Rheboksfontein Wind Energy Project

Part Two Amendment Draft Report

09 December 2020

Project No.: 0547329

The business of sustainability

ERM

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Rheboksfontein Wind Energy Project

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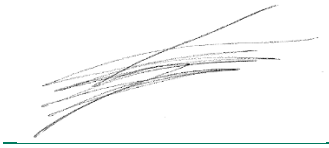

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Acronyms and Abbreviations

Name	Description
AoI	Area of Influence
BID	Background Information Document
CAPE	Cape Action For People and the Environment
CA	Competent Authority
CARA	Conservation of Agricultural Resources Act
CBA	Critical Biodiversity Area
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species
cm	Centimetre
CR	Critically Endangered
CRR	Comments and Responses Report
CV	Curriculum Vitae
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	National Department of Environmental Affairs
DEADP	Western Cape Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DEFF	Department of Environment, Forestry and Fisheries
DMR	Department of Mineral Resources
DOT	Department of Transport
DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme report
EN	Endangered
ERM	Environmental Resources Management
ESA	Ecologically Sensitive Areas
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GNR	Government Notice Regulations
Ha	Hectares
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
Km	Kilometre
m	Meter
NEMA	National Environmental Management Act (Act No. 107 of 1998, as amended)
NEMBA	National Environmental Management: Biodiversity Act

Name	Description
NHRA	National Heritage Resources Act
NSD	Noise-sensitive Development
PPP	Public Participation Process
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SLM	Saldanha Local Municipality
UNFCCC	United Nations Framework Convention on Climate Change
WEF	Wind Energy Facility
WMP	Waste Management Plan

EXECUTIVE SUMMARY

Project History

Moyeng Energy (Pty) Ltd identified the potential to develop various wind energy facility projects to add capacity to the national electricity grid. A site was identified for the establishment of the facility which is located 3km west of Darling within the Western Cape Province (the proposed Rheboksfontein Wind Energy Facility). An Environmental Impact Assessment (EIA) process was conducted during 2010 and 2011, and subsequently authorised on 2 February 2012 (DEFF Reference: **12/12/20/1582**) in terms of regulation 37 of the Environmental Impact Assessment Regulations, 2006. The EA has been amended several times since 2012.

It must be noted that the power line between the Facility and the substation is authorised separately to this EA. The EA for the construction of a 132kV power line between the authorised Rheboksfontein Wind Energy Facility and the Aurora Substation (DEA Ref No.: 14/12/16/3/3/1/1533) was granted on 8 July 2016. Therefore the potential impact of the power line and of the substation is not considered in this amendment application.

Proposed Amendment

Moyeng Energy now wishes to maximise the generating capacity in order to add new capacity to the national electricity grid in line with the Department of Mineral Resources and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement Programme (REIPP Procurement Programme). A maximum capacity of 140MW is permitted in the REIPP Procurement Programme and this will allow for economies of scale and the lowest possible energy pricing.

As such, Moyeng Energy has since identified changes which will increased the capacity output based on wind turbine technology evolution whilst not increasing the project area of influence.

The proposed amendments to the Project description are as follows:

- Increased turbine rotor diameter: from 126m to up to 170m;
- Increased hub height: from 120m to 130m;
- Increased maximum output capacity: from 129MW to 140MW;
- Removal of turbine locations 32 and 33;
- Increased temporary laydown are: from 40x40m to 50x65m;
- Removal of the restriction of a steel tower; and
- Increased turbine footprint: from 15x15m to 25x25m.

In addition to these changes, Moyeng Energy wishes to extend the validity of the EA, which is due to expire in February 2021. Moyeng Energy wishes to extend the validity a further 5 years, as there is uncertainty related to the commencement of Round 5 of the REIPP Procurement Programme and resultant uncertainty of start of construction, should the project be awarded.

Location

The proposed Rheboksfontein project site that has been identified for the establishment of the facility is located 3km west of Darling within the Western Cape Province (Figure 0-1Figure 4-1). The area considered for development of the proposed facility and associated infrastructure, is as follows:

- Remaining extent of Farm 568 (Rheboksfontein);
- Farm 567 (Nieuwe Plaats);
- Remaining extent of Farm 571 (Bonteberg);
- Portion 1 of Farm 574 (Doornfontein);
- Portion 1 of Farm 551 (Plat Klip);
- Farm 1199 (Groot Berg); and
- Portion 2 of Farm 552 (Slang Kop).

Objectives and Legislative Framework

The overall objectives of this assignment are to undertake a Part 2 EA amendment in terms of the EIA Regulations, Listing Notice 2, GNR 326 of the National Environmental Management Act (NEMA), as amended for the proposed amendments.

This amendment report has been compiled in accordance with the provisions of Regulation 32(1) of the EIA Regulations 2014 (as amended), and includes:

- An assessment of all impacts related to the proposed change;
- An evaluation of the advantages and disadvantages associated with the proposed change;
- Provision of measures to ensure avoidance, management and mitigation of any impacts associated with such proposed change; and
- Identification of any changes required to the EMPr.

The report has been made available for public comment for a period of 30 days in terms of the standard requirements by the competent authority, namely the Department of Environment, Forestry and Fisheries (DEFF) in line with applicable legislation. Comments received will be addressed and incorporated into the Final EA Amendment Assessment Report for submission to the DEFF.

Motivation for Changes

Moyeng Energy wishes to maximise the generating capacity in order to add new capacity to the national electricity grid in line with the Department of Mineral Resources and Energy's (DMRE) REIPP Procurement Programme. A maximum capacity of 140MW is permitted in the REIPP Procurement Programme and this will allow for economies of scale and the lowest possible energy pricing.

Turbine technology has significantly improved since the original EA in 2012, and as such, Moyeng Energy is able to increase the generation capacity or production output through improvements in Turbine Rotor Diameter (from 126m to 170m), hub height (120m to 130m) and individual turbine footprint) of the site whilst not increasing the project area of influence or environmental impact. As an upside, as turbine technology evolves annually and unit capacity increases from the 3MW and 4MW platform to the 5MW and 6MW platform, the number of turbines required is expected to subsequently reduce.

Another benefit of the improved technology is the removal of two turbines from the project layout. This will likely reduce potential project impacts, in particular related to avifaunal impacts. The two turbines removed to reduce potential impacts on avifauna.

Motivation for Extending Validity Period

The extension in validity of the EA would allow for sufficient time to commence with construction as there is uncertainty related to the commencement of Round 5 REIPP Procurement Programme and resultant uncertainty of start of construction if the project is awarded. Thus, the applicant wishes to apply to extend the validity of the EA a further five years to allow for Moyeng Energy to partake in the REIPP Procurement Programme. The project/site is also very mature with numerous specialist studies undertaken over the past 10 years with all risks well understood. It has been outside the control of the developer that construction and the REIPPP program has been unable to proceed in the past 5 years, thereby motivating and warranting an extension.

Impact Assessment

The proposed amendments may alter the original significance ratings and mitigation measures of specific environmental considerations. As such, ERM revised the impact assessment for the construction, operational and decommissioning phases, and where necessary the original specialists provided their opinion on the changes to the impacts should the proposed amendments be approved.

As shown in Table 0-1, the proposed amendments (with mitigation measures in place) will bring about a lesser impact on flora and fauna, avifauna, noise and geological receptors. Impacts on heritage resources, visual receptors and social receptors remain largely unchanged.

Table 0-1 Post Mitigation Significance Rating for Original and Amendment Related Impacts

Impact	Original Impact	Amended Impacts
Flora & Fauna	Minor	Negligible
Avian	Moderate	Minor
Visual	Moderate - High	Moderate - High
Noise	Minor - Moderate	Minor
Geology & Soil	Minor	Negligible
Heritage & Palaeontology	Minor	Minor
Social	Positive	Positive

EMPr

Various amendments were made to update the Draft Environmental Management Program report (EMPr), which should be submitted to DEFF for approval prior to the commencement of construction.

Advantages and Disadvantages

The proposed project (with amendments) will have the following advantages:

- The larger generating capacity will help bridge the gap between electricity demand and supply;
- The increase in the validity of the EA means that the proposed facility will be available for REIPP Procurement Programme bidding;
- A reduction in the amount of wind turbines will require less clearance for turbine foundations;
- It will create a comprehensive long term solution that will cater for future demands without the need to construct new power lines in the same area;
- The construction facility will result in the job creation during construction and operation;
- The potential impact on bird species, in particular on pelicans, will be reduced as two of the turbine locations with the highest number of ‘High Risk Flights’ were removed from the revised development proposals;
- The removal of certain turbine positions has reduced the potential interaction with martial eagles, or other species, hunting over these areas or using updrafts from the slopes;
- The updated assessments, as per this EA Amendment Report (and associated specialist assessments) means that the latest policies and guidelines have been considered and incorporated into the EA; and
- Electrification has significant positive benefits from a socio-economic perspective, and leads to many social benefits for organs of state, individuals, industries and communities.

The disadvantages of the proposed change are as follows:

- The height and rotor diameter may have a slighter increased visual impact, however, as highlighted by the Visual specialist the difference in impact significance will be minor.

Recommendations

This report describes the methods used, the findings of specialist studies, proposed amendments to the EMP and any recommendations of the EAP. This report has been compiled to make this information available to I&APs for review prior to the submission of the final report to DEFF, in order to promote transparent and informed decision-making. A thorough PPP is being conducted and all I&APs will be recognised and engaged, their inputs contributing to an enhanced project.

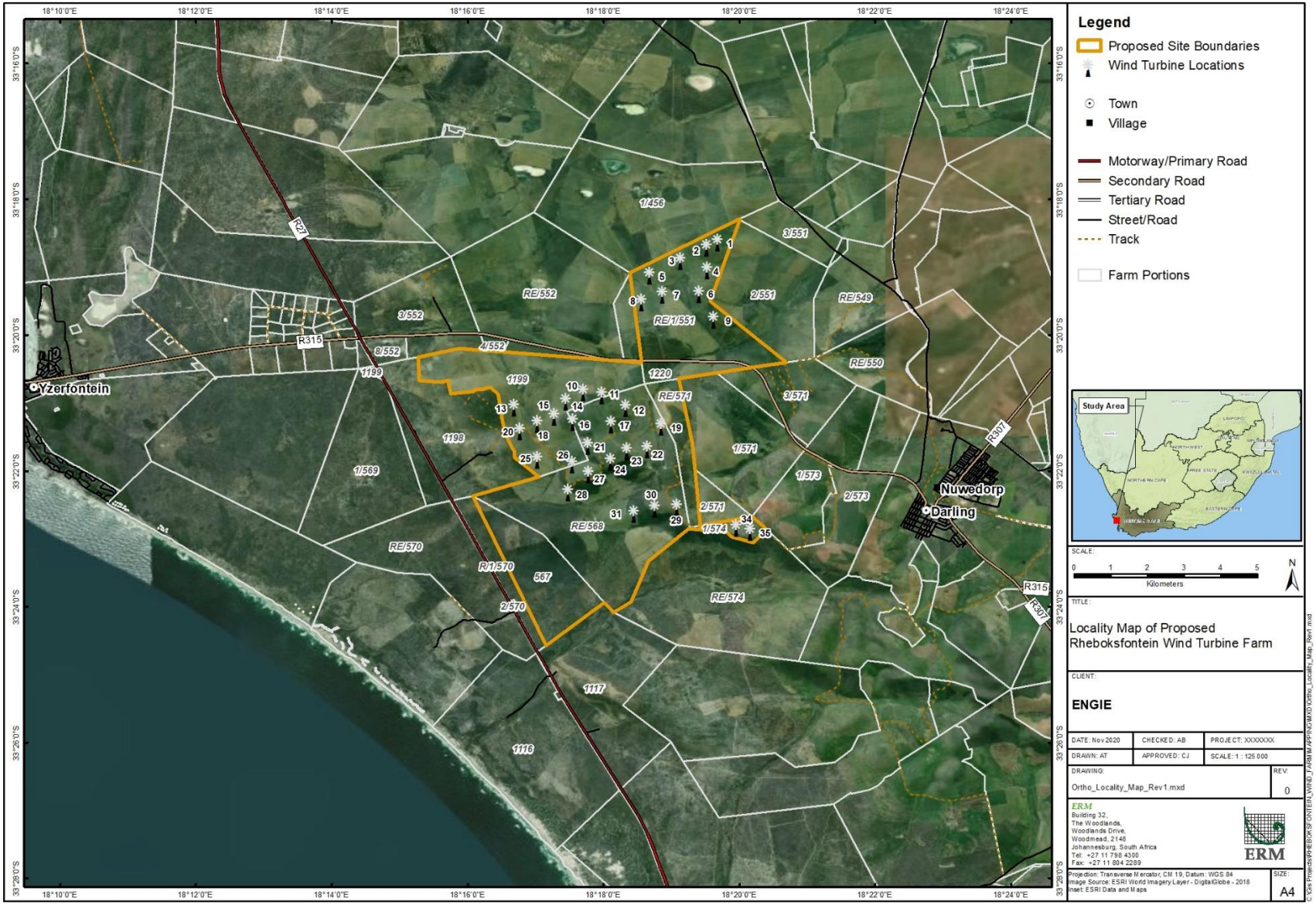


Figure 0-1 Locality Map

1. PROJECT BACKGROUND

1.1 Project History

Moyeng Energy (Pty) Ltd (hereafter referred to as Moyeng Energy or the Project Proponent) has identified the potential to develop various wind energy facility projects to add capacity to the national electricity grid. Extensive pre-feasibility analyses and site identification processes was undertaken by Moyeng Energy and their wind engineers Windlab in identifying potentially suitable sites for wind energy development. A site was identified for the establishment of the facility which is located 3km west of Darling within the Western Cape Province. This proposed development is referred to as the Rheboksfontein Wind Energy Facility.

An Environmental Impact Assessment (EIA) process was conducted by Savannah Environmental during 2010 and 2011, with an Environmental Authorisation (EA) application submitted to the Department of Environment, Forestry and Fisheries (DEFF)[1], and subsequently authorised on 2 February 2012 (DEFF Reference: **12/12/20/1582**) in terms of regulation 37 of the Environmental Impact Assessment Regulations, 2006. The existing EA, and relevant EA amendments is attached as Appendix A to this report.

Six amendments to the EA were granted by the DEFF as follows:

- An amendment to the conditions of the EA was issued to Moyeng Energy in response to appeals submitted by stakeholders;
- An amendment in respect of a change of the name of the holder of the EA and an amendment of text in the project description was granted on 27 June 2014;
- An amendment in respect of a two year extension of validity of the EIA was granted on 30 January 2015;
- An amendment to the project description was granted on 28 May 2015;
- An amendment in respect of a two year extension of validity of the EIA was granted on 22 November 2016; and
- An amendment in respect of a change of the name of the holder of the EA and a two year extension of validity of the EIA was granted on 5 March 2019. The EA is currently valid until 2 February 2021.

It must be noted that the power line between the Rheboksfontein Wind Energy Facility and the Aurora Substation (or potentially Dassenberg Substation), is authorised separately to this EA. The EA for the construction of a 132kV power line between the authorised Rheboksfontein Wind Energy Facility and the Aurora Substation (DEA Ref No.: 14/12/16/3/3/1/1533) was granted on 8 July 2016. Therefore the potential impact of the power line and of the substation is not considered in this amendment application.

1.2 Proposed Amendment

Moyeng Energy now wishes to maximise the generating capacity in order to add new capacity to the national electricity grid in line with the Department of Mineral Resources and Energy's (DMRE) Renewable Energy Independent Power Producer Procurement Programme (REIPP Procurement Programme). A maximum capacity of 140MW is permitted in the REIPP Procurement Programme and this will allow for economies of scale and the lowest possible energy pricing.

As such, Moyeng Energy has since identified changes which will increased the capacity output based on wind turbine technology evolution whilst not increasing the project area of influence.

[1] Previously the Department of Environmental Affairs (DEA)

The proposed amendments to the Project description are as follows:

- Increased turbine rotor diameter: from 126m to up to 170m;
- Increased hub height: from 120m to 130m;
- Increased maximum output capacity: from 129MW to 140MW;
- Removal of turbine locations 32 and 33;
- Increased temporary laydown are: from 40x40m to 50x65m;
- Removal of the restriction of a steel tower; and
- Increased turbine footprint: from 15x15m to 25x25m.

In addition to these changes, Moyeng Energy wishes to extend the validity of the EA, which is due to expire in February 2021. Moyeng Energy wishes to extend the validity a further 5 years, as there is uncertainty related to the commencement of Round 5 of the REIPP Procurement Programme and resultant uncertainty of start of construction, should the project be awarded.

1.3 Objectives

The overall objectives of this assignment are to undertake a Part 2 EA amendment in terms of the EIA Regulations, Listing Notice 2, GNR 326 of the National Environmental Management Act (NEMA), as amended for the proposed amendments to the infrastructure design at the authorised Rheboksfontein Wind Energy Facility in the Western Cape.

This amendment report has been compiled in accordance with the provisions of Regulation 32(1) of the EIA Regulations 2014 (as amended), and includes:

- An assessment of all impacts related to the proposed change;
- An evaluation of the advantages and disadvantages associated with the proposed change;

  Provision of measures to ensure avoidance, management and mitigation of any impacts associated with such proposed change; and
- Identification of any changes required to the EMPr.

The report has been made available for public comment for a period of 30 days in terms of the standard requirements by the competent authority, namely the Department of Environment, Forestry and Fisheries (DEFF) in line with applicable legislation. Comments received will be addressed and incorporated into the Final EA Amendment Assessment Report for submission to the DEFF. This process is described in Section 3.

2. PROJECT PERSONNEL

2.1 Project Proponent

Moyeng Energy is the Project Proponent and Applicant for the purposes of the Environmental Authorisation in South Africa. The contact details for the Proponent are presented below:

Moyeng Energy (Pty) Ltd	
Contact:	Michael Steiner
Telephone:	(086) 231 0262
Email:	Michael.steiner@engie.com
Postal Address:	Building 1 Ground Floor Country Club Estate, 21 Woodlands Drive, Woodmead, 2191, Johannesburg, South Africa

2.2 EIA Consultant

The requirement for environmental consultants to act independently and objectively is an established principle in South African law. The 2014 EIA Regulations, as amended under GN R.326 specifically state:

"…an EAP (environmental assessment practitioner) (must have) no business, financial, personal or other interest in the activity, application or appeal in respect of which that EAP is appointed in terms of these Regulations other than fair remuneration for work performed in connection with that activity; or that there are no circumstances that may compromise the objectivity of that EAP in performing such work."

The role of the environmental consultants is to provide credible, objective and accessible information to government and other stakeholders, so that an informed decision can be made about whether a proposed development should proceed or not.

ERM is a privately-owned company registered to conduct business in South Africa. ERM has no financial ties to, nor is ERM a subsidiary, legally or financially, of Moyeng Energy or ENGIE. Remuneration for the services to ERM is not linked to an approval by the decision-making authority. Furthermore, ERM has no secondary interest in the development.

The ERM team selected for this Project possess the relevant expertise and experience to undertake this EIA Report. As such, ERM has signed the legally required declaration of independence to function as an objective Environmental Assessment Practitioner (EAP).

The CVs and details of the Independent Environmental Practitioner are presented in Appendix B.

The contact details of the EAP for the application are presented in below:

Environmental Resources Management Southern Africa (Pty) Ltd.	
Contact:	Stephanie Gopaul
Telephone:	(+27) 31 265 0033
Email:	Stephanie.gopaul@erm.com
Postal Address:	S005, 17 the Boulevard, Westway Office Park, Westville, 3635, Durban, South Africa

The core EIA team members involved in this EIA process are listed in Table 2-1.

Table 2-1 the EIA Team

Name	Role	Qualifications, Experience
Simon Van Wyk	Partner in Charge	MPhil (Environmental Management), PrSciNat, over 20 years of experience
Stephanie Gopaul	Environmental Assessment Practitioner	MSc (Environmental Management), over 10 years of experience
Amy Barclay	Project Manager, Technical Coordinator	MSc (Environmental and Wetland Sciences), over 4 years of experience
Marianne Strohbach	Biodiversity Specialist	MSc (Botany), PrSciNat (Botany and Ecology), 27 years of experience

2.3 Specialist Team

As part of the original EIA process undertaken in 2010, a number of specialist studies were undertaken. The original specialist reports are attached in Appendix C.

Table 2-2 Specialist Studies Undertaken in 2010 and 2011 for the Original EIA

Specialist	Specialist Study 2010
Nick Helme Botanical Surveys, Nicholas Alexander Helme	Flora Impact Assessment
Avisense Consulting, Andrew Jenkins	Avian Impact Assessment
David Hoare Consulting, David Hoare	Fauna Impact Assessment
Outeniqua Geotechnical Services cc, Iain Paton	Geological Impact Assessment
MetroGIS, Lourens du Plessis	Visual Impact Assessment
ACO Associates, Jayson Orton	Heritage Impact Assessment
M2 Environmental Connection cc, Morné de Jager, Johan Mare'	Noise Impact Study
Tony Barbour Consulting, Tony Barbour	Social Impact Assessment
John Pether	Palaeontological Impact Assessment
ARC Institute for Soil, Climate and Water, Garry Paterson	Soil Profile

In 2018 several studies were undertaken due to the proposed changes to the project. Several of the existing specialist studies were updated to include impact assessments of the proposed changes to the proposed wind turbine sizes and project layout. These reports are attached in Appendix C.

Table 2-3 Specialist Studies Undertaken in 2018 based on Proposed Project Changes

Specialist	Specialist Report 2018
Newton Landscape Architects cc	Comparative Viewshed Analysis And Visual Assessment
Enviro Acoustic Research, Morné de Jager	Addendum to accompany 2010 Noise Impact Assessment Report

Several of the existing specialist studies were updated to include impact assessments of the proposed changes to the proposed wind turbine sizes and project layout. The updated specialist letters and reports are attached in Appendix D.

Table 2-4 Specialist Studies Undertaken in 2020 based on Proposed Changes

Specialist	Specialist Report/ Addendum 2020
ERM, Marianne Strohbach	Addendum to accompany 2010 Flora Impact Assessment Report as well as the 2010 Fauna Impact Assessment Report
ERM, Peter Wright	Addendum to accompany 2010 Avifauna Impact Assessment Report
Outeniqua Geotechnical Services cc, Iain Paton	Addendum to accompany 2010 Geological Impact Assessment Report
Newton Landscape Architects cc, Graham Young	Update of the 2010 Visual Impact Assessment Report
ACO Associates, John Gribble	Addendum to accompany 2010 Heritage Impact Assessment Report
Enviro Acoustic Research, Morné de Jager	Addendum to accompany 2010 and 2019 Noise Impact Assessment Report
Tony Barbour Consulting, Tony Barbour	Update of the 2010 Social Impact Assessment Report

2.4 Undertaking by EAP

ERM believes that the information provided in this Scoping Report is correct and is the most recent information provided by the Proponent and specialists thus far. Inputs and recommendations from the specialists' reports have been included into the report where relevant.

3. LEGAL FRAMEWORK AND ESIA METHODOLOGY

3.1 Policy and Legislative Context

The following table sets out the relevant legislative requirements applicable to the Project, and describes the measures undertaken during the original EIA process as well as this Amendment process to adhere to these requirements.

Table 3-1 Legislative Requirements Applicable to the Project

Applicable legislation & guidelines	Applicable Requirements	Reference where applied
National Environmental Management Act (Act No 107 of 1998)	EIA Regulations have been promulgated in terms of Chapter 5.	This EIA report was submitted to the DEFF and Provincial Environmental Department in support of the application for authorisation.
National Environmental Management: Waste Act (Act No 59 of 2008)	The Act provides listed activities requiring a waste license.	Waste licence is required.
Environment Conservation Act (Act No 73 of 1989)	National Noise Control Regulations GN R154 (10 January 1992).	Noise Impact Assessment is required to be undertaken in accordance with SANS 10328 – this has been undertaken as part of the EIA process. There are noise level limits which must be adhered to.
National Water Act (Act No 36 of 1998)	The project proponent must ensure that reasonable measures were taken throughout the life cycle of the project to prevent and remedy the effects of pollution to water resources from occurring, continuing or recurring.	Applicable during the EIA phase and will continue to apply throughout the life cycle of the project.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	Sections 18, 19 and 20 of the Act allow certain areas to be declared and managed as “priority areas”. Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards.	Applicable during the operational phase of the project. The Act provides that an air quality officer may require any person to submit an atmospheric impact report if there is reasonable suspicion that the person has failed to comply with the Act.

3.2 NEMA Listed Activities

The EA authorised on 2 February 2012 in terms of regulation 37 of the Environmental Impact Assessment Regulations, 2006 included listed activities from GNR 386 of 2006 and GN387 of 2006 as shown in Table 3-2 below.

Table 3-2 Listed Activities Authorised

Activity	Description of Activity	Relevance to the Project
GNR 386 of 2006		
1(m)	The construction of facilities or infrastructure, including associated structures or infrastructure, for - any purpose in the one in ten year flood line of a river or stream, or within 32 metres from the bank of a river or stream where the flood line is unknown, excluding purposes associated with existing residential use, but including - (i) canals; (ii) channels; (iii) bridges; (iv) dams; and (v) weirs;	Potential construction of infrastructure within 32m of a watercourse.
7	The above ground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30m^3 but less than 1,000m^3 at any one location or site.	Fuel/ oil may be stored in the maintenance building required for the facility.
12	The transformation or removal of indigenous vegetation of 3 ha or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004).	The site is greater than 3 hectares and contains indigenous vegetation that may be removed.
15	The construction of a road that is wider than 4m or that has a reserve wider than 6m, excluding roads that fall within the ambit of another listed activity or which are access roads of less than 30m long.	Access roads will be constructed to access the facility and each wind turbine
16(a)	The transformation of undeveloped, vacant or derelict land to residential, mixed, retail, commercial, industrial or institutional use where such development does not constitute infill and where the total area to be transformed is bigger than 1ha.	An area greater than 1 hectare will be transformed.
GNR 387 of 2006		
1(a)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the generation of electricity where (i) the electricity output is 20 megawatts or more; or (ii) the elements of the facility cover a combined area in excess of 1ha	The wind energy facility will consist of wind turbines for electricity generation of up to 140MW. A powerline and substations are ancillary infrastructure for this process.
1(1)	The construction of facilities or infrastructure, including associated structures or infrastructure, for the transmission and distribution of above ground electricity with a capacity of 120kV or more	Construction of 132kV powerline (outside urban area)
2	Any development, activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be 20 ha or more.	The site for the proposed wind energy facility is greater than 20 hectares.

3.3 Part 2 Amendment Legislation

This Report has been compiled in fulfilment of the legal requirements for a Part 2 amendment process in terms of Regulation 31 and 32 of the Environmental Impact Assessment (EIA) regulations (GN No. 982 of 2014) of the National Environmental Management Act (No. 107 of 1998) (NEMA), as amended GN No. 326 of 2017 and in GN No. of 706 of 2018.

Part 2: Amendments where a change in scope occurs

31. Amendments to be applied for in terms of Part 2

An environmental authorisation may be amended by following the process prescribed in this Part if the amendment will result in a change to the scope of a valid environmental authorisation where such change will result in an increased level or change in the nature of impact where such level or change in nature of impact was not—

(a) assessed and included in the initial application for environmental authorisation; or

(b) taken into consideration in the initial environmental authorisation;

and the change does not, on its own, constitute a listed or specified activity.

32. Process and consideration of application for amendment

(*1) The applicant must within 90 days of receipt by the competent authority of the application made in terms of regulation 31, submit to the competent authority—*

(a) a report, reflecting—

(i) an assessment of all impacts related to the proposed change;

(ii) advantages and disadvantages associated with the proposed change; and

(iii) measures to ensure avoidance, management and mitigation of impacts associated with such proposed change; and

(iv) any changes to the EMPr;

which report—

(aa) had been subjected to a public participation process, which had been agreed to by the competent authority, and which was appropriate to bring the proposed change to the attention of potential and registered interested and affected parties, including organs of state, which have jurisdiction in respect of any aspect of the relevant activity, and the competent authority, and

(bb) reflects the incorporation of comments received, including any comments of the competent authority; or

(b) a notification in writing that the report will be submitted within 140 days of receipt of the application by the competent authority, as significant changes have been made or significant new information has been added to the report, which changes or information was not contained in the report consulted on during the initial public participation process contemplated in subregulation (1)(a) and that the revised report will be subjected to another public participation process of at least 30 days.

(2) In the event where subregulation (1)(b) applies, the report, which reflects the incorporation of comments received, including any comments of the competent authority, must be submitted to the competent authority within 140 days of receipt of the application by the competent authority.

4. DESCRIPTION OF THE AUTHORISED DEVELOPMENT

4.1 Introduction

This Chapter provides an overview of the proposed Wind Energy Facility at the Rheboksfontein project site. The need and desirability of the project and the consideration of alternatives is included here as well as a discussion of the main project activities for the construction, operation and decommissioning phases.

4.2 Location

The proposed Rheboksfontein project site that has been identified for the establishment of the facility is located 3km west of Darling within the Western Cape Province (Figure 4-1). The area considered for development of the proposed facility and associated infrastructure, is as follows:

- Remaining extent of Farm 568 (Rheboksfontein);
- Farm 567 (Nieuwe Plaats);
- Remaining extent of Farm 571 (Bonteberg);
- Portion 1 of Farm 574 (Doornfontein);
- Portion 1 of Farm 551 (Plat Klip);
- Farm 1199 (Groot Berg); and
- Portion 2 of Farm 552 (Slang Kop).

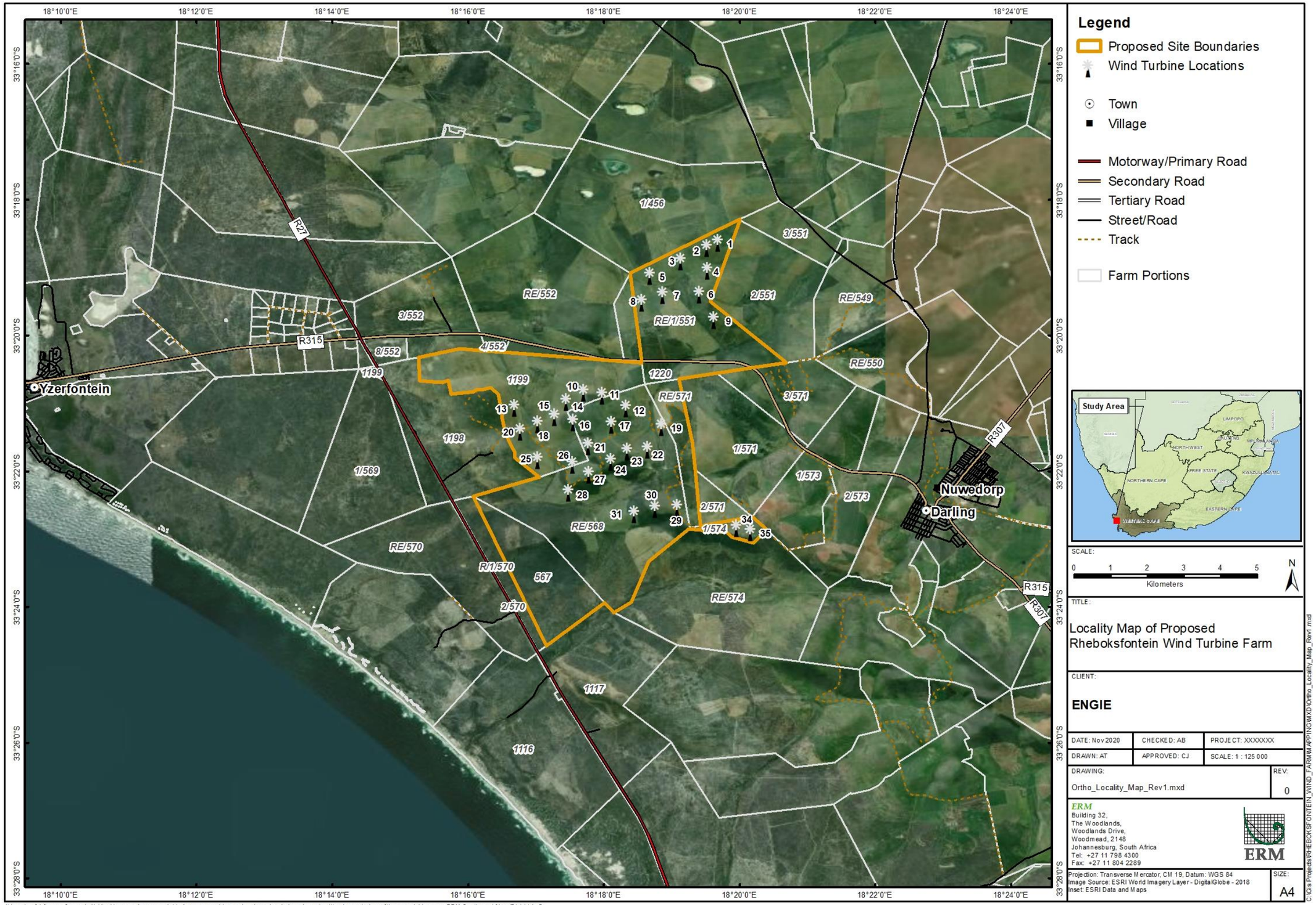


Figure 4-1 Locality and Updated Layout of the Proposed Rheboksfontein Wind Energy Facility

4.3 Project Components

The key components of the proposed Rheboksfontein WEF, listed and discussed below, include the following:

- Wind turbine generators;
- Electrical connections, Substation and associated transmission line;
- Access roads; and
- Additional Infrastructure.

The final layout which will include roads, substations, overhead lines and all other proposed infrastructure will be discussed with landowners and submitted to the DEFF prior to construction for approval as per the existing authorisation. This process will include overlaying all biodiversity information, as well as the opinions of landowners to come up with the most appropriate layout and reduce all potential impacts.

4.3.1 Wind Turbine Generators

Modern wind turbine designs incorporate tubular towers, three blades and a nacelle which houses a generator, gearbox and other operating equipment. The turbines have a maximum hub height of 130m, with a maximum rotor diameter of 170m. An example of a typical wind turbine of the type envisaged for the site is shown in Figure 4-2. The Rheboksfontein site will support 33 wind turbines with an individual capacity of between 5MW and 6MW based on the current turbine technology platform available from OEMs.

The detailed design of the foundation for each turbine will depend on the turbine model procured and the site-specific ground conditions. The turbines are to be supported on reinforced concrete foundations with an approximate area of 625m2. The foundation will include a concrete pedestal at the centre, which projects above ground level and to which the turbine tower is connected.

There will be a temporary gravel surfaced hard standing of approximately 50x65m adjacent to each turbine for use by cranes during construction. A portion of this area, (40x20m) will be retained for maintenance use throughout the life span of the project. Each turbine will have an electrical transformer beside it.

Figure 4-2 Typical Wind Turbine Representative of the Type Proposed

4.3.2 Electrical connections, Substation and associated transmission line

A 132kV power line will be constructed from the authorised Rheboksfontein Wind Energy Facility to the Aurora Substation (or Dassenberg Substation) with a corridor of 500m in width. The preferred connection is at Aurora Substation, although there is still an option to connect to Dassenberg Substation once the positions of the overhead lines is finalised.

Access roads (up to 4m wide) will be constructed along the servitude where required. Following completion of construction and commissioning, this infrastructure will be transferred to Eskom for ownership and operation. In determining a possible route for the 132kV power line, the following environmental restrictions were applied:

- Only underground cable would be considered for the 33kV collection network;
- The visibility of overhead lines and substations should be minimised;
- All substations will be of tubular outdoor design to reduce visibility;
- Turbines will be connected to one another and to the substation by means of underground medium voltage cables. These cables will run along the road network required to connect the turbines, the placing of these cables will therefore not increase the footprint of the facility; and
- The authorised route for the power line will be technically assessed, surveyed and pegged prior to construction.

It must be noted that the power line between the Rheboksfontein Wind Energy Facility and the Aurora Substation (or potentially Dassenberg Substation), is authorised separately to this EA. The EA for the construction of a 132kV power line between the authorised Rheboksfontein Wind Energy Facility and the Aurora Substation (DEA Ref No.: 14/12/16/3/3/1/1533) was granted on 8 July 2016. Therefore the potential impact of the power line and of the substation is not considered in this amendment application.

4.3.3 Access Roads

The R27, R335 and existing access roads are the main points of access to the site. Internal access roads will be required between the turbines for construction purposes (and later limited access for maintenance). Permanent internal roads require a minimum width of 6m, although these may be up to 13m in width during the construction phase.

Special haul roads may need to be constructed to accommodate abnormally loaded vehicle access and circulation. The internal service road alignment will be informed by the final wind turbines layout. These access roads will have to be constructed prior to the delivery of any components to the site, and will remain in place after completion for future access and possibly access for replacement of parts if necessary.

The final layout of these roads will be submitted to DEFF for approval before construction as per the EA. Should the road locations change from those authorised landowners will be consulted with, as well as input from relevant specialists.

4.3.4 Additional Infrastructure

Additional temporary infrastructure required during construction will include the following:

- Temporary lay down areas will be prepared, either beside an access route, for the assembly of the turbine components or as an area adjacent to each turbine. The lay down areas will accommodate the cranes required for the tower and turbine assembly. The lay down area could be temporary or if the landowner prefers, left for long-term use.
- A temporary site compound area for contractors of approximately of 5,000m^2 will be constructed which will house the site office, meeting rooms, canteen etc.

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

- A single story Operations and Maintenance (O&M) building of 3,000m^2 with a warehouse/ workspace, office, telecoms, security and ablution facilities will be constructed on the site preferably close to the substation;
- A substation with a compound area will be constructed in the vicinity of the O&M building;
- At least two permanent wind measuring masts of 70 to 100m in height;
- Although the bulk of the site is currently fenced, additional fencing may be erected as required (i.e. around the operations and maintenance building); and
- Bunding for transformers and any other oil containing equipment to ensure full containment in the event of any oil leakage.

4.4 Need and Desirability

4.4.1 Produce Renewable Power

The intention of Moyeng Energy in establishing renewable energy facilities is to develop wind resources to generate electricity and reduce the dependence on non-renewable energy resources. The South African National Development Plan (NDP) 2030, indicates that South Africa aims to have an energy sector that provides reliable and efficient energy service at competitive rates; that is socially equitable through expanded access to energy at affordable tariffs; and that is environmentally sustainable through reduced emissions and pollution by 2030. It further acknowledges the role that IPPs could play in ensuring sustainable electricity generation.

The South African IRP 2010-2030 outlines the preferred generation technology required to meet the expected demand rates of the country. The 2019 Integrated Resource Plan (IRP, 2019) shows that the actual net electricity energy sent-out for the country declined at an average compound rate of -0,6% over the past years. That was in stark contrast with the expectation of an average growth rate of 3,0% in the IRP 2010–2030.

Figure 4-3 depicts the expected electricity generated verses the actual generation rates between 2010 and 2018 (IRP, 2019). There is an approximate deficit of 90 Terawatts per hour (TWh). The electricity generated by this facility will supply the national grid and positively contribute to the country's goal of emission reduction as outlined in South Africa's IDP.

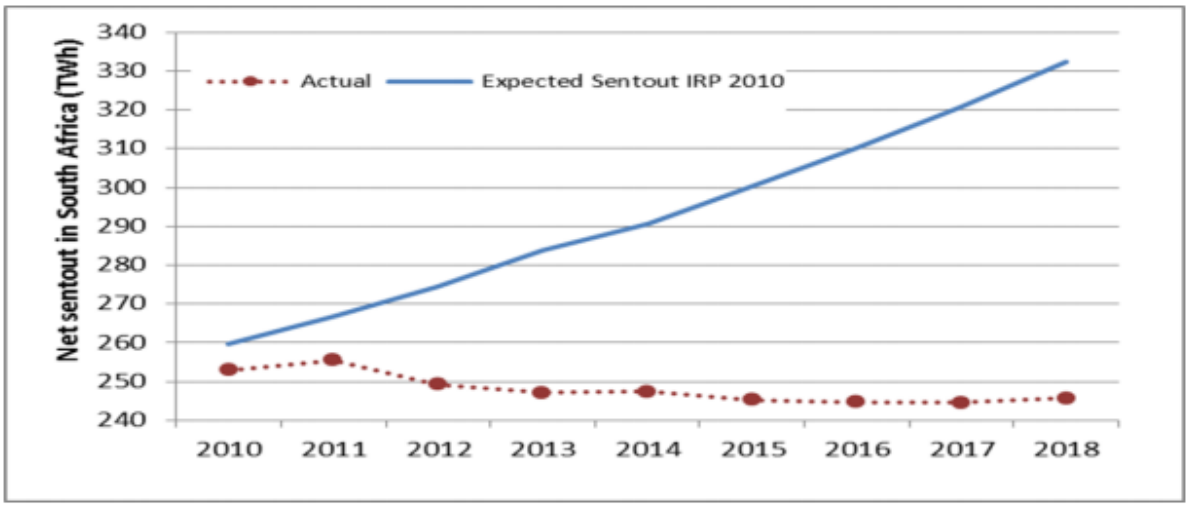


Figure 4-3 Expected Electricity Sent-out (IRP 2010–2030) vs Actual

(Source: IRP 2019)

The proposed project will:

- Reduce South Africa's dependence on fossil fuel resources;
- Increase electricity capacity to contribute to the alleviation of SA's energy crisis;
- Decentralise energy supply to improve electricity supply stability and reliability;
- Meet demand for diversified energy sources;
- Ensure the future of sustainable energy use;
- Reduce CO_2 emissions and the nation's carbon footprint; and
- Promote environmental, social and economically sustainable development.

The carbon tax provides industries with incentives to utilise less carbon intensive practices which further increases South Africa's carbon footprint. Under the National Energy Regulator Act, 2004 (Act No 40 of 2004), the Electricity Regulation Act, 2006 (Act No 4 of 2006) includes a tariff that provides the renewable energy sector a competitive gain over current energy production. The motivating principles behind the Renewable Energy Feed-In Tariff (REFIT) include the following:

- Create an enabling environment for renewable electricity power generation in South Africa;
- Establish a guaranteed price for electricity generated from renewables for a fixed period of time that provides a stable income stream and an adequate return on investment;
- Create a dynamic mechanism that reflects market, economic and political developments;
- Provide access to the grid and an obligation to purchase power generated;
- Establish an equal playing field with conventional electricity generation;
- Create a critical mass of renewable energy investment and support the establishment of a self-sustaining market.

4.4.2 Renewable Energy IPP Procurement Programme

The Department of Mineral Resources and Energy's (DMRE) Renewable Energy Independent Power Producer (REIPP) Procurement Programme (2010) was launched in response to a short-term electricity supply gap as identified in the Integrated Resource Plan of 2010 (IRP 2010). The IRP (2010) developed the preferred energy mix with which to meet the electricity needs over a 20 year planning horizon to 2030.

Since the establishment of the Independent Power Producers Office (IPPO) in 2010, over 6.4 GW of electricity from renewable energy sources has been procured through the Renewable Energy

IPP Procurement Programme. Of this, just under 4 GW is already connected to the national electricity grid, with the balance expected to be connected by 2020/21. The cost of renewable energy projects continues to decrease, with the latest projects producing a levelled cost of energy of less than R0.61/kWh.

The IRP (2019) was issued shortly before Eskom resumed load-shedding on a regular basis towards the end of last year, as well as before the utility took the unprecedented step in December 2019 of declaring Stage 6 load-shedding to ensure that the power system did not collapse. Power projects that come about due to the IRP programmes will work towards closing the prevailing supply/demand energy gap in the medium to long-term. The gazette promulgating the Renewable Energy IPP Procurement Programme Round 5 was approved in September 2020, which means that bidding will open in the future. It is expected that this will happen at some point in the first quarter of 2021.

5. DESCRIPTION AND MOTIVATION FOR THE PROPOSED CHANGES

Moyeng Energy previously received environmental authorisation for the project and have subsequently requested amendments as described below.

5.1 Current Authorised Layout

The current authorisation allows for the following:

- Maximum number of turbine positions: 35
- Maximum output capacity: 129MW sent out capacity
- Maximum Turbine Rotor Diameter: 126m
- Maximum Turbine Hub height: 120m
- Turbine Footprint: 15x15m

5.2 Proposed Changes

Moyeng Energy propose to amend the layout as follows:

- Removal of turbine locations 32 and 33
- Increased turbine rotor diameter: 170m
- Increased maximum output capacity: 140MW
- Increased hub height: 130m
- Removal of the restriction of a steel tower
- Increased turbine footprint: 25mx25m

In addition to these changes, Moyeng Energy wishes to extend the validity of the EA, which is due to expire in February 2021. Moyeng Energy wishes to extend the validity a further 5 years, as there is uncertainty related to the commencement of Round 5 of the REIPP Procurement Programme and resultant uncertainty of start of construction, should the project be awarded.

5.3 Analysis of Alternatives

As this Application is in support of a Regulation 31 Amendment process, no consideration of alternatives is required as no further Listed Activities have been triggered by the proposed Project.

5.4 Motivation for Changes

Moyeng Energy wishes to maximise the generating capacity in order to add new capacity to the national electricity grid in line with the Department of Mineral Resources and Energy's (DMRE) REIPP Procurement Programme. A maximum capacity of 140MW is permitted in the REIPP Procurement Programme and this will allow for economies of scale and the lowest possible energy pricing.

Turbine technology has significantly improved since the original EA in 2012, and as such, Moyeng Energy is able to increase the generation capacity or production output through improvements in Turbine Rotor Diameter (from 126m to 170m), hub height (120m to 130m) and individual turbine footprint) of the site whilst not increasing the project area of influence or environmental impact.

As an upside, as turbine technology evolves annually and unit capacity increases from the 3MW and 4MW platform to the 5MW and 6MW platform, the number of turbines required is expected to subsequently reduce.

Another benefit of the improved technology is the removal of two turbines from the project layout. This will likely reduce potential project impacts, in particular related to avifaunal impacts. The two turbines

removed to reduce potential impacts on avifauna. These possible changes to potential impacts is discussed in Section 8.

5.5 Motivation for Extending Validity Period

The extension in validity of the EA would allow for sufficient time to commence with construction as there is uncertainty related to the commencement of Round 5 REIPP Procurement Programme and resultant uncertainty of start of construction if the project is awarded. Thus, the applicant wishes to apply to extend the validity of the EA a further five years to allow for Moyeng Energy to partake in the REIPP Procurement Programme.

The project/site is also very mature with numerous specialist studies undertaken over the past 10 years with all risks well understood. It has been outside the control of the developer that construction and the REIPPP program has been unable to proceed in the past 5 years, thereby motivating and warranting an extension.

6. PUBLIC PARTICIPATION

All potential Interested and/or Affected Parties (I&APs) have been notified of the release of the Draft Amendment Report for a 30-day commenting period (i.e. 10 December 2020 to 30 January 2021) via the following means:

6.1 Newspaper Advertisement

In order to notify and inform the public of the proposed amendment process and invite I&APs to register on the project database and to comment on the Draft Amendment Report, the release of the Draft Amendment Report was advertised in one provincial newspaper (Die Burger) and one local newspaper (Weslander) on 10 December 2020. Afrikaans advertisements were placed in the Die Burger), whilst an English advertisement was placed in the Weslander.

Drafts of the advertisements are attached in Appendix F of this Draft Amendment Report. Proof of placement of the newspaper advertisements will be included in the Final Amendment Report.

6.2 Site Notice Boards

Regulation 41(2)(a) of the 2014 NEMA EIA Regulations (as amended) requires that a notice board providing information on the project and amendment process is fixed at a place that is conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of the site where the application will be undertaken or any alternative site. To this end, two notice boards were placed in Darling as detailed in Section 6.4.

6.3 Inform I&APs of the Amendment Process and availability of the Draft Amendment Report

Written notification to inform I&APs of the current Amendment application and to inform them of the availability of the Draft Amendment Report for comment was sent to all I&APs and Organs of State registered on the project database via email on 10 December 2020. The letter included notification of the proposed amendments and of the 30-day[2] commenting period for the Draft Amendment Report.

6.4 Availability of information

The Draft Amendment report has been made available and distributed to ensure access to information on the project and to communicate the outcome of specialist studies. Copies of the report were placed at the following locations for I&APs and stakeholders to access for viewing:

- Darling Public Library; and
- Swartland Municipal Office, 46 Main Road, Yzerfontein.

Key authorities were provided with either a hard copy and/or electronic copy of the Amendment Report as noted above. The Draft Amendment Report was uploaded to the project website: https://www.erm.com/rheboksfontein-eia/.

6.5 Compilation of the Final Amendment Report

Following the 30-day commenting period of the Draft Amendment Report the comments received will be incorporated into the Final Amendment report, along with a Comments and Responses Report (CRR). The Final Amendment Report will be submitted to the DEFF in line with Regulation 19 (1)(a) of the 2014 NEMA EIA Regulations (as amended) for decision-making.

[2] Timeframes in terms of the Process are calendar days. Public holidays are excluded, as is the period between 15 December 2020 and 5 January 2021.

In line with best practice, I&APs on the project database will be notified via email of the submission of the Final Amendment Report to the DEFF for decision-making. To ensure ongoing access to information, a copy of the Final Amendment Report will be placed on the project website (https://www.erm.com/rheboksfontein-eia/).

6.6 Environmental decision-making

Regulation 4(1) of the 2014 NEMA EIA Regulations, as amended, states that after the Competent Authority has reached a decision, it must inform the applicant of the decision, in writing, within 5 days of such decision. Regulation 4 (2) stipulates that I&APs need to be informed of the decision and associated appeal period within 14 days of the date of the decision. All registered I&APs will be informed of the outcome of the amendment application and the appeal procedure and its respective timelines. An email to all registered I&APs, Stakeholders and Organs of State (where postal, physical and email addresses are available) on the database. The letter will include a copy of the Decision and information on the appeal process.

All public participation material is attached to this Draft Amendment Report as Appendix F.

7. IMPACT ASSESSMENT METHODOLOGY

An 'impact' is any change to a resource or receptor caused by the presence of a Project component or by a Project-related activity. Impacts can be negative or positive. Impacts are described in terms of their characteristics, including the impact's type and the impact's spatial and temporal features (namely extent, duration, scale and frequency). Terms used in the characterisation of impacts are described Table 7-1.

Table 7-1 Impact Characteristics

Characteristic	Definition	Terms
Type	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect).	**Direct -** Impacts that result from a direct interaction between a planned Project activity and the receiving environment/receptors (i.e. between occupation of a site and the pre-existing habitats or between an effluent discharge and receiving water quality). **Indirect -** Impacts that result from other activities that are encouraged to happen as a consequence of the Project (i.e. in-migration for employment placing a demand on resources). **Induced -** Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project. **Cumulative -** Impacts that act together with other impacts (including those from concurrent or future third party activities) to affect the same resources and/or receptors as the Project.
Duration	The time period over which a resource/ receptor is affected.	**Temporary -** (less than 3 years i.e. negligible/ pre-construction). **Short term -** (less than 5 years i.e. production ramp up period). **Long term -** impacts that will continue for the life of the Project, but ceases when the Project stops operating. **Permanent -** (period that exceeds the life of plant i.e. irreversible).
Extent	The reach of the impact (i.e. physical distance an impact will extend to).	**On-site -** impacts that are limited to the Project site. **Local -** impacts limited to the Project site and adjacent properties. **Regional -** impacts that are experienced at a regional scale. **National -** impacts that are experienced at a national scale. **Trans-boundary/ International** - impacts that are experienced outside of South Africa.
Scale	Quantitative measure of the impact (i.e.. size of the area impacted, fraction of a resource that is affected, etc.).	Quantitative measures as applicable for the feature or resources the project affects. No fixed designations as it is intended to be a numerical value.

7.1 Determining Magnitude

Once impacts are characterised they are assigned a 'magnitude'. Magnitude is a function of some combination (depending on the resource/ receptor in question) of the following impact characteristics:

- Extent;
- Duration; and
- Scale.

Magnitude (from Small to Large) is a continuum. Determination of an impacts 'magnitude' involves to some degree quantification but also professional judgement and experience. Each impact is evaluated on a case-by-case basis and the rationale for each determination is described. Magnitude designations for negative effects are Negligible, Small, Medium and Large. The magnitude designations themselves are universally consistent, but the definition for the designations varies by issue.

In the case of a positive impact, no magnitude designation has been assigned as it is considered sufficient for the purpose of the impact assessment to indicate that the Project is expected to result in a Positive impact.

Some impacts will result in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes are regarded as having no impact, and characterised as having a Negligible Magnitude.

Determining Magnitude for Biophysical Impacts

For biophysical impacts, the semi-quantitative definitions for the spatial and temporal dimension of the magnitude of impacts used in this assessment are provided below.

Large Magnitude Impact affects an entire area, system (physical), aspect, population or species (biological) and at sufficient magnitude to cause a significant measurable numerical increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) or a decline in abundance and/ or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations (physical and biological). A Large Magnitude impact may also adversely affect the integrity of a site, habitat or ecosystem.

Medium Magnitude Impact affects a portion of an area, system, aspect (physical), population or species (biological) and at sufficient magnitude to cause a measurable numerical increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) and may bring about a change in abundance and/or distribution over one or more plant/animal generations, but does not threaten the integrity of that population or any population dependent on it (physical and biological). A Medium magnitude impact may also affect the ecological functioning of a site, habitat or ecosystem but without adversely affecting its overall integrity. The area affected may be local or regional.

Small Magnitude Impact affects a specific area, system, aspect (physical), group of localised individuals within a population (biological), and at sufficient magnitude, resulting in a small increase in measured concentrations (to be compared with legislated or international limits and standards specific to the receptors) (physical). This will be over a short time period (one plant/ animal generation or less but does not affect other trophic levels or the population itself), and in a localised area.

Determining Magnitude for Socio-Economic Impacts

For socio-economic impacts, the magnitude considers the perspective of those affected by taking into account the likely perceived importance of the impact, the ability of people to manage and adapt to change and the extent to which a human receptor gains or loses access to, or control over socio-economic resources resulting in a positive or negative effect on their well-being.

The quantitative elements are included into the assessment through the designation and consideration of scale and extent of the impact.

7.2 Determining Receptor Sensitivity

In addition to characterising the magnitude of impact, the other principal step necessary to assign significance for a given impact is to define the sensitivity of the receptor. There are a range of factors to be taken into account when defining the sensitivity of the receptor, which may be physical, biological, cultural or human. Where the receptor is physical (for example, a water body) its current quality, sensitivity to change, and importance (on a local, national and international scale) are considered.

Where the receptor is biological or cultural (i.e. agricultural habitat or Khoisan culture), its importance (local, regional, national or international) and sensitivity to the specific type of impact are considered.

Where the receptor is human, the vulnerability of the individual, community or wider societal group is considered. As in the case of magnitude, the sensitivity designations themselves are universally consistent, but the definitions for these designations will vary on a resource/receptor basis. The universal sensitivity of receptor is Low, Medium and High.

For ecological impacts, sensitivity is assigned as Low, Medium or High based on the conservation importance of habitats and species. For the sensitivity of individual species, Table 7-2 presents the criteria for deciding on the value or sensitivity of individual species.

For socio-economic impacts, the degree of sensitivity of a receptor is defined as the level of resilience (or capacity to cope) with sudden social and economic changes. Table 7-2 and Table 7-3 present the criteria for deciding on the value or sensitivity of biological and socioeconomic receptors.

Table 7-2 Biological and Species Value / Sensitivity Criteria

Sensitivity	Low	Medium	High
Criteria	Not protected or listed as common/ abundant; or not critical to other ecosystem functions i.e. key prey species to other species).	Not protected or listed but may be a species common globally but rare in South Africa with little resilience to ecosystem changes, important to ecosystem functions, or one under threat or population decline.	Specifically protected under South African legislation and/or international conventions e.g. CITIES Listed as rare, threatened or endangered e.g. IUCN

Note: The criteria are applied with a degree of caution. Seasonal variations and species lifecycle stage will be taken into account when considering species sensitivity. For example, a population might be deemed as more sensitive during the breeding/spawning and nursery periods. This table uses listing of species (i.e. IUCN) or protection as an indication of the level of threat that this species experiences within the broader ecosystem (global, regional, local). This is used to provide a judgement of the importance of affecting this species in the context of Project-level changes.

Table 7-3 Socio-Economic Sensitivity Criteria

Sensitivity	Low	Medium	High
Criteria	Those affected are able to adapt with relative ease and maintain pre-impact status.	Able to adapt with some difficulty and maintain pre-impact status but only with a degree of support.	Those affected will not be able to adapt to changes and continue to maintain-pre impact status.

7.2.1 Reversibility and Loss of Resource

As required by the South African EIA Regulations the following additional items should be considered in the assessment of impacts and risks identified:

- The degree to which the impact and risk can be reversed (this is rated on a scale of High, Medium, or Low);
- The degree to which the impact and risk may cause irreplaceable loss of resources (this is rated on a scale of High, Medium, or Low).

7.2.2 Assessing Significance

Once magnitude of impact and sensitivity of a receptor have been characterised, the significance can be determined for each impact. The impact significance rating will be determined, using the matrix provided in Figure 7-1.

Figure 7-1 Impact Significance

Magnitude of Impact		Sensitivity/ Vulnerability/ Importance of Resource/ Receptor		
		Low	**Medium**	**High**
	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

The matrix applies universally to all resources/ receptors, and all impacts to these resources/ receptors, as the resource/ receptor-specific considerations are factored into the assignment of magnitude and sensitivity/ vulnerability/ importance designations that enter into the matrix. Box 7-1 provides a context for what the various impact significance ratings signify.

Box 7-1 Context of Impact Significances

An impact of **Negligible** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of **Minor** significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.

An impact of **Moderate** significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore 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 impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of **Major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IA (Impact Assessmet) is to get to a position where the Project does not have any major 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 major 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 facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

7.3 Mitigation Potential and Residual Impacts

A key objective of an EIA process is to identify and define socially, environmentally, technically acceptable, and cost feasible measures to manage and mitigate potential impacts. Mitigation measures are developed to avoid, reduce, remedy or compensate for potential negative impacts, and to enhance potential environmental and social benefits.

The approach taken to defining mitigation measures is based on a typical hierarchy of decisions and measures, as described in Box 7-2. The priority is to first apply mitigation measures to the source of the impact (i.e. to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e. to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

The approach taken to defining mitigation measures is based on a typical hierarchy of decisions and measures, as described in Box 7-2.

Box 7-2 Mitigation Hierarchy

Avoid at Source; Reduce at Source: avoiding or reducing at source through the design of the Project ie, avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity.
Abate on Site: add to the design to minimise the impact i.e. pollution control equipment.
Abate at Receptor: if an impact cannot be abated on-site then control measures can be implemented off-site i.e. traffic measures.
Repair or Remedy*:* some impacts involve unavoidable damage to a resource i.e. material storage areas and these impacts require repair, restoration and reinstatement measures.
Compensate in Kind; Compensate through Other Means where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance may be appropriate i.e. financial compensation for degrading agricultural land and impacting crop yields.

7.4 Cumulative Impacts

A cumulative impact is one that arises from a result of an impact from the Project interacting with an impact from another activity to create an additional impact. How the impacts and effects are assessed is strongly influenced by the status of the other activities (i.e already in existence, approved or proposed) and how much data is available to characterise the magnitude of their impacts.

The approach to assessing cumulative impacts is to screen potential interactions with other projects on the basis of:

- Projects that are already in existence and are operating;
- Projects that are approved but not as yet built or operating; and
- Projects that are a realistic proposition but are not yet built.

7.5 Assessing Significance of Risks for Accidental / Unplanned Events

The methodology used to assess the significance of the risks associated with unplanned events differs from the impact assessment methodology set out in Section 7 of this Report. Risk significance for unplanned events is based on a combination of the likelihood (or frequency) of incident occurrence and the consequences of the incident should it occur. The assessment of likelihood and consequence of the event also includes the existing control and mitigation measures for this project.

The assessment of likelihood takes a qualitative approach based on professional judgement, experience from similar projects and interaction with the technical team.

The assessment of consequence is based on specialists' input and their professional experience gained from similar projects.

Definitions used in the assessment for likelihood and consequence are set out in Box 7-3.

Box 7-3 Risk Significance Criteria for Accidental / Unplanned Events

Likelihood

Likelihood describes the probability of an event or incident actually occurring or taking place. It is considered in terms of the following variables:

- **Low**: the event or incident is reported in the industry, but rarely occurs;
- **Medium**: the event or incident does occur but is not common; and/or
- **High**: the event or incident is likely to occur several times during the project's lifetime.

Consequence

The potential consequence of an impact occurring is a combination of those factors that determine the magnitude of the unplanned impact (in terms of the extent, duration and intensity of the impact). Consequence in unplanned events is similar to significance (magnitude x sensitivity) of planned events and is classified as either a:

- **Minor consequence**: impacts of Low intensity to receptors/resources across a local extent, that can readily recover in the short term with little or no recovery/remediation measures required;
- **Moderate consequence**: impacts of Low to Medium intensity across a local to regional extent, to receptors/resources that can recover in the short term to medium term with the intervention of recovery/remediation measures; or
- **Major consequence**: exceeds acceptable limits and standards, is of Medium to High intensity affecting receptors/resources across a regional to international extent that will recover in the long term only with the implementation of significant/remediation measures.

Once a rating is determined for likelihood and consequence, the risk matrix in Table 7-4 is used to determine the risk significance for unplanned events. The prediction takes into account the mitigation and/or risk control measures that are already an integral part of the project design, and the management plans to be implemented by the project.

Table 7-4 Accidental Events Risk Significance

Risk Significance Rating				
Likelihood		**Low**	**Medium**	**High**
Consequence	**Minor**	Minor	Minor	Moderate
	Moderate	Minor	Moderate	Major
	Major	Moderate	Major	Major

It is not possible to completely eliminate the risk of unplanned events occurring. However, the mitigation strategy to minimise the risk of the occurrence of unplanned events is outlined in Box 7-4.

Box 7-4 Mitigation Strategy for Accidental Events

Control: aims to prevent or reduce the risk of an incident happening or reduce the magnitude of the potential consequence to As Low as Reasonably Possible (ALARP) through:

- Reducing the likelihood of the event i.e. preventative maintenance measures, emergency response procedures and training;
- Reducing the consequence; and
- A combination of both of these.

Recovery/ remediation: includes contingency plans and response:

- Emergency Response Plans; and
- Tactical Response Plans

7.6 Assumptions and Limitations

Impact Assessment is a process that aims to identify and anticipate possible impacts based on past and present baseline information. As the EIA deals with the future there is, inevitably, some uncertainty about what will actually happen in reality. Impact predictions have been made based on field surveys and with the best data, methods and scientific knowledge available at this time. However, some uncertainties could not be entirely resolved. Where significant uncertainty remains in the impact assessment, this is acknowledged and the level of uncertainty is provided.

In line with best practice, this EIA process has adopted a precautionary approach to the identification and assessment of impacts. Where it has not been possible to make direct predictions of the likely level of impact, limits on the maximum likely impact have been reported and the design and implementation of the Project (including the use of appropriate mitigation measures) will ensure that these are not exceeded. Where the magnitude of impacts cannot be predicted with certainty, the team of specialists has used professional experience to judge whether a significant impact is likely to occur or not. Throughout the assessment, this conservative approach has been adopted to the allocation of significance.

8. IMPACTS ASSESSMENT AND MITIGATION MEASURES

This chapter describes potential impacts related to the proposed changes to the Rheboksfontein Wind Farm. Note that information used within this chapter has been modified from the EIA Report (Savannah Environmental, 2010) and the specialist reports listed in Table 2-2.

8.1 Summary of Initial Impacts

A number of impacts were identified and assessed in the EIA Report (Savannah Environmental, 2010) as indicated in Table 8-1 below.

With implementation of the mitigation measures detailed in the EMPr (Appendix E), post-mitigation impacts were anticipated to range between very low to medium negative significance, and up to highly positive.

Table 8-1 Summary of Impacts Assessed in the 2010 EIA Report

Impact	Pre-mitigation Significance Rating	Post mitigation Significance Rating
Flora & Ecology: wetlands & vegetation	Moderate	Minor
Fauna	Moderate	Minor
Avian	High	Moderate
Visual	Moderate - High	Moderate - High
Noise	Moderate - High	Minor - Moderate
Geology & Soil	Moderate	Minor
Heritage & Palaeontology	Moderate - Minor	Minor
Social	Minor - Moderate	Positive

8.2 Updated Impact Assessment based on Proposed Changes

The proposed amendments may potentially alter the original significance ratings and mitigation measures of specific environmental considerations. As such, ERM revised the impact assessment for the construction, operational and decommissioning phases, and where necessary the original specialists provided their opinion on the changes to the impacts should the proposed amendments be approved. These specialist reports are attached as Appendix D.

Table 8-2 Summary of Impacts related to the Proposed Changes

Impact	Pre-mitigation Significance Rating	Post mitigation Significance Rating
Flora & Fauna	Moderate	Negligible
Avian	Moderate	Minor
Visual	Moderate - High	Moderate - High
Noise	Moderate	Minor
Geology & Soil	Minor	Negligible
Heritage & Palaeontology	Moderate - Minor	Minor
Social	Minor - Moderate	Positive

8.3 Assessment of Potential Impacts on Flora and Fauna

8.3.1 Habitat Modification and Impacts on Indigenous Species during Construction

Impact Description

Construction of the turbines will not impact on any indigenous flora, but may reduce habitat for some fauna, or have the potential to alter their movement between more suitable habitats used for shelter and/ or breeding.

All activities related to the construction of the turbine foundations and turbines:

- Clearing of vegetation on cultivated areas;
- Excavation works, deposition of materials, landscaping and compaction of soil;
- Interim storage of excavated soils and subsurface materials;
- Machinery and vehicle movement on or to site;
- Unforeseen spillages of hydrocarbons or other pollutants; and
- Landscaping after completion of construction.

Impact Assessment

Direct Negative Impacts during construction due to:

- Direct destruction of vegetation cover and associated faunal habitats, but noting that these habitats are marginal rather than optimal for fauna;
- Compaction and potential unforeseen pollution of topsoils by possible hydrocarbon spills and unauthorised/uncontrolled off-road driving, especially with heavy machinery;
- Potential avoidance of area by fauna due to high disturbance and noise levels;
- Potential direct loss of individuals due to collisions, or being crushed if sheltering in unseen burrows, or falling into excavations; and
- Possible degradation of adjacent natural habitats due to indirect and induced impacts, resulting in a decline of habitat quality and/or increased invasion by alien plant species.

Possible Indirect Impacts:

- Possible degradation of more sensitive habitats within adjacent or downstream habitats, due to accidental leaching or deposition of pollutants, avoidance of area due to high disturbance levels, or distribution of reproductive material of invasive species.

Possible Induced Impacts:

- Avoidance of area due to high disturbance levels; and
- Temporary avoidance of more suitable natural habitats in closer proximity to the construction area.

Most Likely Cumulative Impacts:

- Possible further spread and establishment of alien invasive species.

Table 8-3 summarises the significance of the impacts associated with the project. The resultant impact would be of **Negligible Significance**.

Mitigation Measures

Avoid and Minimise:

- In general, minimise clearing and avoid any spill-over of operations into any surrounding or adjacent area with more sensitive vegetation or any adjacent or nearby riparian habitats (except the clearing of alien invasive species).
- Avoid loss of fauna by inspecting the area prior to groundworks, and ensuring that all excavations are adequately fenced off to block access to large(r) fauna, e.g. hares or guinea fowl
- No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas.
- Delineate all permissible areas so that all movement of vehicles and heavy machinery can be restricted to such areas, these being designated access roads, maintenance roads, turning points and parking areas. No off-road driving beyond designated areas may be allowed.
- Design and create berms to stop runoff from temporary stockpile during/after a periodic high rainfall event to enter directly into existing washes.
- Ensure foundation and excavations are protected from heavy rainfall – if such dams up into excavated turbine foundations, ensure that water is not polluted before pumping it out, preferably not directly into the environment. If the latter cannot be avoided, ensure that pumped-out water is dissipated in a way that will avoid any erosion.

Reduce:

- Keep the clearing of vegetation to a minimum.
- Ensure top soils are first removed and stored separately for rehabilitation purposes.
- Parking and operational areas should be regularly inspected for oil spills and covered with an impermeable or absorbent layer (with the necessary storm water control) if oil and fuel spillages are highly likely to occur.
- Reinforce portions of existing access routes that are prone to erosion or seasonal inundation, create structures or low banks to drain the access road rapidly during rainfall events, yet preventing erosion of the track and surrounding areas.
- Install adequate drainage structures to ensure that water flows are never concentrated or blocked in any way.
- If filling material is to be used, this should be sourced from areas *free* of invasive species, and alien plant control measures are to be applied to all areas used for sourcing fill materials.
- Should there be surface material with potential seed-banks of alien invasive species, such material can be used to fill the lowest areas of excavations, ensuring it will be covered at least 50 cm deep with other subsurface substrate to prevent any of the alien invasive seed to actually germinate.
- Ensure that all employees are aware that no fauna may be snared or in any way hunted, and strictly implement compliance
- Ensure there are staff members adequately trained in handling fauna should such occur within a construction area from which they cannot exit on own accord.

Rehabilitate:

- To aid a more rapid revegetation of construction areas, excavations should be backfilled as soon as possible, all stockpiles must be, as far as possible, eradicated and/or landscaped to merge into the surroundings.

- Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible and progressively during and after construction.
- Re-vegetation of disturbed/modified areas will be done using indigenous shrubs and grasses only, unless otherwise requested by landowners. The selection of species used for rehabilitation may not include any species that are not suitable to the receiving environment (i.e. may become invasive), and also no species that are indicative of habitat degradation, such as species declared as Encroaching (by CARA) or Increaser II or –III grasses.
- Special attention will be paid to ensuring that topography is reconstructed as far as practical.

Table 8-3 Impacts on Habitat and Indigenous Species during Construction

Characteristic	Impact	Residual Impact
Extent	Local	Site-specific
Duration	Short-term	Short-Term
Scale	3 - 10 ha	2 ha
Reversibility	Reversible	Reversible
Irreplaceable Loss of resource	No	No
Magnitude	Medium	Small
Sensitivity of the Resource/ Receptor	Low	Low
Significance of Impact	**Minor**	**Negligible**

8.3.2 Habitat Modification and Impacts on Indigenous Species during Operation

Impact Description

Operation of the turbines will not directly impact on any indigenous flora, but may alter habitat conditions for some fauna, or have the potential to alter their movement between more suitable habitats used for shelter and/or breeding. Further, no impacts on Lepidoptera are expected, hence anticipated impacts relate mostly to terrestrial fauna.

All activities related to the operation of the turbines:

- Rehabilitation of disturbed areas around the turbines;
- Alien plant control around the turbines;
- Machinery or vehicle movement to or near the turbines for routine maintenance; and
- Noise created by the turbines.

Impact Assessment

Direct Negative during operation due to:

- Noise-induced stressors to ground-dwelling fauna that may keep these habitats in a marginal state for fauna. This could, however, also prevent an influx of less desirable opportunistic rodents which in turn may attract raptors;
- Potential unforeseen pollution of topsoils by possible hydrocarbon spills during routine maintenance;
- Potential avoidance of area by fauna due to disturbance levels; and
- Possible degradation of adjacent natural habitats due to an increased invasion by alien plant species (see under separately discussed impacts).

Possible Indirect Impacts:

- Possible minor changes to microclimatic conditions due to alteration of airflows by sweeping rotors.

Possible Induced Impacts:

- Avoidance of area due to consistent disturbance levels.

Most Likely Cumulative Impacts:

- None envisaged as the area is already regularly disturbed by cultivation.
- Positive impacts may be experienced where previously cultivated areas may be vegetated with grazing or indigenous vegetation, thereby increasing habitat conditions for fauna.

Table 8-4 summarises the significance of the impacts associated with the project. The resultant impact would be of **Negligible Significance.**

Mitigation Measures

Avoid and Minimise:

- In general, avoid any spill-over of operations into any surrounding or adjacent area with more sensitive vegetation or any adjacent or nearby riparian habitats (except the clearing of alien invasive species).
- No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas.
- Delineate all permissible areas so that all movement of vehicles and heavy machinery can be restricted to such areas, these being designated access roads, maintenance roads, turning points and parking areas. No off-road driving beyond designated areas may be allowed.
- Manage occasional high volumes of runoff from sealed surfaces to avoid accelerated erosion.

Reduce:

- Parking and operational areas should be regularly inspected for oil spills and covered with an impermeable or absorbent layer (with the necessary storm water control) if oil and fuel spillages are highly likely to occur.
- Prevent the establishment of alien invasive plants
- Ensure the area around turbines is managed in line with current land-uses:
  - If there will be an exclusion zone in which no cultivation should take place, ensure such areas are either vegetated with suitable indigenous vegetation or grazing that can suppress the establishment of alien invasive plants
  - The above will expand natural habitat, especially where turbines are in closer proximity to patches of natural vegetation, and will thus also improve habitat conditions for ground-dwelling fauna.

Rehabilitate:

- Inspect areas around turbines regularly for signs of accelerated erosion and mitigate as soon as such is detected.
- Monitor the establishment of vegetation around turbines, and intervene if such re-vegetation tends to be dominated by undesirable species.

Habitat modification after construction is expected to occur, especially if a radius around the turbine will no longer be subject to cultivation but rather be converted to grazing or secondary indigenous vegetation. Such modification of habitat from the present state will be positive overall, and may also be positive to indigenous species, or at least neutralise potential negative operational impacts.

Table 8-4 Impact on Habitat and Indigenous Species during Operation

Characteristic	Impact	Residual Impact
Extent	Local	Site-specific
Duration	Long Term	Long-Term
Scale	> 20ha	up to 20ha
Reversibility	Reversible	Reversible
Irreplaceable Loss of resource	No	No
Magnitude	Small	Small
Sensitivity of the Resource/ Receptor	Low	Low
Significance of Impact	**Negligible**	**Negligible - positive**

8.3.3 Impacts related to Alien Invasive Vegetation

Impact Description

Physical disturbance to any environment always presents a window of opportunity for the establishment of alien invasive species, especially if regenerative material of such species is already present in close proximity or along major transport routes, as will be in the case of the turbine locations. Introduction of such species is almost always accidental, and it will require an ongoing program to control such plants to prevent a build-up of large seedbanks and populations that become large enough to start negatively affecting rehabilitation efforts as well as remaining natural habitats.

Project Activity:

- Existing stands of alien invasive species on and around the study area that act as source of reproductive material.
- Existing soil seed banks of alien invasive species due to continued persistence.
- Extensive or repeated disturbance of indigenous vegetation and/or topsoil, which creates a window of opportunity for the establishment of alien invasive species.
- Transport of reproductive materials of alien invasive species by movement of personnel, machinery or other agents from infested areas to non-infested areas.
- Soil of areas with high presence of alien invasive species being used for rehabilitation or being transported to areas with non-invaded indigenous vegetation.

Direct and Indirect Negative during all phases of the mine due to:

- Possible continued distribution and increased establishment of alien invasive species, also in surrounding areas.
- Possible increased displacement of indigenous vegetation by alien invasive species.
- Possible reduction of suitable habitat for species of conservation concern due to degradation of such habitats caused by the negative impacts of alien invasive species on natural resources as well as indigenous species themselves.
- Possible influx of opportunistic species, especially rodents due to (seasonal) increase in food resources from invasive grains, which may again attract raptors that may then be subject to collision with blades.
- Possible continued degradation of ecosystem functionality.

Impact Assessment

Induced Impacts:

- Possible increased cost and time required to achieve annual rehabilitation goals.
- Possible further reduction of ecological health of rehabilitated and surrounding areas.

Cumulative Impacts:

If mitigation measures are not strictly implemented:

- Possible increased modification and degradation of natural and unique habitats and continued loss of species unique to the area and affected ecosystems, increasing the impact of existing surrounding anthropogenic activities.
- Possible continued and unabated spread and establishment of alien invasive species.

Table 8-5 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Negligible to Minor Significance.**

Mitigation Measures

Unfortunately, alien invasive species are widespread throughout southern Africa. The study area is no exception, with a high presence of annual and perennial alien invasive species. Mitigation will thus focus on keeping the level of alien invasive plants as low as possible, whilst also acting pro-actively to prevent infestations by any additional species or in new areas.

Avoid and Minimise:

- Wheels of large machinery should be checked prior to entering the site and cleared of seed or any other plant material (especially of species with spiny or bur-like seeds) to reduce the introduction and spread of alien invasive plants. All such plant material removed must be burnt in a controlled area or otherwise destroyed.
- If filling material is to be used, this should be sourced from areas free of invasive species, and alien plant control measures are to be applied to all areas used for sourcing fill materials.

Reduce:

Conduct a detailed Alien Invasive Survey, and if possible also along approximately 20 - 50 km of all major access routes leading to the site (along which heavy machinery is expected to be coming in). From this:

- Create and implement a suitable Alien Management Control Plan, which is also aligned to control plans by the land-owners;
- Destruction of regenerative material of cleared alien species by burning in a protected area is encouraged; and
- Be aware of alien species that may be newly introduced to the area and act immediately to eradicate such once detected.

Rehabilitate:

Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible and progressively during all phases of construction, during operation and after decommissioning. This will be according to a Rehabilitation Plan that needs to be compiled and will include the following:

- Re-vegetation measures of disturbed/modified areas using indigenous shrubs, forbs and grasses only – unless requested otherwise (i.e. crops) by the landowner. The selection of species used for rehabilitation may not include any species that are not suitable to the receiving environment (i.e. are known to be weeds or invasive), and also no species that are indicative of habitat degradation, such as species declared as Encroaching or Increaser II or –III grasses.

Any physical disturbance and movement of man and machinery always present opportunities for alien invasive plants to become established. Currently this can be controlled, but will require a permanent ongoing effort to ensure that alien invasive species do not become a major problem to manage.

Table 8-5 Impact on Habitat and Indigenous Species during Operation

Characteristic	Impact	Residual Impact
Extent	Regional	Local
Duration	Permanent	Mid– to Long-Term
Scale	> 20 ha	< 2 ha
Reversibility	Non-Reversible	Non-Reversible
Irreplaceable Loss of resource	No	No
Magnitude	Medium	Small
Sensitivity of the Resource/ Receptor	Low	Low
Significance of Impact	**Moderate**	**Negligible - Minor**

8.3.4 Conclusions and Recommendations

All sites where turbines will be constructed have a low ecological value, as they are already under cultivation, and often are already subject to a high presence of alien invasive forbs. Where under cultivation, planted crops are growing at such density that movement through crops before harvest is limited and habitats are rather marginal for indigenous fauna. There will thus be no direct impact on indigenous flora, and negative impacts on indigenous terrestrial fauna is expected to be minor and short-lived (during construction or maintenance only), or negligible.

After construction, if cultivation in the immediate vicinity of turbines will be replaced by grazing or reestablishment of indigenous fauna, this could actually improve habitat conditions relative to the current state for small fauna, neutralising potential negative effects created by low but continuous disturbances such as noise emitted by the operation of the turbines or the occupation of area by turbine foundations.

The following monitoring measures must be implemented:

- Monitor excavated areas on a daily basis to remove any fauna that may have become trapped;
- Ensure drivers of vehicles and machinery are on the look-out for slower-moving fauna such as tortoises that may cross access roads to move such out of the way;
- Monitor the establishment of alien invasive species on disturbed areas and eradicate timeously before flowering/production of reproductive material;
- Ensure signs of accelerated erosion, such as conspicuous sheet-wash, rills or gullies are detected early and mitigated as soon as detected;
- Ensure re-vegetation of construction areas around turbines achieves rehabilitation goals and does not allow the establishment of alien invasive species; and
- It is recommended that a faunal observation register is maintained to establish, over time, if and which terrestrial faunal species utilise the space within 100m around the turbines. If a significant influx of undesirable and/or opportunistic small mammals such as rodents or gerbils are recorded, this should be addressed as it may attract raptors, which may then be subject to collision with the rotor blades.

8.4 Assessment of potential impacts on avifauna

8.4.1 Habitat Disturbance and Displacement during Construction

Impact Description

Construction activities will result in the temporary disturbance of birds from around the Project site, resulting in temporary loss of feeding or nesting habitat. The majority of species affected by disturbance will be common and widespread species that utilise the predominantly agricultural areas in which the Project will be built. Small numbers of species of conservation concern may be displaced from foraging areas (predominantly blue crane, martial eagle, black harrier, African marsh harrier and lanner falcon). However these species in the Project area will be habituated to a degree of human activity associated with agricultural land management undertaken over the majority of the Project site.

The principal difference in the baselines between the consented scheme and the current proposed Project is the report in Jenkinson et al 2014 of the establishment of a martial eagle territory to the south of the Project layout since the Project was approved. During surveys to update the habitat and terrestrial biodiversity baseline during 2020, the martial eagle nest was searched for and local communities and landowners were interviewed to ascertain if the martial eagle breeding territory was still present. None of the land owners reported having seen a large raptor nest in the vicinity of the Project, and no sightings of martial eagle or a potential nest were recoded. However, the potential remains that martial eagle may breed in the vicinity of the Project, and additional mitigation measures to reduce disturbance impacts to this territory have been proposed should it still be present.

Impact Assessment

The majority of impacts will be of negligible-small magnitude on common and widespread species of low sensitivity, resulting in impacts that are negligible or of **Minor Significance**. Negligible -small magnitude impacts are predicted on a number of species of high sensitivity, namely blue crane, lanner falcon, secretary bird, martial eagle and black harrier resulting in impacts of **Moderate Significance**.

Table 8-6 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Minor Significance.**

Mitigation Measures

The recommendations contained in the original and updated Avifauna Impact Assessment (Appendix C and D) should be implemented. These include:

- Abbreviating construction time, scheduling activities around avian breeding and/or movement schedules, lowering levels of associated noise, and reducing the size of the inclusive development footprint;
- Minimising the disturbance impacts associated with the construction of the facility, by abbreviating construction time, scheduling activities around avian breeding and/or movement schedules, and lowering levels of associated noise;
- The key species here are blue crane (a summer breeder) and black harrier (a spring breeder), both of which might breed on or close to the site at least occasionally. Ideally, the welfare of these and other sensitive species should be further catered for by a pre-construction walk-through, and by on-going monitoring of the area throughout the construction period; and
- Carefully monitoring the local avifauna both during and post-construction, adding detail and value to the data collected during the present study and implementing appropriate additional mitigation as and when significant changes are recorded in the number, distribution or breeding behaviour of any of the priority species listed in the specialist report, or when collision or electrocution mortalities are recorded for any of the priority species.

In addition to these mitigation measures, the following have been identified during this updated assessment.

- Undertake a pre-construction walkover survey to confirm if martial eagle breeding territory is present and identify other sensitive breeding species.
- Establish a suitable buffer zones around active martial eagle nests identified. The buffer zone should be 3km for turbine placement, and a 1km exclusion where no construction activity will be undertaken during the martial eagle breeding season.

With the proposed mitigation measures set out above, construction activity will result in a temporary small magnitude impact on two high sensitivity receptors, namely martial eagle and black harrier, resulting in impacts of **Minor Significance.**

Table 8-6 Impacts of Habitat disturbance during construction

Characteristic	Impact	Residual Impact
Extent	Local	Local
Duration	Short Term	Short Term
Scale	1km from construction activities	
Reversibility	Non-Reversible	Non-Reversible
Irreplaceable Loss of resource	Medium	Small
Magnitude	Medium	Small -Medium
Sensitivity of the Resource/ Receptor	Low - High	Low - High
Significance of Impact	**Moderate**	**Minor**

8.4.2 Avifauna habitat loss during construction and around infrastructure

Impact Description

During construction, the vegetation under the proposed project infrastructure (including the wind turbines, pads and access roads) will be cleared. This will result in a loss of supporting habitat for bird species within the Project area. With the revised layout, the Project will contain two fewer turbines than the consented scheme, although the area of habitat cleared around each turbine will be larger as a result of the larger turbines used. Overall the area of habitat lost under turbine bases will increase from approximately 0.8ha to 2ha. The habitat loss will largely affect agricultural land. The loss of habitat represents a relatively small component of the overall area of similar agricultural habitats in the Project boundary and in the wider Swartland area.

The majority of species that will lose supporting habitat are common and widespread species of agricultural areas. However habitat clearance and construction of project infrastructure will result in loss of habitat for a number of species of conservation concern including blue crane, martial eagle, black harrier, African marsh harrier and lanner falcon.

Impact Assessment

Construction of the Project will result in approximately 2ha of habitat loss under the turbines themselves, as well as habitat lost under access tracks and other project infrastructure. Although this loss represents a small area of generally common and widespread agricultural habitat or relatively low biodiversity value, it may result in the loss of small areas of habitat used by small numbers of individuals of bird species of conservation concern.

Table 8-7 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Moderate Significance.**

Mitigation Measures

The recommendations contained in the original and updated Avifauna Impact Assessment (Appendix C and D) should be implemented. These include:

- Minimising habitat destruction caused by the construction of the facility by keeping the lay-down areas as small as possible, building as few temporary roads as possible, and reducing the final extent of developed area to a minimum. Much of the habitat on site is heavily modified.

With the mitigation measures in place, the residual impacts are considered to be of **Minor** Significance.

Table 8-7 Impacts of avifauna habitat loss during construction and where infrastructure is planned

Characteristic	Impact	Residual Impact
Extent	On-Site	On-Site
Duration	Long term	Long term
Scale	Project layout including associated infrastructure.	
Reversibility	Partly reversible (Medium)	Partly reversible (Medium)
Irreplaceable Loss of resource	Medium	Medium
Magnitude	Small	Small
Sensitivity of the Resource/ Receptor	Low - High	Low - High
Significance of Impact	**Moderate**	**Minor**

1.1.1.2 Operation – Disturbance and Displacement

1.1.1.3 Impact Description

During operation, the presence of the turbines may result in disturbance to and displacement of birds from the Project site. Birds may be displaced by the physical presence of operating turbines and the movement and noise they create. This could result in some birds maintaining a stand-off distance from the turbines and avoiding the area or foraging elsewhere.

Some exclusion of birds from the habitat surrounding operating wind farms has been reported from monitoring studies undertaken at wind farms to date, due to the avoidance of the areas closest to the wind turbines and hence displaced from a suitable habitat. However there seem to be many species-specific differences, with some species including raptors foraging to within 25m of operating wind farms, whilst other species including those on passage showing avoidance distances of up to 800m.

A review of displacement impacts at South African wind farms found that there was little conclusive evidence for displacement of priority species from any sites. In particular the study did not identify a specific pattern in displacement and abundance for raptors and noted that blue cranes appeared unlikely to be displaced from wind farm sites, but that passage rates (flights through the wind farm area) did reduce.

1.1.1.4 Impact Assessment

During operation, the presence of the Project turbines and operational activity is likely to result in the displacement of birds across the Project area. The majority of impacts will be of negligible - small magnitude on common and widespread species of low sensitivity, resulting in impacts that are negligible or of **Minor Significance**. Small magnitude impacts are predicted on a number of species of high sensitivity, namely blue crane, lanner falcon, secretary bird martial eagle and black harrier resulting in impacts of **Moderate Significance**.

1.1.1.5 Mitigation Measures

The recommendations contained in the original and updated Avifauna Impact Assessment (Appendix C and D) should be implemented. These include:

- Abbreviating maintenance times, scheduling activities in relation to avian breeding and/or movement schedules, and lowering levels of associated noise.

In addition to these mitigation measures, the following have been identified during this updated assessment.

- Subject to confirmation of its presence, establishing a suitable buffer zone (3km) around the martial eagle nest to the south of the Project site, with turbines excluded from this zone.
- If potential eagle nests are identified within 3km of the Project site, artificial nest platforms should be established at suitable alternative sites in a suitable habitat outside 3km to encourage birds to move away from the Project.

1.1.1.6 Residual Impacts

With the proposed mitigation measures set out below, the presence of the operational Project may result in a long term small magnitude impact on two high sensitivity receptors, namely martial eagle and black harrier, resulting in impacts of **Minor Significance**.

Table 8-8 Disturbance and Displacement of Birds during Operation

Characteristic	Impact	Residual Impact
Type	Direct	Direct
Extent	Local	Local
Duration	Long term	Long term
Scale	1 km from the operational wind farm	
Reversibility	Reversible (High)	Reversible (High)
Loss of resource	Medium	Medium
Magnitude	Medium	Medium
Sensitivity of the Resource/ Receptor	Low - High	Low - High
Significance of Impact	**Moderate**	**Minor**

8.4.3 Bird mortality by Collision

Impact Description

Once a wind farm is constructed, it may impact on bird populations by causing additional mortality through birds colliding with the turbines or associated structures including overhead lines. Several factors influence the risk of collision, including:

- The location of these structures (ie are they sited on regular local flight paths or migration routes);
- The extent to which birds are flying at heights at which the turbines are operating;
- The extent to which the birds exhibit avoidance behaviour (ie alter their flight path to avoid the structures);
- The extent to which some bird species fly at night, a time when the structures are much less visible;

- The extent to which the birds' flight patterns change naturally during poorer weather conditions, or in the case of raptors when stooping or pursuing prey, hence making them more susceptible to collisions;
- Use of lighting on the turbines which may attract birds to them at night; and
- The extent of habituation.

Impact Assessment

For this assessment of the revised Project, radar data for great white pelican, as well as other priority species, were analysed to assess the collision mortality with the revised project layout and turbine specifications.

Great White Pelican

The previous collision risk assessment of the consented development assessed the collision risk of great white pelican using the radar data to identify the number of 'High Risk Flights' (i.e. those that are predicted to collide with the turbine based on their placement and size) for the development. It then assessed the number of birds associated with these flights likely to collide with the operations turbines using the Band collision risk model (Band *et al*, 2007). The approach adopted uses a range of variables which affect the outcome of the collision risk modelling to provide a range of potential impact levels, including different bird speed, different rotor speed and different avoidance rates, set out in Table 8-9.

Table 8-9 Parameters Used to Inform Collision Risk Modelling

Great White Pelican Biological Parameters		
Bird Length		162cm
Wingspan		293cm
Bird speed		3.2, 12.3, 22.0 ms^{-1}
Turbine Technical Parameters		
	Consented Development	**Revised Project**
Hub Height	120m	130m
Rotor Diameter	126m	170m
Number of blades	3	3
Rotation period	3.6, 5.5, 11.3 s	5, 9.5, 14 s*
Maximum chord width	4 m	4.3*
Average pitch angle	15º	15º
Avoidance Rate		
No Avoidance 95% avoidance 98% avoidance		

*Turbine specifications are not currently available for the 85m blade (170 m turbine radius) assessed, therefore rotation period and maximum chord width for the largest considered similar turbine (Vestas 162 5 MW 81 m blade length) have been used.

Based on the chosen parameters, the most likely outcome of the modelling for the consented development was considered to be an annual mortality of 22 great white pelicans. This prediction was based on the average rotor speed, and average bird speed and an avoidance rate of 95%. The avoidance rate is one of most important variables in determining the predicted number of collisions. Current SNH guidance (SNH, 2018) recommends using 98% if a species specific rate isn't available (and as great white pelicans are not native to Scotland, avoidance rates have not been published for

this species by SNH). The 2013 impact assessment and 2014 radar study use three rates – no avoidance, a conservative 95% avoidance and 98% avoidance.

Given the trend for operational monitoring to result in overall increases in avoidance rates, the higher avoidance rates adopted for other large waterbird species, and the data from operational monitoring of sites with great white pelican in Romania, a revised avoidance rate of 98% has been adopted for this assessment.

The updated avoidance rate was applied to re-analysed radar data of high risk flights. The number of 'High Risk Flights' was calculated using the approach outlined in Jenkins *et al* 2014, by a GIS analysis of the flights intersecting with the turbine blades at each location (in this case a revised 33 turbine layout with hub height of 130 m and blade length of 85m) with a 17m buffer to account for radar accuracy. The 'High Risk Flights' identified for the revised Project are shown in Table 8-10.

The number of high risk flights was extrapolated over the entire great white pelican breeding season, and an annual predicted mortality calculated. The results of the collision risk modelling for the revised Project are presented in Table 8-10. Taking the average flight speed and average turbine speed as the most likely outcome, and with the revised avoidance rate of 98%, the predicted annual mortality of the revised layout is 6 great white pelicans per year, much lower than the 22 casualties per year predicted in the previous assessment (using the average turbine and bird speed) (Jenkins *et al* 2014). Using the more precautionary 95% avoidance rate, the predicted mortality is lower than that predicted for the consented development (16 casualties per year rather than 22).

The reduction in predicted mortality is largely a result of the redesigning of the layout to move turbines away from areas with higher pelican flight activity associated with slopes likely to generate up drafts (particularly in the south east of the Project site), and the reduction in the overall number of turbines, and the application of a more realistic avoidance rate applied.

Table 8-10 Collison Risk Model Results

Avoidance Scenario	Bird speed	Rotor Speed		
		Low	Average	High
No avoidance	Low	712	988	1664
	Average	283	328	472
	High	254	265	320
95% avoidance	Low	36	49	83
	Average	14	16	24
	High	13	13	16
98% avoidance	Low	14	20	33
	Average	6	6	9
	High	5	5	6

Note: values rounded up or down to nearest whole number.

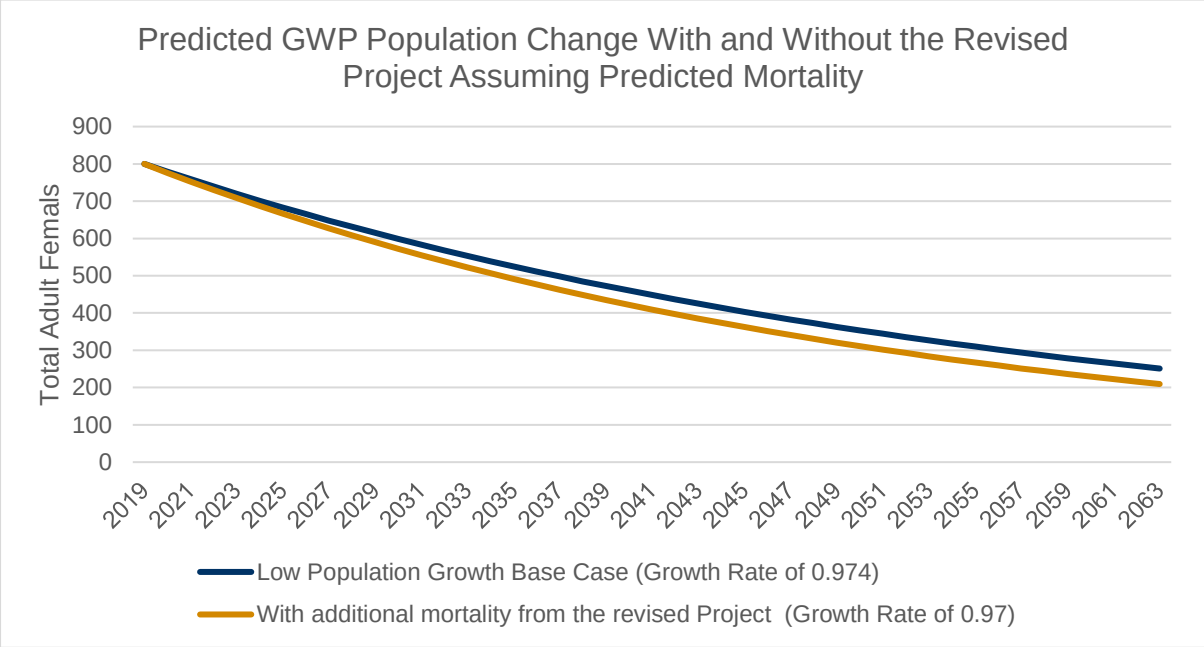
As part of the impact assessment for the consented development, Jenkins *et al* developed a range of potential population growth rates for the Dassen Island great white pelican population (a relatively stable growth rate of 1.001, a declining growth rate of 0.974 and an increasing population growth rate of 1.036), and assessed the impacts of the additional mortality associated with the consented development. At the time, the Dassen Island pelican population was considered to be stable and so the mortality was applied to a relatively stable growth rate (1.001) (Jenkins *et al*, 2014).

Based on the latest colony count data, the Dassen Island great white pelican population is declining (Figure 8-1). As a result, the declining growth rate calculated by Jenkins *et al* (2014) has been used to inform the potential effects of the predicted mortality from the revised Project. Based on the

observed rate of population decline, the calculated declining population growth rate is likely to overestimate the speed of population decline, but has been adopted as a precautionary approach.

Figure 8-1 shows the predicted changes to the Dassen Island great white pelican population, based on the calculated declining growth rate from Jenkins *et al*, together with the predicted population change with the revised development proposals. As the population growth is driven by the availability of adult females in the population, the modelling approach adopted by Jenkins *et al* focuses on changes in the number of adult females.

Figure 8-1 Predicted Changes to Dassen Island Great White Pelican Population



Based on the results of the updated collision risk model, the revised Project will result in lower impacts on the Dassen Island Pelican population than the consented development.

The revised development is predicted to result in a low annual level of mortality that may over time reduce the Dassen Island pelican population. However counts of the colony indicate that the population is currently in decline, and is predicted to continue to decline without conservation intervention. The additional mortality associated with the revised Project will not substantially change the current population trend, but would lead to a slight increase in the speed of the population decline.

It should be noted however that there is a relatively large degree of variation in the natural population size as indicated by the changes in annual population size, which suggests that other factors are likely to influence the size of the population and may be as important as drivers of population size as adult female availability (e.g. suitable nest sites at Dassen Island, available food supplies). In addition, estimates for great white pelican indicate that only between 34-57% of the adult population breed in any year (Jenkins *et al* 2014). This also suggest that there may be a relatively large buffer inherent in the population that would prevent population decline despite increased mortality.

Other Priority Species

The baseline studies for the consented development recorded very low levels of flight activity for species other than great white pelican, with overall calculated passage rates of between 0.005 and 0.05 birds per hour.

Jenkins *et al* 2014 noted that higher flight activity was observed in the radar study area for some species during the 2013-2014 radar study (particularly black harrier, martial eagle, African marsh

harrier and greater flamingo) and recommended reviewing the radar data to identify any changes in the volume of flight activity for these species that might increase the collision risk compared to that assessed in the original impact assessment for the consented development (Jenkins et al 2014).

As a result, all non-great white pelican tracks from the 2013-2014 radar study were analysed to identify flights of priority species within the Project site, and to identify 'High Risk Flights' in line with the approach adopted for great white pelican. The analysis only identified flights of martial eagle (18 flights), African marsh harrier (2 flights) and black harrier (1 flight) within the Project area, and did not identify any 'High Risk Flights'.

The majority of martial eagle flight activity (14 flights) occurred to the south of the Project site where turbines 33 and 35 from the consented development were located close to slopes supporting more natural habitat and higher vegetation that may have provided suitable foraging areas for martial eagle. These turbine positions have been removed from the revised Project, reducing potential interaction with martial eagle, or other species, hunting over these areas or using updrafts from the slopes.

Therefore, as a result of the relatively low flight activity of non-great white pelican priority species recorded during the radar study, the potential collision impacts of the revised Project on other species is considered to be no worse than the consented development, and potentially better as a result of the removal of turbine locations in the south of the consented development close to more natural habitat.

The majority of impacts from collision mortality will be of negligible to medium magnitude on common and widespread species of low sensitivity, resulting in impacts that are negligible or of Minor Significance. Given the removal of two higher risk turbine locations and the very low flight activity recorded during baseline surveys, negligible - small magnitude impacts are predicted on a number of species of high sensitivity, namely blue crane, lanner falcon, black harrier and martial eagle also resulting in impacts of **Minor Significance.** Negligible-small magnitude impacts are predicted on medium sensitivity greater and lesser flamingo resulting in impacts of **Minor Significance.**

Over the lifetime of the project, large magnitude impacts are predicted on high sensitivity great white pelican in the absence of adaptive management and effective mitigation, resulting in impacts of **Major Significance.**

Table 8-11 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Moderate Significance.**

Mitigation Measures

The recommendations contained in the original and updated Avifauna Impact Assessment (Appendix C and D) should be implemented. These include:

- Careful siting of turbines, painting turbine blades, marking power lines, bird friendly power hardware, monitoring priority bird movements and collisions, turbine management sensitive to these data – radar assisted if necessary.
- Painting one blade of each turbine black to maximise conspicuousness to oncoming birds.
- Ensuring that lighting on the turbines is kept to a minimum, and is coloured (red or green) and intermittent, rather than permanent and white, to reduce confusion effects for nocturnal migrants.
- Removal of the highest risk turbines from the proposed development layout.
- Minimising the length of any new power lines installed, ensuring that all new lines are marked with bird flight diverters (Jenkins *et al.* 2010) from origin to destination (with markers and fittings as per the industry standard), and that all new power infrastructure is adequately insulated and bird friendly in configuration (Bevanger 1994, Lehman *et al.* 2007). Note that current understanding of power line collision risk in birds precludes any guarantee of successfully distinguishing high risk from medium or low risk sections of a new line (Bevanger 1994, Jenkins *et al.* 2010, Barrientos *et al.* 2011). The relatively low cost of marking the entire length of a new line during construction, especially quite a short length of line in an area frequented by collision

prone birds, more than offsets the risk of not marking the line, causing unnecessary mortality of birds, and then incurring the much greater cost of retro-fitting the line post-construction. In situations where new lines run in parallel with existing, unmarked power lines, this approach has the added benefit of reducing the collision risk posed by the older line.

- Carefully monitoring the local avifauna both during and post-construction (Jenkins *et al.* 2013 and references therein), adding detail and value to the data collected during the present study – ideally using radar to improve the quantity and spatial accuracy of the movement data available - and implementing appropriate additional mitigation as and when significant changes are recorded in the number, distribution or breeding behaviour of any of the priority species listed in this report, or when collision or electrocution mortalities are recorded for any of the priority species listed in this report.
- Ensuring that the results of this study and of subsequent monitoring work are applied to project-specific impact mitigation in a way that allows for the potentially considerable cumulative effects on the local/regional avifauna of further phases of this wind energy project, and of multiple other wind energy projects proposed for this area.
- Should any impacts be detected either during construction or once the wind farm is operational that are deemed sufficiently detrimental to the regional avifauna, the developer must be prepared to apply mitigation options additional to those already listed here. Such additional mitigation might include re-scheduling construction or maintenance activities on site, or shutting down problem turbines either permanently or at certain times of year or under certain weather conditions.

In addition to these mitigation measures, the following have been identified during this updated assessment.

- Undertake pre-construction phase monitoring, focussing on flight activity surveys (Vantage Point surveys) to update the project baseline and inform operational monitoring in line with recommendations in Jenkins *et al* 2015.
- Undertaken operational monitoring in line with the recommendations in Jenkins *et al* 2015.
- Operational monitoring will inform adaptive management of the Project, with fatality estimates used to test the predicted impacts in relation to collision mortality.
- The Project is likely to results in a low annual level of collision mortality for the regionally important Dassen Island great white pelican population. This mortality may increase the ongoing decline in the population over the lifetime of the Project. The Project should support compensation measures to offset impacts from the Project, to be informed by operational monitoring of the Project. The specific actions should be agreed with relevant stakeholders but could include:
  - Undertaking studies to better understand and inform management actions for the population (e.g. satellite tagging studies to confirm terrestrial foraging site and threats, mapping of at sea feeding areas and pressures, monitoring of drivers of breeding success);
  - Management of threats associated with terrestrial feeding areas (e.g. agricultural areas and waste management facilities);
  - Support to protect or manage at sea feeding areas; and
  - Provision of alternative supplementary feeding sites.

With adaptive management and mitigation measures in place, impacts on great white pelican are predicted to be of negligible -small magnitude impact and overall of **Minor Significance**.

Negligible-small magnitude impacts are predicted on high sensitivity blue crane, lanner falcon, black harrier and martial eagle martial eagle and medium sensitivity greater and lesser flamingo resulting in impacts of **Moderate Significance**.

Table 8-11 Impacts of Bird mortality by collision or electrocution

Characteristic	Impact	Residual Impact
Extent	Local - Regional	Local - Regional
Duration	Long term	Long term
Scale	Collision mortality will affect different numbers of individuals of different species over the lifetime of the Project.	
Reversibility	Partly reversible (Medium)	Partly reversible (Medium)
Irreplaceable Loss of resource	Medium	Medium
Magnitude	Small - Large	Small - Medium
Sensitivity of the Resource/ Receptor	Low - High	Low - High
Significance of Impact	**Minor - Major**	**Minor**

8.4.4 Conclusions and Recommendations

The Project site predominantly support a range of common and widespread bird species which are unlikely to be significantly affected by the development. A small number of priority species at greater risk of significant impact have been identified using the Project site and surrounding area. Key among these are the raptor species martial eagle, black harrier and African marsh harrier which are likely to primarily use remaining areas of natural vegetation but also agricultural areas to hunt, greater and lesser flamingo which use and travel between coastal and inland waterbodies, blue crane which predominantly uses agricultural areas particularly in the non-breeding season, and great white pelican which flies through the Project area to and from the breeding colony at Dassen Island.

The Project will result in some disturbance and displacement of bird species during construction and operation. This will likely be limited to a relatively small area around the Project site with the majority of species used to some level of disturbance as a result of the agricultural nature and associated of much of the Project site. Impacts for the proposed revised Project are considered to be no greater than for the consented development.

The Project will result in the loss of a relatively small area of agricultural habitat under the turbine bases, access tracks and other Project infrastructure. The area of habitat lost will be slightly larger than for the consented development, however the significance of impacts are considered to be no greater.

Impacts from collision mortality are predicted for great white pelican from the Project, with the collision risk modelling undertaken predicting 6 birds per year will collide. This level of mortality is lower than that predicted for the consented development, however if un-mitigated may still result in declines in the Dassen Island great white pelican population. Mitigation and active management measures have been identified to compensate for impacts, underpinned by operational monitoring of the Project.

8.5 Assessment of Potential Impacts on Geology and Soils

8.5.1 Soil degradation

Impact Description

Soil degradation is the removal, alteration or damage to soil and soil forming processes, usually due to human activity. The proposed activity will include excavation or displacement of soil, topsoil burial, stockpiling, mixing, wetting and compaction of topsoil and pollution of soil, which contribute to soil degradation. Removal or burial of topsoil in disturbance areas (areas where construction activity takes place around proposed turbines, structures or along access roads or power line routes) impacting on soil forming processes and resources.

Soil degradation is linked to the following issues:

- Removal or burial of topsoil in disturbance areas (areas where construction activity takes place around proposed turbines, structures or along access roads or power line routes) impacting on soil forming processes and resources;
- Pollution, salinisation, acidification or water-logging of natural soil in construction areas affecting soil formation processes;
- Loosening, mixing, dumping and stockpiling of soil onto topsoil and compaction of topsoil affecting soil stability and organic processes; and
- Increased sheet, rill or gulley erosion and deposition down-slope due to the removal of vegetation and other activity in construction areas.

Impact Assessment

The proposed development layout indicates that turbines are concentrated on the upper slopes and plateau areas underlain by granite. These areas also tend to be less sensitive, i.e. have a lower erodibility potential, as the hydraulic energy is generally low and the unconsolidated transported soils are generally thinner. A reduction in number of turbines will contribute positively to direct and cumulative impacts on soil degradation.

Table 8-12 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Minor Significance.**

Mitigation Measures

The recommendations contained in the original Geological Impact Assessment (Appendix C) should be implemented. These include:

- Minimise disturbance areas and use existing disturbed areas or low sensitivity areas;
- Rehabilitate soil and vegetation in areas of activity as soon as possible after construction;
- Restrict zone of disturbance to area of construction;
- Control use and disposal of potential contaminants or hazardous materials (e.g. fuel);
- Prevent unnecessary removal and stockpiling of soil;
- Ensure stable slopes of stockpiles/excavations to minimise slumping;
- Implement effective erosion control measures;
- Carry out earthworks in phases across site to minimise exposed ground at any one time; and
- Keep to existing roads, where practical, to minimise loosening of undisturbed ground.

Table 8-12 Impacts of soil degradation

Characteristic	Impact	Residual Impact
Extent	Local	Local
Duration	Medium Term	Short Term
Scale	Site specific	
Reversibility	Partially Reversible	Partially Reversible
Irreplaceable Loss of resource	Yes	No
Magnitude	Large	Medium
Sensitivity of the Resource/ Receptor	Medium	Medium
Significance of Impact	**Moderate**	**Minor**

8.5.2 Degradation of Bedrock

Impact Description

Excavations into bedrock may result in unsightly scars, resulting in potential visual impacts. In addition, deep or poorly planned excavations may potentially affect the stability of the surroundings, such as rock slides along road cuttings. Excavations into bedrock may affect the geohydrology of an area and can contaminate groundwater. Blasting operations associated with excavations into rock have environmental issues, including noise pollution, dust, vibrations and chemical hazards.

Impact Assessment

The proposed activity is unlikely to have significant impact in this regard because the proposed activity is unlikely to involve excavations deeper than 2-3m and, where required, access roads can probably be constructed without significant cuttings.

Table 8-13 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Negligible Significance.**

Mitigation Measures

The recommendations contained in the original Geological Impact Assessment (Appendix C) should be implemented. These include:

- Restrict zone of disturbance and plan excavations carefully;
- Plan any new access roads taking contour lines into consideration to minimise cutting and filling operations; and
- Keep to existing roads, where practical, to minimise impacts on undisturbed ground.

Table 8-13 Impacts of degradation of parent rock

Characteristic	Impact	Residual Impact
Extent	Local	Local
Duration	Permanent	Permanent
Scale	3 - 10 ha	3 - 10 ha
Reversibility	Irreversible	Irreversible
Irreplaceable Loss of resource	Yes, but insignificant	Yes, but insignificant
Magnitude	Small	Small
Sensitivity of the Resource/ Receptor	Low	Low
Significance of Impact	**Minor**	**Negligible**

8.5.3 Conclusions and Recommendations

The proposed changes have reduced the likely impact from Moderate to Minor due to a fewer number of Turbines. The proposed impacts can be mitigated by effective implementation of the EMPr to reduce the impact to a negligible level with an acceptable loss of resources.

8.6 Assessment of Potential Impacts on Heritage

8.6.1 Impacts on Palaeontology: Findings or Loss of Fossils during Construction

Impact Description

Notwithstanding, fossils may occur in particular circumstances, such as buried crevices and small ravines that may be exposed by removal of the surface soil. The coversand area in the south-western corner, where higher fossil potential resides, has been avoided. Although the fossil potential is overall low, the installations involve the disturbance of a considerable volume of deposits, increasing the probability that fossils will be encountered.

Impacts to palaeontological material could involve displacement or destruction of material at turbine locations and in the paths of power lines and access roads.

Impact Assessment

No palaeontological material will occur in the Cape Granite Suite rocks that underlie most of the WEF, nor were fossils expected or noted in the Holocene sands that blanket most of the site.

Table 8-14 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Negligible Significance.**

Mitigation Measures

No palaeontological resources were located or are known from the vicinity. As such, no mitigation can be suggested or implemented, although a walk-through survey of the final surveyed power line corridor must be undertaken by a heritage specialist in order to inform site-specific mitigation to be implemented during construction and operation

Table 8-14 Impacts on Palaeontology during Construction

Characteristic	Impact	Residual Impact
Extent	Site Specific	Site Specific
Duration	Long-term	Long-term
Scale	Small	Small
Reversibility	Non-Reversible	Non-Reversible
Irreplaceable Loss of resource	No	No
Magnitude	Small	Small
Sensitivity of the Resource/ Receptor	Low	Low
Significance of Impact	**Negligible**	**Negligible**

8.6.2 Impacts on Archaeological Material

Impact Description

Archaeological material was found to be rare and widely scattered across the WEF. Only one concentration of artefacts worthy of being called a site was recorded on the crest of the ridge that overlooks the coastal plain and in the lee of a small granite dome. The site contains both indigenous and colonial artefacts and was assessed to be of significance, with the potential to provide information that would improve our understanding of the pre-colonial history of the area.

Most other surface archaeological finds were isolated artefacts relating to the Early Stone Age (ESA) and Later Stone Age (LSA) and these were assessed to be of no significance beyond indicating the presence of Stone Age people in the landscape in the past.

Impact Assessment

Table 8-15 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Negligible Significance.**

Mitigation Measures

The recommendations contained in the original Geological Impact Assessment (Appendix C) should be implemented. These include:

- A walk-through survey of the final surveyed WEF area of the connection corridor to the substation must be undertaken by a heritage specialist in order to inform site-specific mitigation to be implemented during construction and operation; and
- Recording, sampling and curation of important fossil heritage within development area, both before and during construction, to be achieved before completion of construction phase.

Table 8-15 Impacts to Archaeological Material

Characteristic	Impact	Residual Impact
Extent	Site Specific	Site Specific
Duration	Permanent	Permanent
Scale	Small	Small
Reversibility	Non-Reversible	Non-Reversible
Irreplaceable Loss of resource	Yes	No
Magnitude	Small	Small
Sensitivity of the Resource/ Receptor	Large	Low
Significance of Impact	**Minor**	**Negligible**

8.6.3 Impacts on the Built Environment

Impact Description

Several clusters of buildings are present within the facility, most directly related to three main farm complexes (Wildschutsvlei, Grootberg and Rheboksfontein), with a few isolated buildings also noted. The majority of the farm buildings were modern, and of little heritage significance, but a few older buildings were noted, the most significant being the primary residence on Rheboksfontein the core of which appears to originally date to the 18th century.

Impact Assessment

Table 8-16 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Minor Significance.**

Mitigation Measures

The recommendations contained in the original Geological Impact Assessment (Appendix C) should be implemented.

Table 8-16 Impacts to the Built Environment

Characteristic	Impact	Residual Impact
Extent	Site Specific	Site Specific
Duration	Long term	Long term
Scale	Small	Small
Reversibility	Reversible	Reversible
Irreplaceable Loss of resource	Yes	No
Magnitude	Medium	Small
Sensitivity of the Resource/ Receptor	Medium	Low
Significance of Impact	**Moderate**	**Minor**

8.6.4 Impacts on the Cultural Landscape and Sense of Place

Impact Description

The region's landscape is strongly dominated by agriculture - wheat farming and grazing – and modifications to the landscape almost exclusively revolve around agriculture and farm complexes. The presence of several tree lines or clusters of large trees related to the agricultural use of the area, and which contribute to the cultural landscape and sense of place, was noted in the HIA.

Impact Assessment

Table 8-17 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Moderate Significance.**

Mitigation Measures

The recommendations contained in the original Geological Impact Assessment (Appendix C) should be implemented. These include:

- A plan should be in place to decommission or reuse the facility at the end of its lifetime. Under no circumstances can the turbines be allowed to fall into disrepair and become abandoned on site;
- The Visual Impact Assessment mitigation measures are to be implemented; and
- Tree lines should be protected as far as possible.

Table 8-17 Impacts to Cultural Landscapes and Sensitivity

Characteristic	Impact	Residual Impact
Extent	Site Specific	Site Specific
Duration	Long term	Long term
Scale	Small	Small
Reversibility	Reversible	Reversible
Irreplaceable Loss of resource	No	No
Magnitude	Medium	Medium
Sensitivity of the Resource/ Receptor	Medium	Medium
Significance of Impact	**Moderate**	**Moderate**

8.6.5 Conclusions and Recommendations

The proposed use of larger turbines will have no additional impacts on heritage resources to those identified in the HIA and addressed in the recommended mitigation measures. From a heritage resources perspective, the proposed amendment to the environmental authorisation for the Rheboksfontein WEF are considered acceptable.

8.7 Assessment of Potential Visual Impacts

8.7.1 Impacts on the Visual Receptors

Impact Description

The primary visual impact is the appearance and dimensions of the WEF, which is not possible to mitigate to any significant extent within this landscape. The visual impacts are linked to the sites location relative to the R27 and R315, which are recognised scenic routes, and its location on the Darling Hills, which have a high scenic value. This picturesque landscape is dominated by rounded, rolling hills and broad valleys, punctuated by granite outcrops. The sense of place is of a landscape extensively used for commercial cropping (wheat, vineyards) pastoral (sheep and cattle) and conservation activities.

Other impacts include impacts associated with lighting of substations, and the aircraft warning lights mounted on top of the hub of the wind turbines. Due to the nature of the area within which the facility is planned, there are only a few potentially sensitive receptors.

Impact Assessment

The increased area of visual exposure does not include any additional exposure to major roads within the study area. It is expected that the wind turbine structures, both the original dimensions and the proposed increased dimensions would be equally visible and noticeable from both the roads and homesteads identified above, therefore signifying a negligible change to the potential visual impact.

These changes would have a minor negative effect when compared to the approved facility. In consideration of the proposed amendments, there is no change to the significance rating compared with the original EIA visual impact assessment report.

Table 8-18 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Moderate to High Significance.**

Mitigation Measures

The recommendations contained in the original Visual Impact Assessment (Appendix C) should be implemented. These include:

- Aviation warning lights must be mounted on turbine hub or such measures required by the Civil Aviation Authority. Indications are that the facility may not be required to fit a light to each turbine, but rather place synchronous flashing lights on the turbines representing the outer perimeter of the facility.
- Ensure that proper planning is undertaken regarding the placement of lighting structures for the substation and that light fixtures only illuminate areas inside the substation site.
- A lighting engineer must be consulted to assist in the planning and placement of light fixtures in order to reduce visual impacts associated with glare and light trespass. In addition, the possibility of motion activated security lighting should be investigated. This will allow for a predominantly dark site to be lit only as required.
- Maintain the general appearance of the facility in an aesthetically pleasing way.
- Undertake regular maintenance of light fixtures. Moyeng Energy Operation and maintenance

- Limit access to the wind energy facility site, power lines and substation along existing access roads
- Avoid the unnecessary removal of vegetation for the distribution power line servitudes and limit access to the servitudes (during both construction and operational phases) along existing access roads.

Table 8-18 Impacts on Visual Receptors

Characteristic	Impact	Residual Impact
Extent	Local - Regional	Local - Regional
Duration	Long Term	Long Term
Scale	1,000km^2	1,000km^2
Reversibility	Reversible	Reversible
Irreplaceable Loss of resource	No	No
Magnitude	Medium	Medium
Sensitivity of the Resource/ Receptor	Medium	Medium
Significance of Impact	**Moderate - High**	**Moderate- High**

8.7.2 Conclusions and Recommendations

The proposed amendments would slightly increase the visibility of the project and its visual exposure. These changes, however, would have a minor negative effect when compared to the approved facility. A low magnitude and significance of change in the visual characteristics of the study area is predicted. Mitigation measures as per the original VIA report must be upheld.

8.8 Assessment of Potential Noise Impacts

8.8.1 Impacts from Construction Activities on Potential Noise Receptors

Impact Description

Increased noise levels are directly linked with the various activities associated with the construction of the WEF and related infrastructure, as well as the operational phase of the activity.

Construction activities include:

- Construction of access roads;
- Establishment of turbine tower foundations and electrical substations;
- The possible establishment, operation and removal of concrete batching plants;
- Delivery of turbine, substation and power line components, as well as other materials to the site;
- Digging of trenches to accommodate underground power cables; and
- The erection of turbine towers and assembly of wind turbine generators.

The area is mainly used for various agricultural activities. These agricultural activities and the roads (R27 and R315) are the main noise source in the vicinity of the study area during the day. Traffic on the R27 and R315 dies down in the evening. Late at night/early morning there is no traffic on the R315. The ocean and other natural sounds define the ambient sound environment late at night and early in the mornings.

Impact Assessment

The mitigation of noise during the construction phase is normally relatively easy to achieve. Mitigation options included both management measures as well as technical changes. The revised layout removed two of wind turbines, and slightly moved others. The result is that the projected noise impact due to construction activities was slightly reduced. Further mitigation is not required, but potential options are mentioned to further assist in maintaining a low risk of a noise impact during the construction phase.

Table 8-19 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Moderate Significance.**

Mitigation Measures

The recommendations contained in the original and updated Noise Impact Assessments (Appendix C) should be implemented. These include:

- Reducing the number simultaneous construction activities when working close to a receptor. Noise reduction between 3 and 6 dBA.
- Ensuring that all equipment and machinery are well maintained and equipped with silencers (where possible). Noise reduction between 1 and 5 dBA.
- Considering the noise emission characteristics of equipment when selecting equipment for a project/operation, and select the smallest, or least noisy machine available to do the specific work. Noise reduction between 3 and 15 dBA.
- Working together with the local communities, and provide prior warning when a noisy activity is to take place. Higher acceptance to the noise, less annoyance, reduce probability of impact.
- Only conduct very noisy activities between 10am and 4pm. Reduce probability that it will impact on receptors.
- Conduct noisy activities in the shortest possible time (especially site preparation with bulldozer and civil work using an excavator). Noise reduction between 0 and 3 dBA.
- Move the closest turbines further from the receptors, or do not construct any turbines within 500 meters from potential receptors. This will move the construction sites. The increased distances from the activities and the receptors could have the single most significant reduction in noise levels. Variable, depends on distance between receptor and noise source.

Table 8-19 Noise Related Impacts during Construction

Characteristic	Impact	Residual Impact
Extent	Regional	Regional
Duration	Medium Term (1 month)	Medium Term (1 month)
Scale	1,000m^2	1,000m^2
Reversibility	Reversible	Reversible
Irreplaceable Loss of resource	No	No
Magnitude	Medium	Small
Sensitivity of the Resource/ Receptor	Medium	Medium
Significance of Impact	**Moderate**	**Minor**

8.8.2 Impacts from Operation on Potential Noise Receptors

Impact Description

It should be noted that the change in Wind Turbine Generator (WTG) specifications such as the hub height and rotor diameter does not relate to sound power emission levels, which depends on the model and make of a WTG. For the same model and make, a change in specifications such as hub-height and rotor diameter have an insignificant impact on sound power emission levels. Therefore, there is no advantage or disadvantage in terms of acoustics by changing the WTG specifications for the same make and model of WTG.

By changing the wind turbine model and make to a WTG with a lower sound power emission levels however will have a significant advantage on acoustics (reduced noise emissions). Similarly, changing the WTG model or make to a WTG with a higher sound power emission level will increase the operational noise levels and the potential noise impact significance.

The wind energy market is fast changing and adapting to new technologies as well as site specific constraints. Optimizing the technical specifications can add value through, for example, minimizing environmental impact and maximizing energy yield. As such the developer has been evaluating several WTG models, however the selection will only be finalized at a later stage once the most optimal WTG is identified (factors such as meteorological data, price and financing options, guarantees and maintenance costs, etc. must be considered). As such the developer cannot commit to a specific wind turbine model, but it should be noted that the previous noise impact assessment did consider a worst-case scenario, using a WTG with a high noise emission level.

Impact Assessment

Therefore, considering the layout, the proposed changes and the potential noise impact:

- The change will not increase the significance of the noise impact;
- A full noise impact assessment with new modelling will not be required and the recommendations as contained in the previous document will still be valid; and
- The cumulative noise impact will not change, as there are no new or proposed wind turbines (from a different WEF), located within 2,000m from identified NSDs that will cumulatively increase the noise levels.

An updated noise impact assessment will not be required and the findings, mitigation measures and recommendations as contained in the previous document (report SE-ERWEF/ENIAR/201811-Rev 0) will still be valid. If the developer uses a WTG with a sound power emission level less than 107.4 dBA (re 10-12 watt) the significance will be low. In terms of noise, the proposed change will be acceptable.

Table 8-20 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Moderate Significance.**

Mitigation Measures

The recommendations contained in the original and updated Noise Impact Assessments (Appendix C) should be implemented. These include:

- If required, the Vestas V90 2.0 MW turbine can be run in different modes to reduce the noise emissions from the wind turbine.
- The developer can consider larger wind turbines which would require less wind turbines for the same power generation potential, but increase the buffer zone appropriately (modelling would be required to define the recommended buffer zone)
- The developer and consider to use smaller and/or quieter wind turbines.
- Reducing the number of wind turbines in areas where there are sensitive receptors.

- Developing the same number of wind turbines over a larger area.
- Ensuring a larger setback around potentially sensitive receptors taking cognisance of prevailing wind directions.
- The voluntary relocation of the receptors that are impacted.
- A combination of the above options.

Mitigation measures that would reduce a potential noise impact after the implementation of the facility includes (if a noise complaint is registered):

- Operating all, or selected wind turbines in a different mode. The Vestas as well as most other manufacturers allow the turbines to be operated in a different mode. This allows the wind turbine generator to operate more silently, albeit with a slight reduction of electrical power generation capability.
- Problematic wind turbines could also be disabled, or the rotational speeds significantly decreased during periods when a quieter environment is desired (and complaints registered).

Table 8-20 Noise Related Impacts during Operation

Characteristic	Impact	Residual Impact
Extent	Local	Local
Duration	Long Term	Long Term
Scale	<500m^2	<500m^2
Reversibility	Reversible	Reversible
Irreplaceable Loss of resource	No	No
Magnitude	Medium	Small
Sensitivity of the Resource/ Receptor	Medium	Medium
Significance of Impact	**Moderate**	**Minor**

8.8.3 Conclusions and Recommendations

The proposed changes will not increase the significance of the noise impact, and the cumulative noise impact will not change, as there are no new or proposed wind turbines (from a different Wind Energy Facility), located within 2,000m from identified NSDs that will cumulatively increase the noise levels.

8.9 Assessment of potential social impacts

8.9.1 Potential Positive Social impacts During Construction

The key positive social issues associated with the construction phase include:

- Creation of employment and business opportunities.

Impact Description

The construction create approximately 120 direct employment opportunities for a period of 18 months. Approximately 25% of opportunities will be available to skilled personnel (engineers, technicians, management), 35% to semi-skilled personnel (drivers, equipment operators), and 40% to low skilled personnel (construction labourers, security staff).

Members from the local community in the area are likely to be in a position to qualify for the majority of the low skilled and a proportion of the semi-skilled employment opportunities. The majority of these employment opportunities will accrue to Historically Disadvantaged members from the SLM community. The towns that are likely to benefit are Darling, Malmesbury and Yzerfontein.

Impact Assessment

The potential benefits for local communities are confirmed by the findings of the Overview of the Independent Power Producers Procurement Programme undertaken by the Department of Energy, National Treasury and DBSA (March 2019). The review found that by the end of March 2019 the 64 renewable energy projects that had been successfully completed had created 31,633 job years of employment, compared to the anticipated 20 689. This was 53% more than planned. The study also found that significantly more people from local communities were employed during construction than was initially planned.

The wage bill associated with the construction phase is estimated at R30 million for the 18-month construction phase (2020 Rand values). A percentage of the wage bill will therefore be spent in the local economy over the 18-month construction phase. This will create opportunities for local businesses in the area. The sector of the local economy that is most likely to benefit from the proposed development is the local service industry. This is confirmed by the experience with the other renewable projects. The potential opportunities for the local service sector are linked to accommodation, catering, cleaning, transport and security, etc. associated with the construction workers on the site.

The capital expenditure will be in the region of R 2 billion (2020 Rand values). Local procurement will create opportunities for local business in the area, specifically engineering and construction companies.

Table 8-21 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Positive Significance**.

Mitigation Measures

In order to enhance local employment and business opportunities associated with the construction phase the following measures should be implemented:

Employment

- Where reasonable and practical the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. Due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area;
- Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria;
- Before the construction phase commences the proponent should meet with representatives from the SLM to establish the existence of a skills database for the area. If such as database exists it should be made available to the contractors appointed for the construction phase;
- The local authorities, relevant community representatives and local farmers should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that the proponent intends following for the construction phase of the project;
- Where feasible a training and skills development programmes for local workers should be initiated prior to the initiation of the construction phase;
- The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.

Business

- The proponent should liaise with the SLM with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies

etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work;

- Where possible, the proponent should assist local BBBEE companies to complete and submit the required tender forms and associated information.
- The SLM, in conjunction with the local business sector and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project.

Table 8-21 Positive Social Impacts during Construction

Characteristic	Impact	Residual Impact
Extent	Regional	Regional
Duration	Medium Term	Medium Term
Scale	>100	>100
Reversibility	Reversible	Reversible
Irreplaceable Loss of resource	No	No
Magnitude	Medium	Medium
Sensitivity of the Resource/ Receptor	High	High
Significance of Impact	**Positive**	**Positive**

8.9.2 Potential Negative Social Impacts during Construction

Impact Description

The key negative social issues associated with the construction phase include:

- Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of grass fires;
- Impact of heavy vehicles, including damage to roads, safety and dust;
- Impact on farming activities.

Impact of construction workers on local communities

The presence of construction workers poses a potential risk to family structures and social networks. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on local communities. The most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to potentially risky behaviour of male construction workers, including an increase in alcohol and drug use; increase in crime levels; increase in teenage and unwanted pregnancies; increase in sexually transmitted diseases (STDs).

Influx of Job Seekers

Large construction projects tend to attract people to the area in the hope that they will secure a job, even if it is a temporary job. These job seekers (and sometimes their families who follow them) can in turn become “economically stranded” in the area or decide to stay on irrespective of finding a job or not. As in the case of construction workers employed on the project, the actual presence of job seekers in the area does not in itself constitute a social impact. However, the manner in which they conduct themselves can impact on the local community.

Risk to safety, livestock, farm infrastructure and farming operations

The presence on and movement of construction workers on and off the site may pose a potential safety threat to local famer's and farm workers in the vicinity of the site. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or fences being damaged or stock theft linked either directly or indirectly to the presence of farm workers on the site. The local farmers in the area interviewed indicated that the presence of construction workers on the site increased the exposure of their farming operations and livestock to the outside world, which, in turn, increased the potential risk of stock theft and crime.

Increased fire risk

The presence of construction workers and construction-related activities on the site poses an increased fire risk, which could, in turn, pose a threat grazing and livestock.

Impacts associated with construction vehicles

The movement of heavy construction vehicles during the construction phase has the potential to damage local farm roads and create dust and safety impacts for other road users in the area and also impact on farming activities. The movement of construction traffic on the site should be limited to the relevant access roads and construction site.

The project components are likely to be transported to the site via the R27, which is an important tourist route between Cape Town and the West Coast. The transport of components to the site therefore has the potential to impact on other road users travelling along the R27, including tourists.

Experience from other projects also indicates that the transportation of construction workers to and from the site can result in the generation of waste along the route (packaging and bottles etc. thrown out of windows etc.)

Impacts on productive farmland due to construction activities

Activities such as the establishment of access roads, the movement of heavy vehicles, the establishment of lay-down areas and foundations for the wind turbines, as well as the establishment of substations and power lines will potentially damage topsoil and vegetation.

Impact Assessment

Impact of construction workers on local communities

Experience has shown that the potential social impacts associated with construction workers are typically associated with low-skilled workers and not the more skilled workers. However, given the relative proximity of the site to the Cape Town and other large towns in the Swartland and Boland, it would be relatively easy to transport workers to and from site on a daily basis. Some skilled and semi-skilled personnel may be accommodated in nearby towns such as Darling or Yzerfontein. In this regard Moyeng Energy has indicated that construction workers will be transported onto and off site on a daily basis. Exposure to farm workers and their families is therefore expected to be minimal. The potential risk posed by construction workers on local communities is therefore not likely to represent a significant social issue. Employing local community members for the low skilled jobs will also assist to effectively mitigate the potential risks associated with construction workers in the area.

Influx of Job Seekers

The influx of job seekers and their families can place pressure on the existing services in the area. In addition to the pressure on local services the influx of construction workers and job seekers can also result in competition for scarce employment opportunities. Further secondary impacts included increase in crime levels, especially property crime, as a result of the increased number of unemployed people. These impacts can result in increased tensions and conflicts between local residents and job seekers from outside the area.

In some instances the potential impact on the community may be greater given that they are unlikely to have accommodation and may decide to stay on in the area. In addition, they will not have a reliable source of income. The risk of crime associated with the influx of job seekers may therefore be greater. However, the potential for economically motivated in-migration and subsequent labour stranding in the area linked to the proposed project is likely to be low. This is due to the location of the site and the relatively small size of the project (140MW), the limited employment opportunities (~120) and short duration of the construction phase (18 months). There are also limited economic opportunities in area, specifically Yzerfontein and Darling. The risks associated with job seekers being attracted to and staying on in the area will therefore be low.

Risk to safety, livestock, farm infrastructure and farming operations

The proposed WEF site and adjacent area is primarily used for mixed commercial farming and conservation. All the properties affected by the proposed Rheboksfontein site farm sheep, which are vulnerable to stock theft. Sheep theft is currently problematic in the study area. The local farmers interviewed did, however, indicate that the potential risks (safety, livestock and farm infrastructure) can be effectively mitigated by careful planning and managing the movement of construction on the site workers during the construction phase. Moyeng Energy has indicated that construction workers will not be housed on-site

Increased fire risk

The potential fire risk of grass fires is highest towards the end of the dry summer months (November-March). This period also coincides with dry, windy conditions in the area. The local fynbos vegetation is fire prone, especially over the hot, dry summer months. In addition, a number of properties are infested with alien vegetation (Acacia spp.), specifically some of the properties located to the west of the R27.

Impacts associated with construction vehicles

The movement of heavy construction vehicles will only occur during the construction phase and should movement of construction traffic on the site should be limited to the relevant access roads and construction site, the damage to farming roads can be avoided.

The potential impacts on tourists and locals can be effectively mitigated by restricting construction traffic movements to weekdays, and, where possible, limiting activities during over holiday periods, specifically Christmas and Easter holiday periods and other long weekends. The movement of heavy construction vehicles will also damage internal farm roads and other unsurfaced public roads that may be used to access the site. The damage will need to be repaired after the completion of the construction phase.

Impacts on productive farmland due to construction activities

All affected landowners indicated that the movement should be limited to the access road(s) and construction site. The construction footprint should be minimized to mitigate the damage to the natural veld and disturbed areas should be rehabilitated upon completion of the construction phase.

Overall

The findings of the SIA indicate that the significance of all the potential negative impacts with mitigation were Low Negative. The potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. Given that the majority of the low and semi-skilled construction workers can be sourced from the local area the potential risk posed by construction workers on local family structures and social networks is regarded as low for the community as a whole.

Table 8-22 summarises the significance of the impacts associated with the Project. The resultant impact would be of **Minor Significance.**

Mitigation Measures

Impact of construction workers on local communities

- Where possible the proponent should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories;
- The proponent should consider the need for establishing a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from the SLM, farmers and the contractor(s). The MF should also be briefed on the potential risks to the local community and farm workers associated with construction workers;
- The proponent and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation;
- The proponent and contractor (s) should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;
- The contractor should provide transport to and from the site on a daily basis for low and semi-skilled construction workers. This will enable the contractor to effectively manage and monitor the movement of construction workers on and off the site;
- Where necessary, the contractors should make the necessary arrangements to enable low and semi-skilled workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks;
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.

Influx of Job Seekers

It is not possible to prevent job seekers from coming to the area in search of a job. However, as indicated above, due to the location of the site the potential influx of job seekers to the area as a result of the proposed WEF will be low. In addition:

- The proponent should implement a "locals first" policy, specifically with regard to unskilled and low skilled opportunities.

Risk to safety, livestock, farm infrastructure and farming operations

- The proponent should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase proven to be associated with the construction activities for the WEF will be compensated for. The agreement should be signed before the construction phase commences;
- Contractors appointed by the proponent should provide daily transport for workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties;
- The proponent should consider the option of establishing a MF that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site;
- The proponent should hold contractors liable for compensating farmers in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors and

neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities;

- The Environmental Management Programme (EMP) should outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested;
- Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms;
- Contractors appointed by the proponent must ensure that construction workers who are found guilty of trespassing, stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation;
- The housing of construction workers on the site should be limited to security personnel.

Increased fire risk

- The proponent should enter into an agreement with the local farmers in the area whereby losses associated with fires that can be proven to be associated with the construction activities for the WEF will be compensated for. The agreement should be signed before construction commences;
- Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas;
- No smoking should be permitted on site, except in designated areas;
- Contractor should ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the higher-risk dry, windy summer months;
- Contractor to provide adequate fire-fighting equipment on-site;
- Contractor to provide fire-fighting training to selected construction staff;
- No construction staff, with the exception of security staff, to be accommodated on site over night;

As per the conditions of the Code of Conduct, in the event of a fire proven to be caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the fire-fighting costs borne by farmers and local authorities.

Impacts associated with construction vehicles

- As far as possible, the transport of components to the site along the R27 should be planned to avoid weekends and holiday periods;
- The contractor should inform local farmers and representatives from the SLM and the Tourism representatives of dates and times when abnormal loads will be undertaken;
- The contractor must ensure that damage caused by construction related traffic to the gravel public roads and local, internal farm roads is repaired on a regular basis throughout the construction phase. The costs associated with the repair must be borne by the contractor;
- Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis[3], adhering to speed limits and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers;

[3] Treated effluent (non-potable) water should be used for wetting of roads and construction areas

- All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits;
- The Contractor should ensure that workers are informed that no waste can be thrown out of the windows while being transported to and from the site. Workers who throw waste out windows should be fined;
- The Contractor should be required to collect waste along access roads on a weekly basis;
- Waste generated during the construction phase should be transported to the local permitted landfill site.
- EMP measures and penalties should be implemented to ensure farm gates are closed at all times and speed limits s are adhered to at all times.

Impacts on productive farmland due to construction activities

- The location of wind turbines, access roads, laydown areas etc. should be informed by the findings of the soil and vegetation study. Areas of sensitive vegetation soils should be avoided;
- The footprint areas for the establishment of individual wind turbines should be clearly demarcated prior to commencement of construction activities. All construction related activities should be confined to the demarcated area and minimised where possible;
- An Environmental Control Officer (ECO) should be appointed to monitor the establishment of the construction phase;
- All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase. The rehabilitation plan should be informed by input from the soil scientist and discussed with the local farmer;
- The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed;
- The implementation of the Rehabilitation Programme should be monitored by the ECO;
- All workers should receive training/ briefing on the reasons for and importance of not driving in undesignated areas;
- EMP measures should be implemented to strictly limit all vehicle traffic to designated roads and construction areas. Under no circumstances should vehicles be allowed to drive into the veld;
- Disturbance footprints should be reduced to the minimum.

Compensation should be paid by the developer to farmers that suffer a permanent loss of land due to the establishment of the WEF. Compensation should be based on accepted land values for the area.

Table 8-22 Negative Social Impacts during Construction

Characteristic	Impact	Residual Impact
Extent	Local	Local
Duration	Medium Term	Medium Term
Scale	Large	Large
Reversibility	Reversible (except HIV/AIDS)	Reversible (except HIV/AIDS)
Irreplaceable Loss of resource	Possible (HIV/AIDS)	Possible (HIV/AIDS)
Magnitude	Medium	Small
Sensitivity of the Resource/ Receptor	Medium	Medium
Significance of Impact	**Moderate**	**Minor**

8.9.3 Potential Positive Social Impacts during Operation

The Potential positive impacts affecting the operational phase include:

- The establishment of renewable energy infrastructure.
- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- Benefits associated with the establishment of a Community Trust;
- Benefits for affected landowners.

Impact Description

Development of renewable energy infrastructure

The establishment of renewable energy infrastructure, such as the proposed WEFs, should be viewed, firstly within the context of the South Africa's current reliance on coal powered energy to meet the majority of its energy needs, and secondly, within the context of the success of the REIPP Procurement Programme.

The Green Jobs study (2011) notes that South Africa has one of the most carbon-intensive economies in the world, thus making the greening of the electricity mix a national imperative.

The Green Jobs study (2011) identifies a number of advantages associated with wind power as a source of renewable energy, including zero carbon dioxide (CO_2) emissions during generation and low lifecycle emissions. Greenhouse gases (GHG) associated with the construction phase are offset within a very short period of time compared with the project's lifespan. Wind power therefore provides an ideal means for reaching emission reduction targets in a relatively easy manner. In addition, and of specific relevance to South Africa, wind as energy source is not dependent on water (as compared to the massive water requirements of conventional power stations), has a limited footprint and therefore does not impact on large tracts of land, poses limited pollution and health risks, specifically when compared to coal and nuclear energy plants.

Creation of employment and business opportunities

The Project's operation would create ~ 20 employment opportunities over a 20-year period. Of this total ~70% will be low and semi-skilled and 30% skilled. The annual wage bill for the operational phase would be ~ R3 million. The majority of employment opportunities associated with the operational phase is likely to benefit HD members from the local community. It will also be possible to increase the number of local employment opportunities through the implementation of a skills development and training programme linked to the operational phase. Such a programme would support the strategic goals of promoting employment and skills development contained in the NKLM and NDM. The operational phase will also require regular maintenance which will also create employment opportunities.

A percentage of the monthly wage bill earned by permanent staff will be spent in the regional and local economy. This will benefit local businesses in the relevant towns. The benefits to the local economy will extend over the anticipated 20-year operational lifespan of the project.

The local hospitality industry is also likely to benefit from the operational phase. These benefits are associated with site visits by company staff members and other professionals (engineers, technicians etc.) who are involved in the company and the project but who are not linked to the day-to-day operations.

Community Trust

The establishment of a community benefit structure (such as a Community Trust) also creates an opportunity to support local economic development in the area. The requirement for the project to allocate funds to socio-economic contributions (through structures such as Community Trusts)

provides an opportunity to advance local community projects, which is guaranteed for a 20-year period (project lifespan). The revenue from the proposed WEF can be used to support a number of social and economic initiatives in the area, including but not limited to:

- Creation of jobs;
- Education;
- Support for and provision of basic services;
- School feeding schemes;
- Training and skills development; and
- Support for SMME's.

Benefits to landowners

The income from the WEFs reduces the risks to the livelihoods of the affected landowners posed by droughts and fluctuating market prices for wheat, sheep and farming inputs, such as fuel, feed etc. The additional income from the WEF would improve economic security of farming operations, which in turn would improve job security of farm workers and benefit the local economy.

Impact Assessment

Development of renewable energy infrastructure

The National Climate Change Response White Paper outlines the national response to the impacts of climate change, as well as the domestic contribution to international efforts to mitigate green-house gas emissions. As part of the global commitment, South Africa is targeting an emissions trajectory that peaks at 34% below a "business as usual" case in 2020, 42% below in 2025 and from 2035 declines in absolute terms. The emission reductions between March 2018 and 2019 are estimated to be 10.9 million tonnes of CO_2. This represents 53% of the total projected annual emission reductions achieved with only partial operation to date. Since operation, the IPPs have generated 35 699 GWh, resulting in 36.2 Mton of CO_2 emissions being offset and saving 42.8 million kilolitres of water related to fossil fuel power generation.

The REIPP Procurement Programme had therefore contributed significantly towards meeting South Africa's GHG emission targets and, at the same time, supporting energy security, economic stability and environmental sustainability.

The establishment of renewable energy facilities, such as the proposed WEF, therefore not only address the environmental issues associated with climate change and consumption of scarce water resources, but also creates significant socio-economic opportunities and benefits, specifically for historically disadvantaged, rural communities.

Creation of employment and business opportunities

The operational phase will create in the region of 20 full time employment opportunities.

The establishment of WFs, such as the proposed WEF, also supports the development of a green energy manufacturing sector in South Africa. The Green Jobs study (2011) found that South Africa is in a position to leverage upon some of its existing manufacturing capacities in order to produce components and parts for various sections of wind turbines. The study does however note that critical mass would have to be developed in order to obtain economies of scale. The establishment of WEFs, such as the proposed WEF, would therefore contribute to achieving this critical mass.

Community Trust

Wind farms located in rural areas create an opportunity to benefit the local and regional economy through the creation of jobs and tax revenues. In this regard the towns of as Darling and Yzerfontein are small rural towns.

The long-term duration of the contributions from the WEF also enables local municipalities and communities to undertake long term planning for the area. Experience has, however, shown that Community Trusts can be mismanaged. This issue will need to be addressed in order to maximise the potential benefits associated with the establishment of a Community Trust or other community benefit structure (entity). The REIPP Procurement Programme does however have stringent audit requirements in place to try and prevent the mismanagement of trusts.

Benefits to landowners

The proponent has entered into rental agreements with the affected landowners for the use of the land for the establishment of the proposed WEF. In terms of the rental agreement the affected landowner(s) will be paid an annual amount dependent upon the number of wind turbines located on the property. Based on the findings of the SIA the area is prone to droughts and farming operations can be challenging. Any additional source of income therefore represents a significant benefit for the affected landowner(s). The additional income reduces the risks to their livelihoods posed by droughts and fluctuating market prices for livestock and farming inputs, such as fuel, feed etc. The additional income from the WEF would improve economic security of farming operations, which in turn would improve job security of farm workers and benefit the local economy.

Table 8-23 summarises the significance of the impacts associated with the project. The resultant impact would be of Minor Significance.

Mitigation Measures

Development of renewable energy infrastructure

- Implement a skills development and training programme aimed at maximizing the number of employment opportunities for local community members;
- Maximise opportunities for local content, procurement and community shareholding;
- Consider establishing a visitor centre. The findings of the SIA indicate that there are frequent requests by visitors to visit the existing Darling Wind Farm.

Creation of employment and business opportunities

- The proponent should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African’s and locals employed during the operational phase of the project;
- The proponent, in consultation with the SLM, should investigate the options for the establishment of a Community Development Trust.

Community Trust

- The SLM should be consulted as to the structure and identification of potential trustees to sit on the Trust. The key departments in the SLM that should be consulted include the Municipal Managers Office, IDP Manager and LED Manager;
- Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community;
- Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the Community Trust from the WEF.

Benefits to landowners

- Implement agreements with affected landowners.

Table 8-23 Noise Related Impacts during Operation

Characteristic	Impact	Residual Impact
Extent	Local	Local
Duration	Long Term	Long Term
Scale	Small	Small
Reversibility	Reversible	Reversible
Irreplaceable Loss of resource	No	No
Magnitude	Medium	Small
Sensitivity of the Resource/ Receptor	Medium	Medium
Significance of Impact	**Positive**	**Positive**

8.9.4 Potential Negative Social Impacts during Operation

Potential negative impacts

- The visual impacts and associated impact on sense of place;
- Impact on property values; and
- Potential impact on tourism.

Impact Description

Visual impacts and impact on sense of place

The potential visual impact on the areas sense of place and rural character was not raised as a concern by local landowners and tourism representatives interviewed. The SLM IDP also indicated that it is located within an Alternative Energy Area (Area A). The area has therefore been identified as suitable for the establishment of renewable energy facilities, including WEFs.

Impact on property values

A literature review was undertaken as part of the SIA. The assessment rating is based on the findings of the review. In total five articles were identified and reviewed (the full literature review can be found in Annex F of the updated Social Impact Assessment (Appendix D). The key findings of the literature review are summarised below.

Stephen Gibbons (April, 2014): The overall findings of the study indicate that wind farms reduce house prices in postcodes where the turbines are visible, and reduce prices relative to postcodes close to wind farms where the wind farms are not visible. The overall finding is that “averaging over wind farms of all sizes, this price reduction is around 5-6% within 2km, falling to less than 2% between 2 and 4km, and less than 1% by 14km which is at the limit of likely visibility”. The study notes that small wind farms have no impact beyond 4km, whereas the largest wind farms (20+ turbines) reduce prices by 12% within 2km, and reduce prices by small amounts right out to 14km (by around 1.5%).

Martin D. Heintzelman and Carrie M. Tuttle (March, 2011): The paper concludes that the results of the study appear to indicate that proximity to wind turbines does have a negative and significant impact on property values. Importantly, the best and most consistent measure of these effects appears to be the simple, continuous, proximity measure, the (inverse distance) to the nearest turbine.

Ben Hoen, et al (August 2013): Based on the results, the study found that it is *highly unlikely* that the actual average effect for homes that sold in the sample areas within 1 mile of an existing turbine is larger than +/-4.9%. In other words, the average value of these homes could be as much as 4.9% higher than it would have been without the presence of wind turbines, as much as 4.9% lower, the same (i.e., zero effect), or anywhere in between. Similarly, it is highly unlikely that the average actual

effect for homes sold in the sample area within a half mile of an existing turbine is larger than +/-9.0%. In other words, the average value of these homes could be as much as 9% higher than it would have been without the presence of wind turbines, as much as 9% lower, the same (i.e., zero effect), or anywhere in between. The study notes that, regardless of these potential maximum effects, the core results of the study consistently show no sizable statistically significant impact of wind turbines on nearby property values.

Urbis Pty Ltd (2016): Based on the outcome of the study the authors were of the opinion that wind farms may not significantly impact rural properties used for agricultural purposes. In conclusion, the authors of the Urbis study found:

- Appropriately located wind farms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values;
- There is limited available sales data to make a conclusive finding relating to value impacts on residential or lifestyle properties located close to wind farm turbines, noting that wind farms in NSW have been constructed in predominantly rural areas.

Based on the findings of the literature review the potential impact of WEFs on rural property values is likely to be low. This was confirmed by the feedback from the local landowners interviewed, none of whom raised concerns about the potential impact on property values.

Potential impact on tourism

A review of international literature in the impact of wind farms was undertaken as part of the SIA. The key findings are summarised below.

The research by Aitchison (2012) found that that previous research from other areas of the UK has demonstrated that wind farms are very unlikely to have any adverse impact on tourist numbers (volume), tourist expenditure (value) or tourism experience (satisfaction) (Glasgow Caledonian University, 2008; University of the West of England, 2004). In addition, there is no evidence to demonstrate that any wind farm development in the UK or overseas has resulted in any adverse impact on tourism. In conclusion, the findings from both primary and secondary research relating to the actual and potential tourism impact of wind farms indicate that there will be neither an overall decline in the number of tourists visiting an area nor any overall financial loss in tourism-related earnings as a result of a wind farm development.

In addition, all of the studies that have sought to predict impact have demonstrated that any negative impact of wind farms on tourism will be more than outweighed by the increase in tourists that are attracted by wind farms, by the increase in employment brought about by the development of wind farms and/or by the continuing growth of tourism. The study by the Glasgow Caledonian University (2008) found that only a negligible fraction of tourists will change their decision whether to return to Scotland as a whole because they have seen a wind farm during their visit. The study also found that 51.0% of respondents indicated that they thought wind farms could be tourist attractions.

The study by Regeneris Consulting (2014) found that there was no evidence that wind farms would deter tourists from traveling along designated visitor or tourists routes. The study indicated that small minorities of visitors would be encouraged, whilst others would be discouraged. Overall, however, there was no evidence to suggest that there would be any significant change in visitor numbers using these routes to reach destination elsewhere.

Impact Assessment

Visual impacts and impact on sense of place

The potential visual impact on the areas sense of place and rural character was not raised as a concern by local landowners and tourism representatives interviewed. A number of interviewees also indicated that the existing Darling WEF has become well known landmark in in the area. In this regard the owner of the Darling WEF and Darling Tourism Office routinely receive requests from tourists to

visit the Darling WEF facility. Due to its proximity to Cape Town the WEF is also frequently used for film shoots and commercials.

The manager of !Kwa Tuu, Mr Daiber, indicated that the key views from the facility area to the west (Atlantic) and south (Table Mountain) and not towards the WEF site. The context is not pristine, and while the addition of industrial infrastructure is not ideal, it is unlikely to significantly affect visitor flows to !Kwa tuu (Daiber, pers. comm). Mr Fourie from the Doornfontein Wildlife Estate indicate that the turbines are located sufficiently distant not to have any potentially adverse impact on the operation (Fourie, pers. comm). The representative for the Tienie Versfled Wild Flower Reserve indicated that the nearest turbine would be located 1.5 km from the reserve and was unlikely to impact on visitor numbers (Burger, pers. comm). Mr Duckitt from the Rondeburg Private Nature Reserve indicated that none of the turbine locations are considered intrusively close to Rondeberg PNR and associated residential uses (Duckitt, pers. comm).

In addition, none of the interviewees raised issues or concerns with regard to turbine locations or increased hub heights and rotor diameters. This is largely linked to the facts that the hub height (+10m) and rotor diameter (+38m) increases are relatively small and that turbines located in potentially sensitive areas have been removed, reducing the number of turbines from 80 in 2010 to 48 in 2012 to 35 in 2015 to 33 in 2020.

Impact on property values

Three of the articles evaluated in the literature review indicate that wind farms have the potential to impact on property values, while two indicate that the impacts are negligible and or non-existent. In terms of the proposed project the most relevant study is the Urbis study (2016). The authors of the study found that appropriately located wind farms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values.

Potential impact on tourism

Based on the findings of the literature review there is limited evidence to suggest that the proposed WEF would impact on the tourism in the SLM at a local and regional level. The findings also indicate that wind farms do not impact on tourist routes. Also, as indicated above, a number of interviewees indicated that the existing WEF has become well known landmark and the owner of the Darling WEF and the Darling Tourism Office routinely receive requests from tourists to visit the facility. The director of !Khwa tuu also indicated that the increased visibility associated with the larger wind turbines was unlikely to deter potential visitors.

Table 8-24 summarises the significance of the impacts associated with the project. The resultant impact would be of Minor Significance.

Mitigation Measures

Visual impacts and impact on sense of place

- The recommendations contained in the VIA should be implemented; and
- Recommended that the applicants meet with the affected landowners to discuss the possibility relocating wind turbines that have the highest potential visual impact.

Impact on property values

- The recommendations contained in the VIA should be implemented; and
- Recommended that the applicants meet with the affected landowners to discuss the possibility relocating wind turbines that have the highest potential visual impact.

Potential impact on tourism

- The recommendations contained in the VIA should be implemented.

Table 8-24 Negative Social Impacts during Construction

Characteristic	Impact	Residual Impact
Extent	Local	Local
Duration	Long Term	Long Term
Scale	Small	Small
Reversibility	Reversible	Reversible
Irreplaceable Loss of resource	No	No
Magnitude	Small	Small
Sensitivity of the Resource/ Receptor	Low	Low
Significance of Impact	**Minor**	**Minor**

8.9.5 Conclusions and Recommendations

The findings of the SIA indicate that the development of the proposed amendments to the WEF will create employment and business opportunities for locals during both the construction and operational phases of the project. The establishment of a Community Trust will benefit the local community. The proposed development also represents an investment in clean, energy infrastructure. Given the negative environmental and socio-economic impacts associated with a coal-based energy economy and the challenges created by climate change, this represents a significant positive social benefit for society as a whole. The findings of the SIA also indicate that the REIPP Procurement Programme has resulted in significant socio-economic benefits, both at a national level and a local, community level. These benefits are linked to foreign Direct Investment, local employment and procurement and investment in local community initiatives.

The establishment of Community Trusts associated with renewable energy projects also have the potential to create significant benefits for local rural communities. These benefits should be viewed within the context of the limited economic opportunities in the area and the impact of the decline in the mining sector on the local economy. The proposed Amended Rheboksfontein WEF is also located within area identified in the SLM IDP as an Alternative Energy Area (Area A). The area has therefore been identified as suitable for the establishment of renewable energy facilities.

8.10 Assessment of Potential Cumulative Impacts

There are approximately twelve proposed renewable energy facilities located within a 35 km radius of the Project location. Eleven of these facilities have existing EAs, two of which (Darling and the Umoya Energy Wind Energy Facilities) have been constructed to date. The potential for combined and sequential visibility is therefore high. As it is uncertain at present whether the other proposed developments will be implemented, it is not possible to quantitatively assess the potential cumulative impacts associated with numerous developments of this nature in the area. It is, however, considered important to describe the potential cumulative impacts which may be expected in order to obtain a better understanding of these impacts and the possible mitigation that may be required.

The cumulative impacts associated with the proposed facility primarily refer to those impacts associated with visual (including impacts on the cultural landscape), avifaunal and social impacts, and are mainly associated with the existing and planned wind energy facilities in the area. The cumulative impacts of the Facility in the context of the other proposed and constructed renewable energy projects in the area are acknowledged and were previously assessed in the Final EIA Report (2011). Given the scale of the changes identified for the individual impacts, when considered in the context of the proposed amendments, it is not considered that there would be an increase in overall significance of impacts

8.11 Summary of Changes to Impacts

As shown in Table 8-25, the proposed amendments (with mitigation measures in place) will bring about a lesser impact on flora and fauna, avifauna, noise and geological receptors. Impacts on heritage resources, visual receptors and social receptors remain largely unchanged.

Table 8-25 Post Mitigation Significance Rating for Original and Amendment Related Impacts

Impact	Original Impact	Amended Impacts
Flora & Fauna	Minor	Negligible
Avian	Moderate	Minor
Visual	Moderate - High	Moderate - High
Noise	Minor - Moderate	Minor
Geology & Soil	Minor	Negligible
Heritage & Palaeontology	Minor	Minor
Social	Positive	Positive

9. AMENDMENTS TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

This section outlines the recommended amendments required to the Draft Environmental Management Program report (EMPr), which should be submitted to DEFF for approval prior to the commencement of the construction phase.

The following mitigation measures have been added to the existing EMPr and converted to an EMPr. No other changes have been made to the existing EMPr.

9.1 Fauna and Flora

- In general, minimise clearing and avoid any spill-over of operations into any surrounding or adjacent area with more sensitive vegetation or any adjacent or nearby riparian habitats (except the clearing of alien invasive species);
- Avoid loss of fauna by inspecting the area prior to groundworks, and ensuring that all excavations are adequately fenced off to block access to large(r) fauna, e.g. hares or guinea fowl;
- No open fires may be lit for cooking or any other purposes, unless in specifically designated and secured areas;
- Delineate all permissible areas so that all movement of vehicles and heavy machinery can be restricted to such areas, these being designated access roads, maintenance roads, turning points and parking areas. No off-road driving beyond designated areas may be allowed;
- Design and create berms to stop runoff from temporary stockpile during/after a periodic high rainfall event to enter directly into existing washes;
- Ensure foundation and excavations are protected from heavy rainfall – if such dams up into excavated turbine foundations, ensure that water is not polluted before pumping it out, preferably not directly into the environment. If the latter cannot be avoided, ensure that pumped-out water is dissipated in a way that will avoid any erosion;
- Keep the clearing of vegetation to a minimum;
- Ensure top soils are first removed and stored separately for rehabilitation purposes;
- Parking and operational areas should be regularly inspected for oil spills and covered with an impermeable or absorbent layer (with the necessary storm water control) if oil and fuel spillages are highly likely to occur;
- Reinforce portions of existing access routes that are prone to erosion or seasonal inundation, create structures or low banks to drain the access road rapidly during rainfall events, yet preventing erosion of the track and surrounding areas;
- Install adequate drainage structures to ensure that water flows are never concentrated or blocked in any way;
- If filling material is to be used, this should be sourced from areas *free* of invasive species, and alien plant control measures are to be applied to all areas used for sourcing fill materials;
- Should there be surface material with potential seed-banks of alien invasive species, such material can be used to fill the lowest areas of excavations, ensuring it will be covered at least 50 cm deep with other subsurface substrate to prevent any of the alien invasive seed to actually germinate;
- Ensure that staff are aware that no fauna may be snared or in any way hunted, and strictly implement compliance;
- Ensure there are employees adequately trained in handling fauna should such occur within a construction area from which they cannot exit on own accord;

- To aid a more rapid revegetation of construction areas, excavations should be backfilled as soon as possible, all stockpiles must be, as far as possible, obliterated and/or landscaped to merge into the surroundings;
- Rehabilitate and revegetate all areas that have been disturbed as soon as practically possible and progressively during and after construction;
- Re-vegetation of disturbed/modified areas will be done using indigenous shrubs and grasses only, unless otherwise requested by landowners. The selection of species used for rehabilitation may not include any species that are not suitable to the receiving environment (i.e. may become invasive), and also no species that are indicative of habitat degradation, such as species declared as Encroaching (by CARA) or Increaser II or – III grasses; and
- Special attention will be paid to ensuring that topography is reconstructed as far as practical.

9.2 Avifauna

- Undertake a pre-construction walkover survey to confirm if martial eagle breeding territory is present and identify other sensitive breeding species;
- Establish a suitable buffer zones around active martial eagle nests identified (subject to confirmation by survey). The buffer zone should be 3km for turbine placement, and a 1km exclusion where no construction activity will be undertaken (following similar exclusion zones set out in Ralston-Paton, 2017) during the martial eagle breeding season (February – November);
- Undertake pre-construction phase monitoring, focussing on flight activity surveys (Vantage Point surveys) to update the project baseline and inform operational monitoring in line with recommendations in Jenkins et al 2015;
- Undertaken operational monitoring in line with the recommendations in Jenkins et al 2015;
- Operational monitoring will inform adaptive management of the Project, with fatality estimates used to test the predicted impacts in relation to collision mortality. Where mortality of priority species is recorded, the Project will develop additional mitigation measures to reduce collision mortality at relevant turbines;
- Flight activity survey monitoring during the first two years of operation, to be reviewed annually thereafter;
- Carcass monitoring during the first five years of operation, to be reviewed annually thereafter;
- Carcass monitoring must include consideration of searcher efficiency and scavenger removal, in line with recommendations in Jenkins et al, 2015. The results must be used to produce fatality estimates for the Project (in line with Jenkins et al 2015 or more recent approaches such as GenEst (USGS, 2018);
- Annual monitoring reports should be produced as well as interim quarterly reports.

9.3 Noise

- Pre-operation ambient sound level measurements must be collected at three different locations over a period of at least 5 night-times to determine existing ambient sound levels. The data must be used to develop ambient sound levels versus wind speed curves;
- Operational noise measurements should be collected over at least 48 hours during the operation phase (winter period) to ensure that noise levels are less than 45dBA at the representative dwellings falling in the 40 – 45dBA noise contour. The acoustician measuring noise levels can advise whether further measurements are required;

- The developer must investigate any reasonable and valid noise complaint if registered by a receptor staying within 2,000m from the location where construction activities are taking place or from an operational wind turbine;
- The developer must select appropriate mitigation measures to ensure that the total noise levels due to the operation of the turbines are less than 45dBA at all NSDs.

9.4 Social

- The proponent and contractor (s) should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;
- The contractor should provide transport to and from the site on a daily basis for low and semi-skilled construction workers. This will enable the contractor to effectively manage and monitor the movement of construction workers on and off the site;
- Where necessary, the contractors should make the necessary arrangements to enable low and semi-skilled workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks;
- It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site;
- Compensate farmers/ community members at full market related replacement cost for any losses, such as livestock, damage to infrastructure etc. The agreement should be signed before the construction phase commences;
- Contractors appointed by the proponent should provide daily transport for workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties;
- The proponent should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site;
- The proponent should hold contractors liable for compensating farmers in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should be contained in the Code of Conduct to be signed between the proponent, the contractors and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities;
- Contractors appointed by the proponent must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms;
- Contractors appointed by the proponent must ensure that construction workers who are found guilty of trespassing, stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation; and
- The housing of construction workers on the site should be limited to security personnel.

The full EMPr is attached to this Report as Appendix E.

10. CONCLUSION

10.1 Summary of Proposed Changes

Moyeng Energy has applied to amend the existing wind energy facility projects Environmental Authorisation (DEFF Reference: 12/12/20/1582). The proposed amendments are set out in Table 10-1.

Table 10-1 Summary of proposed changes

Aspect	Current	Requested Amendment
Validity of EA	February 2021	February 2026
Output Capacity	129MW	140MW
Location of Turbines	35 Turbines	Removal of turbine locations 32 & 33
Turbine footprint	15x15m	25x25m
Hub Height	120m	130m
Rotor Diameter	126m	170m
Tower	Steel	Not restricted to steel

Specialists who were part of the original EIA process were requested to comment on the proposed amendments. A summary of their conclusions is presented in Table 10-2.

Table 10-2 Summary of Changes to Impacts and Mitigations Measures

Aspect	Change to Impacts	Change to Mitigation
Flora and Fauna		
Validity of EA	Neutral	None
Output Capacity	Positive	None
Number of Turbines	Positive	None
Turbine Footprint	Neutral	None
Hub Height	Neutral	None
Rotor Diameter	Neutral	None
Turbine Tower Material	Neutral	None
OVERALL CHANGE	**Positive**	**Described in Section 9**
Avifauna		
Validity of EA	Neutral	None
Output Capacity	Positive	None
Number of Turbines	Positive	None
Turbine footprint	Neutral	Described in Section 9
Hub Height	Neutral	None
Rotor Diameter	Neutral	None
Tower	Neutral	None
OVERALL CHANGE	**Positive**	**Described in Section 9**
Geology		
Validity of EA	Neutral	None
Output Capacity	Neutral	None
Number of Turbines	Positive	None

Aspect	Change to Impacts	Change to Mitigation
Turbine footprint	Neutral	None
Hub Height	Neutral	None
Rotor Diameter	Neutral	None
Tower	Neutral	None
OVERALL CHANGE	**Positive**	**None**
	Heritage	
Validity of EA	Neutral	None
Output Capacity	Positive	None
Number of Turbines	Positive	None
Turbine footprint	Neutral	None
Hub Height	Neutral	None
Rotor Diameter	Neutral	None
Tower	Neutral	None
OVERALL CHANGE	**Neutral**	**None**
	Visual	
Validity of EA	Neutral	None
Output Capacity	Neutral	None
Number of Turbines	Neutral	None
Turbine footprint	Neutral	None
Hub Height	Negative	None
Rotor Diameter	Neutral	None
Tower	Neutral	None
OVERALL CHANGE	**Negative (low significance)**	**None**
	Noise	
Validity of EA	Neutral	None
Output Capacity	Neutral	None
Number of Turbines	Positive	None
Turbine footprint	Neutral	None
Hub Height	Neutral	None
Rotor Diameter	Neutral	None
Tower	Neutral	None
OVERALL CHANGE	**Neutral**	**Described in Section 9**
	Social	
Validity of EA	Neutral	None
Output Capacity	Positive	None
Number of Turbines	Positive	None
Turbine footprint	Neutral	None
Hub Height	Neutral	None
Rotor Diameter	Neutral	None
Tower	Neutral	None
OVERALL CHANGE	**Positive**	**Described in Section 9**

10.2 Advantages and Disadvantages of proposed Changes

The advantages and disadvantages associated with the proposed project are highlighted below.

10.2.1 Advantages of the proposed change

The proposed project (with amendments) will have the following advantages:

- The larger output generating capacity will help bridge the gap between demand and supply of electricity;
- The increase in the validity of the EA means that the proposed facility will be available for REIPP Procurement Programme bidding;
- A reduction in the amount of wind turbines will require less clearance for turbine foundations;
- It will create a comprehensive long term solution that will cater for future demands without the need to construct new power lines in the same area;
- The construction facility will result in the job creation during the construction and operation phases;
- The potential impact on bird species, in particular on pelicans, will be reduced as two of the turbine locations with the highest number of 'High Risk Flights' were removed from the revised development proposals;
- The removal of certain turbine positions has reduced the potential interaction with martial eagles, or other species, hunting over these areas or using updrafts from the slopes;
- The updated assessments, as per this EA Amendment Report (and associated specialist assessments) means that the latest policies and guidelines have been considered and incorporated into the EA; and
- In addition, electrification has significant positive benefits from a socio-economic perspective. The provision of electricity leads to many social benefits for organs of state, individuals, industries and communities.

10.2.2 Disadvantages of the proposed change

The disadvantages of the proposed change are as follows:

- The height and rotor diameter may have a slighter increased visual impact, however, as highlighted by the Visual specialist the difference in impact significance will be minor.

10.3 Recommendations

This report describes the methods used, the findings of specialist studies, proposed amendments to the EMP and any recommendations of the EAP. This report has been compiled to make this information available to I&APs for review prior to the submission of the final report to DEFF, in order to promote transparent and informed decision-making. A thorough PPP is being conducted and all I&APs will be recognised and engaged, their inputs contributing to an enhanced project.

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APPENDIX A EXISITNG ENVIRONMENTAL AUTHORISATIONS

APPENDIX B RELEVANT DECLARATIONS

APPENDIX C ORIGINAL SPECIALSIT STUDIES

APPENDIX D UPDATED SPECIALIST STUDIES

APPENDIX E ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT (EMPR)

APPENDIX F PUBLIC PARTICIPATION MATERIAL

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