence level
							Without mitigation /management	With mitigation /management (residual risk/impact)	
Operation activities pose a mortality risk to bats during operations at the REF site.	**Mortality of bats as a result of collision with wind turbines and due to baro-trauma**	Negative	Local	Long-term	Low	Unlikely	Low	Low	Low

Noise impacts (Construction and Operation phase)

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Intensity	Likelihood	Significance of impact/risk = consequence x probability		Confidence level
							Without mitigation /management	With mitigation /management (residual risk/impact)	
Noise generated during construction activities on site	**Increase in noise levels will increase ambient noise levels and impact on sensitive receptors**	Negative	Local	Short-term	Medium-	High	Medium	Low-Medium	Medium
Noise generated during operation of the wind turbines	**Increase in noise levels will increase ambient noise levels and impact on sensitive receptors**	Negative	Local	Long-term	Medium-	High	Medium	Low	High

Visual impacts (Operation phase)

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Intensity	Likelihood	Significance of impact/risk = consequence x probability		Confidence level
							Without mitigation /management	With mitigation /management (residual risk/impact)	
Operation activities results in a negative direct impact on the visual landscape in the area surrounding the REF site.	**Impact on visual landscape**	Negative	Local	Long-term	High	Definite	High	Medium-High	High

Impact on heritage (Operation phase)

Aspect/ Impact pathway	Nature of potential impact/risk	Status	Spatial Extent	Duration	Intensity	Likelihood	Significance of impact/risk = consequence x probability		Ranking of impact/risk
							Without mitigation /management	With mitigation /management (residual risk/impact)	
Wind turbines and associated infrastructure will have negative impact on cultural landscape.	**Impact on cultural landscape (sense of place)**	Negative	Local	Long-term	Medium	Definite	Medium	Medium	High