



SOUTH AFRICA MAINSTREAM RENEWABLE POWER DEVELOPMENTS (PTY) LTD

**Proposed Construction of the
Dwarsrug Wind Farm near
Loeriesfontein, Northern Cape
Province**

**Draft Environmental Authorisation (EA)
Amendment Assessment Report**

DEA Reference Number: 14/12/16/3/3/2/690/AM2
Issue Date: 27 September 2019
Version No.: 1
Project No.: 15659

Date:	27 September 2019
Document Title:	Proposed Construction of the Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province – Draft Environmental Authorisation (EA) Amendment Assessment Report
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SOUTH AFRICA MAINSTREAM RENEWABLE POWER DEVELOPMENTS (PTY) LTD

PROPOSED CONSTRUCTION OF THE DWARSRUG WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

DRAFT ENVIRONMENTAL AUTHORISATION (EA) AMENDMENT ASSESSMENT REPORT

Executive Summary

South Africa Mainstream Renewable Power Developments (Pty) Ltd (hereafter referred to as Mainstream) was issued with an Environmental Authorisation (EA) for the proposed construction of the 140MW Dwarsrug Wind Energy Facility (WEF), near Loeriesfontein in the Northern Cape Province. Authorisation was granted on 28 September 2015, by way of EA Reference No 14/12/16/3/3/2/690 (**Appendix A**), and subsequently amended on 12 October 2015 (14/12/16/3/3/2/690/AM1). The proposed WEF is located within the Hantam Local Municipality, approximately 60km north of Loeriesfontein, in the Northern Cape Province.

Mainstream is now proposing to submit a Part 2 Amendment Application to allow for amendments to the turbine specifications as assessed in the original EIA for the Dwarsrug WEF to allow for greater project efficiency and viability. The proposed amendments are as follows:

- Increased turbine hub height: from 150m up to 200m;
- Increased rotor diameter: from 150m to up to 200m.

Accordingly, Mainstream has appointed SiVEST to act as the independent Environmental Assessment Practitioner (EAP) to undertake the Part 2 Amendment process as required in terms of Regulation 32 of GN R. 982. This amendment report has thus been compiled in accordance with the provisions of Regulation 32 (1) of the EIA Regulations 2014, (as amended).

As part of the original EIA process for the proposed Dwarsrug WEF and associated infrastructure undertaken in 2015, the following specialist studies were undertaken:

- Biodiversity (including fauna and flora) Assessment;
- Avifaunal Assessment;
- Bat Assessment;
- Surface Water Impact Assessment;
- Agricultural Potential and Soils Assessment;
- Noise Impact Assessment;
- Visual Impact Assessment;
- Heritage and Palaeontology Assessment; and
- Socio-economic Impact Assessment.

The EIA process and above-mentioned associated specialist studies considered the impacts of turbines with a maximum hub height of 150m and with a maximum rotor diameter of 150m. Each of these

specialist studies was investigated in order to ascertain if further input would be required in respect of the above mentioned proposed amendments. Accordingly, specialists were commissioned to assess the impacts of the proposed amendments in respect of the following:

- Avifauna;
- Bats;
- Noise;
- Visual.

Although the specialist assessments did not identify any new environmental risks or impacts, it was found that the proposed amendments could result in a potential increase in the significance of negative impacts in respect of avifauna and bats. Specialist studies did however determine that the potential negative impacts resulting from the proposed amendments would remain unchanged with the implementation of specific new mitigation measures. Impacts remain unchanged in respect of noise and visual.

The proposed WEF layout has been refined to incorporate the recommendations and mitigation measures provided by the Avifaunal and Bat specialists. This has resulted in a reduction in the size of the buildable area and also a reduction in the number of turbines from 70 to 44 turbines.

The advantages and disadvantages of the proposed amendment were explored to provide an indication of the potential benefits and drawbacks. Based on the feedback received from the specialists, it is evident that the advantages outweigh the disadvantages, mainly due to the fact that the larger turbines may reduce the total number of turbines required to generate the 140MW output capacity.

An application to amend the EA according to the above-mentioned proposed amendments was submitted to the DEA on 12 August 2019. All affected landowners, as well as the relevant provincial authority, were notified about the EA Amendment Application which was submitted (**Appendix D6**). The Department subsequently acknowledged having received the application on 28 August 2019 and assigned the following reference number for the amendment process: 14/12/16/3/3/2/690/AM2.

A Public Participation Process (PPP) as required in terms of Chapter 6 of the EIA Regulations, 2014 (as amended) is being conducted in respect of the Part 2 Amendment application for the Dwarsrug WEF: This includes:

- Notification of affected landowners and Provincial Authority;
- Notification of potential Interested and Affected Parties (I&APs) by way of newspaper advertisements and site notices;
- The Draft EA Amendment Assessment Report has been made available on SIVEST's website to all I&APs, key stakeholders and Organs of State (OoS) / Authorities for comment and review for a period of 30 days;

All comments received throughout the EA amendment process will also be included in the Comments and Response Report (C&RR).

In light of the above, it is concluded that the EA should be amended in line with the specifications as proposed and that the increased risks and impacts identified can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.

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DEVELOPMENTS (PTY) LTD**

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ASSESSMENT REPORT**

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GLOSSARY OF TERMS

ABBREVIATIONS

ATNS	- Air Traffic Navigation Services
C&RR	- Comments and Response Report
CV	- Curriculum Vitae
DAFF	- Department of Agriculture, Forestry and Fisheries
DEA	- Department of Environmental Affairs
DMR	- Department of Mineral Resources
DoE	- Department of Energy
DWS	- Department of Water & Sanitation
EA	- Environmental Authorisation
EAP	- Environmental Assessment Practitioner
ECP	- Emissions Control Plan
EIA	- Environmental Impact Assessment
EIAr	- Environmental Impact Assessment Report
EMC	- Electromagnetic Compatibility
EMI	- Electromagnetic Interference
EMPr	- Environmental Management Programme
ESA	- Early Stone Age
EWT	- Endangered Wildlife Trust
FEIAr	- Final Environmental Impact Assessment Report
GIS	- Geographic Information System
GN	- Government Notice
GPS	- Global Positioning System
HIA	- Heritage Impact Assessment
I&AP(s)	- Interested and Affected Parties
IPP(s)	- Independent Power Producers
KM	- Kilometre(s)
M	- Metres
MSA	- Middle Stone Age
MW	- Megawatt
NCR	- National Noise Control Regulations
NC DENC	- Northern Cape Department of Environment and Nature Conservation
NEMA	- National Environmental Management Act (Act No. 107 of 1998)
NSD	- Noise Sensitive Development
OoS	- Organs of State
RE	- Renewable Energy
REIPPPP	- Renewable Energy Independent Power Producer Procurement Programme
PPA	- Power Purchase Agreement
PPP	- Public Participation Process
SA	- South Africa
SA CAA	- South African Civil Aviation Authority
SAHRA	- South African Heritage Resources Agency
SANRAL	- South African National Roads Agency SOC Limited

SKA - Square Kilometre Array
VIA - Visual Impact Assessment
WEF - Wind Energy Facility
WESSA - Wildlife & Environment Society of South Africa
WTG - Wind Turbine Generator

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1 INTRODUCTION

South Africa Mainstream Renewable Power Developments (Pty) Ltd (hereafter referred to as Mainstream) was issued with an Environmental Authorisation (EA) for the proposed construction of the 140MW Dwarsrug Wind Farm, near Loeriesfontein in the Northern Cape Province. Authorisation was granted on 28 September 2015, by way of EA Reference No 14/12/16/3/3/2/690 (Appendix A), and subsequently amended on 12 October 2015 (14/12/16/3/3/2/690/AM1) (Appendix A).

Although no turbine specifications were included in the EA, the Environmental Impact Assessment (EIA) and associated specialist studies considered the impacts of turbines with hub heights of up to 150m and rotor diameters of up to 150m. In light of advancements in wind turbine technology, Mainstream is proposing amendments to the turbine specifications as assessed for the Dwarsrug WEF to allow for greater project efficiency and viability. The proposed amendments are as follows:

- Increased turbine hub height: from 150m to up to 200m;
- Increased rotor diameter: from 150m to up to 200m.

The increased rotor diameter and tower hub height would result in a maximum tip height of 300m. Although other authorised elements of the project, such as the total output capacity and the associated infrastructure will remain unchanged, the number of turbines will change in accordance with the findings of the specialist studies. As such, the proposed amendments may be construed as a change in the scope of the EA and may result in changes in the associated impacts, thus requiring an amendment application in terms of Part 2 of Chapter 5 of the EIA Regulations 2014, (as amended).

Accordingly, Mainstream has appointed SiVEST to act as the independent EAP to undertake the Part 2 Amendment process as required in terms of Regulation 32 of GN R. 982. This amendment report has thus 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 will be 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 Environmental Affairs (DEA) in-

line with legislation (refer to **Appendix B**). Comments received will be addressed and incorporated into the Final EA Amendment Assessment Report for submission to the DEA.

1.1 Expertise of Environmental Assessment Practitioner (EAP)

SiVEST Environmental Division has considerable experience in the undertaking of EIA and Amendment Application processes. Staff and specialists who were involved in this Amendment Application process and contributed to the compilation of this report are detailed in **Table 1** below.

Table 1: Project Team

Name and Organisation	Role
Andrea Gibb – SiVEST SA (Pty) Ltd	Project Coordinator
Stephan Jacobs – SiVEST SA (Pty) Ltd	Environmental Assessment Practitioner (EAP)
Kerry Schwartz – SiVEST SA (Pty) Ltd	Environmental Consultant / GIS and Mapping
Hlengiwe Ntuli – SiVEST SA (Pty) Ltd	Public Participation Consultant
Chris van Rooyen – Chris van Rooyen Consulting	Avifaunal Specialist
Stephanie Dippenaar – Stephanie Dippenaar Consulting	Bat Specialist
Mornè de Jager – Enviro Acoustic Research	Noise Specialist
Kerry Schwartz & Andrea Gibb - SiVEST SA (Pty) Ltd	Visual Specialist

As per the requirements of the EIA Regulations 2014, (as amended), the details and level of expertise of the person who prepared the EA Amendment Assessment Report are provided in **Table 2** below. CVs for each team member are provided in **Appendix F**.

Table 2: Expertise of the EAP

Environmental Practitioner	Stephan Jacobs
Contact Details	stephani@sivest.co.za
Qualifications	B.Sc. Environmental Sciences (undergraduate) and B.Sc. (Hons) Environmental Management and Analysis
Professional Affiliations	IAIAsa (International Association for Impact Assessment)
Expertise	Stephan joined SiVEST in May 2015 and holds the position of Environmental Consultant in the Johannesburg and Pretoria offices. Stephan specialises in the field of Environmental Management and has been extensively involved in Environmental Impact Assessment (EIA) and Basic Assessment (BA) processes for various types of projects / developments, particularly energy generation and electrical distribution projects. Stephan thus has vast experience with regards to the compilation of EIAs and BAs. Additionally, Stephan has extensive experience in undertaking public participation and stakeholder engagement processes. Stephan has also assisted extensively in the undertaking of fieldwork and the compilation of reports for specialist studies such as Surface Water and Visual

	Impact Assessments. Stephan also has experience in Environmental Compliance and Auditing and has acted as an Environmental Control Officer (ECO) for several infrastructure projects.
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2 PROJECT OVERVIEW

2.1 Project Location

The proposed WEF is located within the Hantam Local Municipality, approximately 60km north of Loeriesfontein, in the Northern Cape Province. The WEF project includes the following farms:

- Remainder of Farm Brak Pan No. 212;
- Stink puts North No. 229.

The layout assessed in the Final Environmental Impact Assessment Report (FEIAR) is indicated in **Figure 1**.

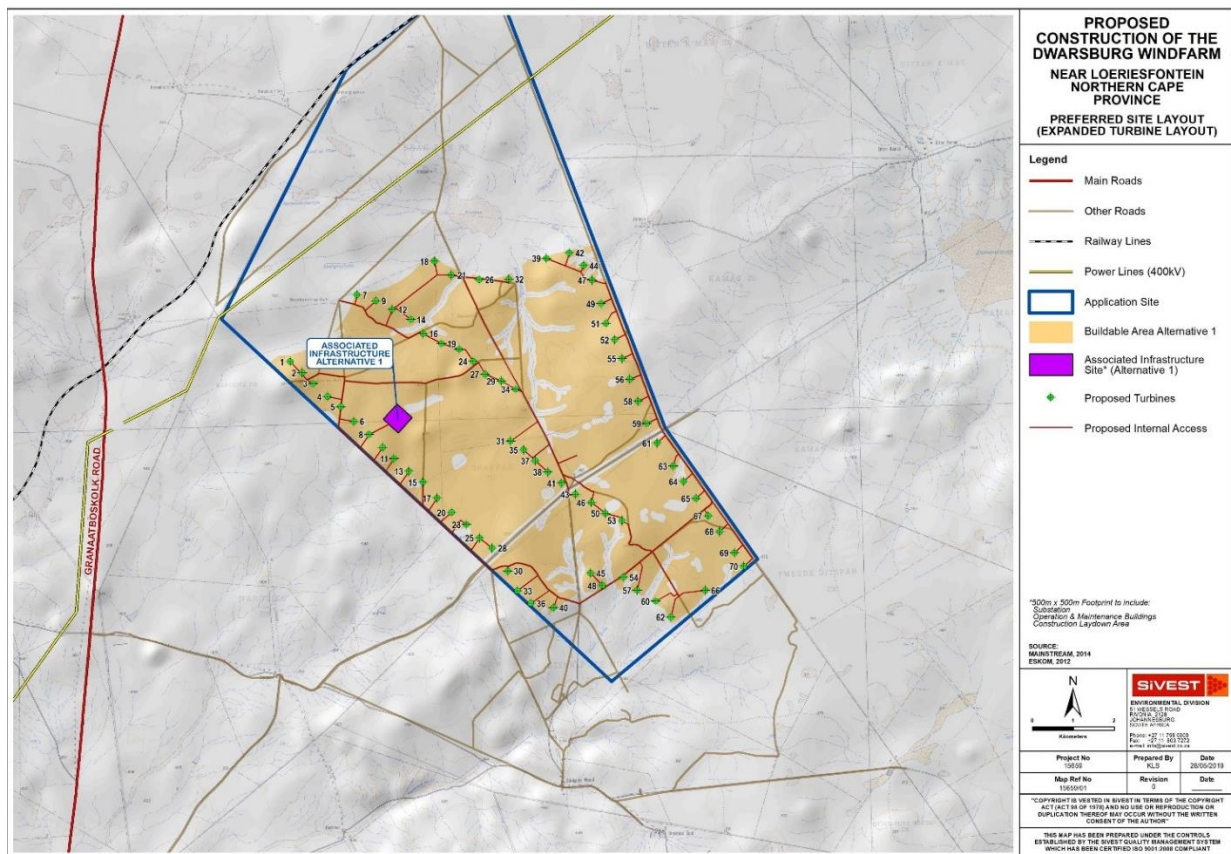


Figure 1: Layout Assessed in FEIAR

As per Condition 13 of the EA dated 28 September 2015, the above layout has not been approved. The final development layout map must be made available for comments and the holder of the EA must consider such comments and thereafter submit the final development layout to the DEA for written approval prior to commencement of the activity. The final development layout will be determined during the detailed design phase once the project has been awarded preferred bidder status. As such, this amendment process does not cover obtaining approval of the development layout.

2.2 Authorised Project Components

In terms of the EA for the Dwarsrug WEF and associated infrastructure dated 28 September 2015, (DEA Ref No 14/12/16/3/3/2/690), the following components were authorized:

- A WEF comprising a maximum of 70 wind turbines with a total output capacity of 140MW;
- Electrical connections;
- Substation;
- Internal roads;
- Temporary construction area;
- Borrow pits;
- Buildings;
- Other associated on-site infrastructure including fencing, linking station (if required) and water treatment facility (if required);
- A 132kV power line with a length of up to 15km connecting the WEF with the national distribution network at Helios MTS, and
- An access road between 8m and 10m wide.

2.3 Listed Activities

As per the EA for the Dwarsrug Wind Farm (DEA Reference No 14/12/16/3/3/2/690) the following activities indicated in Listing Notice 1, Listing Notice 2 and Listing Notice 3 (GN R. 544, 545 and 546) were authorised. These activities were authorised in terms of the National Environmental Management Act (NEMA) EIA 2010 Regulations which were applicable at the time of the original EA.

Table 3: Authorised Listed activities in terms of the NEMA Regulations

Listed Activities	Activity / Project description
<p><i>GN R. 544 Item 10</i></p> <p><i>“The construction of facilities or infrastructure for the transmission and distribution of electricity-</i></p> <p><i>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.”</i></p>	<p>A 132 kV power line and an on-site 33/132kV substation are required to connect the wind farm to the grid. The power line would be located outside of an urban area.</p>
<p><i>GN R. 544 Item 11</i></p> <p><i>“The construction of:</i></p> <p><i>(x) buildings exceeding 50 square metres in size; or</i></p> <p><i>(xi) infrastructure or structures covering 50 square metres or more</i></p> <p><i>where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse.”</i></p>	<p>According to the detailed surface water assessment undertaken during the EIA phase a total of 1213 individual drainage line segments, 7 watercourses, and 34 wetlands were identified within the development site. Although these were taken into account and avoided when determining the buildable area within the development site, construction activities will still take place within 32m of these water features. The administration and warehouse buildings will have a footprint of approximately 5000 m². In addition, each turbine will have a hard standing area of approximately 400m².</p>

Listed Activities	Activity / Project description
<p><i>GN R. 544 Item 18</i></p> <p><i>“The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from</i></p> <p><i>(i) a watercourse.”</i></p>	<p>According to the detailed surface water assessment undertaken during the EIA phase a total of 1213 individual drainage line segments, 7 watercourses, and 34 wetlands were identified within the development site and were taken into account and avoided when determining the buildable area. In order to reduce the environmental impact, the proposed access roads to the site and the internal access roads and cables were positioned to follow the existing roads where possible. These existing access roads traverse some of the identified surface water features. During the construction phase of the access roads and cables, soil may therefore be removed from watercourses.</p>
<p><i>GN R. 544 Item 22</i></p> <p><i>“The construction of a road outside urban areas</i></p> <p><i>(ii) where no reserve exists where the road is wider than 8 metres”</i></p>	<p>Internal access roads that are between 8 and 10m wide will be constructed. In some sections the road may need to be as wide as 12 meters at certain corners to accommodate the turning circle of the extended trucks transporting the turbine tower sections and turbine blades. Laybys may need to go up to 15m, but this will be limited.</p>
<p><i>GN R. 544 Item 47</i></p> <p><i>“The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre -</i></p> <p><i>(i) where the existing reserve is wider than 13,5 meters; or</i></p> <p><i>(ii) where no reserve exists, where the existing road is wider than 8 metres –</i></p> <p><i>excluding widening or lengthening occurring inside urban areas.”</i></p>	<p>An existing access road from the Granaatboskolk road will need to be upgraded and widened to provide access to the site. In some sections the road may need to be as wide as 12 meters at certain corners to accommodate the turning circle of the extended trucks transporting the turbine tower sections and turbine blades. Laybys may need to go up to 15m, but this will be limited.</p>
<p><i>GN R. 545 Item 1</i></p> <p><i>“The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.”</i></p>	<p>It is proposed that a Wind Farm with a generation capacity of approximately 140MW will be constructed.</p>
<p><i>GN R. 545 Item 15</i></p> <p><i>Physical alteration of undeveloped, vacant or derelict land for residential, retail, commercial, recreational, industrial or institutional use where the total area to be transformed is 20 hectares or more;</i></p> <p><i>except where such physical alteration takes place for</i></p> <p><i>(a) Linear development activities; or</i></p>	<p>The proposed development will transform undeveloped, vacant or derelict land to industrial use (wind farm) and the total area to be transformed will be more than 20 ha. A maximum buildable area of 5210.045 ha has been identified, and the actual cumulative footprint covered by the hard standing area of all the turbines (approximately 70), substation site and</p>

Listed Activities	Activity / Project description
(b) <i>Agriculture or afforestation where the activity 16 in this schedule will apply</i>	administration and warehouse buildings is approximately 21 ha.
<p>GN R. 546 Item 19</p> <p><i>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</i></p> <p>(a) <i>In Northern Cape province:</i></p> <p>(i) <i>Outside urban areas, in:</i></p> <p>(ii) <i>Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined.</i></p>	An existing access road from the Granaatboskolk road will need to be upgraded and widened to provide access to the site. In some sections the road may need to be as wide as 12 meters at certain corners to accommodate the turning circle of the extended trucks transporting the turbine tower sections and turbine blades. According to the detailed surface water assessment undertaken during the EIA phase a total of 1213 individual drainage line segments, 7 watercourses and 34 wetlands were identified within the development site. Both access road alternative 1 and 2 traverse some of the identified surface water features.

As per the EA for the Dwarsrug Wind Farm (DEA Reference No 14/12/16/3/3/2/690), the following additional activities indicated in Listing Notice 1, Listing Notice 2 and Listing Notice 3 (GN R. 983, 984 and 985) were authorised. These activities were authorised in terms of the National Environmental Management Act (NEMA) EIA 2014 Regulations which were promulgated while the original EA was in progress.

Table 4: Authorised Listed activities in terms of the NEMA Regulations

Listed Activities	Activity / Project description
<p>GN R. 983 Item 11</p> <p><i>“The development of facilities or infrastructure for the transmission and distribution of electricity-</i></p> <p>(i) <i>outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kV.”</i></p>	A 132 kV power line and an on-site 33/132kV substation are required to connect the wind farm to the grid. The power line would be located outside of an urban area.
<p>GN R. 983 Item 12</p> <p><i>“The development of -</i></p> <p>(x) <i>buildings exceeding 100 square metres in size; or</i></p> <p>(xii) <i>infrastructure or structures with a physical footprint of 100 square metres or more</i></p> <p><i>where such development occurs –</i></p> <p>c) <i>if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.”</i></p>	According to the detailed surface water assessment undertaken during the EIA phase a total of 1213 individual drainage line segments, 7 watercourses, and 34 wetlands were identified within the development site. Although these were taken into account and avoided when determining the buildable area within the development site, construction activities will still take place within 32m of these water features. The administration and warehouse buildings will have a footprint of approximately 5000 m ² . In addition, each turbine will have a hard standing area of approximately 400m ² .

Listed Activities	Activity / Project description
<p><i>GN R. 983 Item 19</i></p> <p><i>“The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from</i></p> <p><i>(i) a watercourse.”</i></p>	<p>According to the detailed surface water assessment undertaken during the EIA phase a total of 1213 individual drainage line segments, 7 watercourses, and 34 wetlands were identified within the development site and were taken into account and avoided when determining the buildable area. In order to reduce the environmental impact, the proposed access roads to the site and the internal access roads and cables were positioned to follow the existing roads where possible. These existing access roads traverse some of the identified surface water features. During the construction phase of the access roads and cables, soil may therefore be removed from watercourses.</p>
<p><i>GN R. 983 Item 24</i></p> <p><i>“The development of -</i></p> <p><i>(ii) a road with a reserve wider than 13,5 metres, or where no reserve exists where the road is wider than 8 metres”</i></p>	<p>Internal access roads that are between 8 and 10m wide will be constructed. In some sections the road may need to be as wide as 12 meters at certain corners to accommodate the turning circle of the extended trucks transporting the turbine tower sections and turbine blades. Laybys may need to go up to 15m, but this will be limited.</p>
<p><i>GN R. 983 Item 56</i></p> <p><i>“The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre -</i></p> <p><i>(i) where the existing reserve is wider than 13,5 meters; or</i></p> <p><i>(ii) where no reserve exists, where the existing road is wider than 8 metres;</i></p> <p><i>excluding widening or lengthening occurring inside urban areas.”</i></p>	<p>An existing access road from the Granaatboskolk road will need to be upgraded and widened to provide access to the site. In some sections the road may need to be as wide as 12 meters at certain corners to accommodate the turning circle of the extended trucks transporting the turbine tower sections and turbine blades. Laybys may need to go up to 15m, but this will be limited.</p>
<p><i>GN R. 984 Item 1</i></p> <p><i>“The development of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs within an urban area.”</i></p>	<p>It is proposed that a wind farm with a generation capacity of approximately 140MW will be constructed.</p>
<p><i>GN R. 984 Item 15</i></p> <p><i>“The clearance of an area of 20 hectares or more of indigenous vegetation.”</i></p>	<p>The proposed development will transform undeveloped, vacant or derelict land to industrial use (wind farm) and the total area to be transformed will be more than 20 ha. A maximum buildable area of 5210.045 ha has been</p>

Listed Activities	Activity / Project description
	identified, and the actual cumulative footprint covered by the hard standing area of all the turbines (approximately 70), substation site and administration and warehouse buildings is approximately 21 ha.
<p><i>GN R. 985 Item 18</i></p> <p><i>“The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</i></p> <p><i>(a) In Northern Cape province:</i></p> <p><i>(ii) Outside urban areas, in:</i></p> <p><i>(ii) Areas on the watercourse side of the development setback line or within 100 metres from the edge of a watercourse where no such setback line has been determined.”</i></p>	<p>An existing access road from the Granaatboskolk road will need to be upgraded and widened to provide access to the site. In some sections the road may need to be as wide as 12 meters at certain corners to accommodate the turning circle of the extended trucks transporting the turbine tower sections and turbine blades. According to the detailed surface water assessment undertaken during the EIA phase a total of 1213 individual drainage line segments, 7 watercourses and 34 wetlands were identified within the development site. Both access road alternative 1 and 2 traverse some of the identified surface water features.</p>

The proposed amendments will not result in any changes to the authorised activities and will not introduce any new activities.

2.4 Assessment of Environmental Impacts

As part of the original EIA process for the proposed Dwarsrug WEF and associated infrastructure undertaken in 2015, the following specialist studies were undertaken:

- Biodiversity (including fauna and flora) Assessment;
- Avifaunal Assessment;
- Bat Assessment;
- Surface Water Impact Assessment;
- Agricultural Potential and Soils Assessment;
- Noise Impact Assessment;
- Visual Impact Assessment;
- Heritage and Palaeontology Assessment; and
- Socio-economic Impact Assessment.

It should be noted that the EIA process and above-mentioned associated specialist studies considered the impacts of turbines with maximum hub heights of 150m and with maximum rotor diameter of 150m. Impacts identified in the specialist reports are summarised in the tables below.

Table 5: Original Rating of Impacts during construction of the proposed WEF and associated infrastructure

Specialist Study	Impact	Pre-Mitigation Rating	Post Mitigation Rating
Biodiversity	Vegetation clearing for construction of WEF and associated infrastructure will impact vegetation and protected or listed plant species.	Medium (-)	Medium (-)
	Vegetation clearing, the use of heavy machinery and human presence at the site during construction is likely to negatively affect resident fauna.	Medium (-)	Medium (-)
	Disturbance created during construction will leave the disturbed areas vulnerable to erosion, while any topsoil or other waste or storage dumps will also pose a risk.	Medium (-)	Low (-)
Avifauna	Displacement of priority species due to disturbance during construction phase.	Medium (-)	Medium (-)
	Displacement of priority species due to habitat transformation during construction phase.	Low (-)	Low (-)
Bats	Bat foraging habitat destruction during construction.	Low (-)	Low (1)
	Impacts of artificial lighting at night on insect prey composition, bat foraging dynamics and species diversity.	Low (-)	Low (-)
Surface Water	Impacts on surface water resources include: <ul style="list-style-type: none"> ▪ Compaction impacts due to temporary structures & vehicle movement. ▪ Degradation of surface water resources; ▪ Contamination and pollution of surface water from stored oils, fuels and other hazardous substances. ▪ Erosion and sedimentation impacts as well as vegetation loss resulting from the clearance/removal of vegetation. 	Low (-)	Low (-)
	Degradation of surface water resources as a result of vehicles crossing or entering these features.	Low (-)	Low (-)
	Pollution and contamination impacts resulting from oil leaks from construction vehicles and machinery.	Low (-)	Low (-)
	Sedimentation and erosion impacts may occur where foundations for wind turbines and associated hardstands are established in close proximity to, or within the buffer zones of surface water resources.	Low (-)	Low (-)
	Impacts associated with general access into surface water resources, including: <ul style="list-style-type: none"> ▪ Destruction of surface water resources by construction machinery. 	Low (-)	Low (1)

Specialist Study	Impact	Pre-Mitigation Rating	Post Mitigation Rating
	<ul style="list-style-type: none"> ▪ Use of surface water resources for sanitary facilities and ablutions. ▪ Dumping of materials, waste and litter into surface water resources. 		
	Increased storm water run-off, erosion and sedimentation impacts resulting from vegetation clearance.	Low (-)	Low (-1)
	Impacts of degradation resulting from the construction of roads through surface water resources.	High (-)	High (-)
Agricultural Potential and Soils	Loss of agricultural land use.	Low (-)	N/A
	Generation of additional land use income.	Low (+)	N/A
	Increased security against stock theft.	Low (+)	N/A
	Soil erosion resulting from hard surfaces, access roads and disturbance of surface cover.	Low (-)	Low (-)
	Loss of topsoil resulting from soil profile disturbance (levelling, excavations, disposal of spoils from excavations etc).	Low (-)	Low (-)
	Degradation of veld vegetation beyond the direct development footprint.	Low (-)	Low (-)
Noise	Increased noise levels at receptors dwelling.	Low (-)	N/A
Visual	<p>Potential visual impacts from construction activities include:</p> <ul style="list-style-type: none"> ▪ Alteration of the natural character of the study area and exposure of potentially sensitive visual receptors to visual impacts associated with the construction phase. ▪ Perception of the construction activities as an unwelcome visual intrusion, particularly in more natural undisturbed settings. 	Low (-)	Low (-)
Heritage	Impacts on palaeontological sensitive rock formations.	High (-)	Low (-)
	Impacts on Stone Age find spots and sites.	Low (-)	Low (-)
	Impacts on historical structures.	Low (-)	Low (-)
	Impacts on unidentified heritage structures.	Medium (-)	Low (-)
Socio-Economic	Impacts on economic production.	High (+)	High (+)
	Impacts on regional GDP.	High (+)	High (+)
	Impacts on employment.	High (+)	High (+)
	Impacts on household income.	High (+)	High (+)
	Impacts on skills development.	Medium (+)	Medium (+)
	Impacts on Government Revenue.	Low (+)	Low (+)
	Impacts on agricultural activities in zone of influence.	Low (-)	Low (-)

Specialist Study	Impact	Pre-Mitigation Rating	Post Mitigation Rating
	Impacts on demographics.	Medium (-)	Low (-)
	Impacts on social pathologies.	Medium (-)	Medium (-)
	Impacts on sense of place, living and working conditions.	Low (-)	Low (-)
	Impacts on basic services and social and economic infrastructure.	Medium (-)	Medium (-)

Table 6: Original Rating of Impacts during operation of the proposed WEF and associated infrastructure

Specialist Study	Impact	Pre-Mitigation Rating	Post Mitigation Rating
Biodiversity	Disturbance created during construction will leave the site vulnerable to alien plant invasion with may affected biodiversity and ecosystem services provision.	Low (-)	Low (-)
	Disturbance created during construction will leave the site vulnerable to erosion for some year following construction.	Medium (-)	Low (-)
	The presence and operation of the facility is likely to impact some resident fauna.	Medium (-)	Low (-)
Avifauna	Collisions of priority species with the turbines in the operational phase.	Low (-)	Low (-)
Bats	Impacts of artificial lighting at night on insect prey composition, bat foraging dynamics and species diversity.	Low (-)	Low (-)
	Bat mortalities due to direct blade impact or barotrauma during foraging activities.	Medium (-)	Low (-)
	Change of species composition due to artificial roosting space provided by building roofs and overhangs.	Medium (-)	Low (-)
Surface Water	Impacts of storm-water run-off associated with substation and operation control buildings.	Low (-)	Low (-)
	Impacts of vehicular activity associated with service roads.	Medium (-)	Medium (-)
Agricultural Potential and Soils	Generation of additional land use income	Low (+)	N/A
	Increased security against stock theft.	Low (+)	N/A
	Soil erosion resulting from hard surfaces, access roads and disturbance of surface cover.	Low (-)	Low (-)
Noise	Increased noise levels at receptors dwelling.	Low (-)	N/A
Visual	Potential visual impacts from the WEF and associated infrastructure include:	Medium (-)	Medium (-)

	<ul style="list-style-type: none"> ▪ Alteration of the natural character of the study area and exposure of potentially sensitive visual receptors to visual impacts. ▪ Perception of the development as an unwelcome visual intrusion, particularly in more natural undisturbed settings. 		
Heritage	No impacts during operation.	N/A	N/A
Socio-Economic	Impacts on economic production.	Medium (+)	Medium (+)
	Impacts on regional GDP.	Medium (+)	Medium (+)
	Impacts on employment.	Medium (+)	Medium (+)
	Impacts on household income.	Medium (+)	Medium (+)
	Impacts on skills development.	Low (+)	Low (+)
	Impacts on Government Revenue.	Low (+)	Low (+)
	Impacts on SED and ED initiatives.	Medium (+)	Medium (+)
	Impacts on property and land value.	Low (+)	Low (+)

3 PROPOSED AMENDMENTS

3.1 Changes to Authorised Elements of the Project

Although no turbine specifications were included in the EA, the Environmental Impact Assessment (EIA) and associated specialist studies considered the impacts of turbines with hub heights of up to 150m and rotor diameters of up to 150m. Mainstream is proposing amendments to these turbine specifications to allow for greater project efficiency and viability. The proposed amendments are as follows:

- Increased turbine hub height: from 150m up to 200m;
- Increased rotor diameter: from 150m up to 200m.

Other authorised elements of the project such as the total output capacity (140MW) and the associated infrastructure remain unchanged.

The increased rotor diameter and tower hub height would result in a maximum tip height of 300m, an increase of some 75m from that which was assessed in the EIA and the associated specialist studies. These new turbine specifications could potentially change the impacts previously identified and result in a reduction in the number of turbines.

Accordingly, where necessary, the specialists have been asked to re-evaluate the findings of their original reports in light of the proposed new turbine specifications.

An additional amendment is included in the application, this being an amendment to the contact details for the holder of the EA. This is however merely an administrative amendment and does not require any further assessment.

3.2 Motivation

The turbines available on the market are constantly improving and as new technology becomes available the turbine specifications often change. These modifications mean that what is perceived as the optimal wind turbine option can change because of the following:

- **Improved technology certified and available subsequent to original EA:**
The technology behind all renewable energies is currently advancing at an intense pace and new developments are being brought to the marketplace at very short intervals. Thus, the wind turbine technology has advanced since the undertaking of the EIA for the Dwarsrug Wind Farm and new and improved models are available that the applicant would like to consider in order to optimise the project.
- **Better fit for purpose technology is available today to suit the wind resource of the site:**
More up-to-date turbine models are more efficient, and some are better suited to the native wind conditions on the site. Being in a position where these turbines can be considered will allow for the optimisation of the project driving improved overall efficiency.
- **Larger wind turbine generators require fewer turbines:**
Larger turbines have larger generators per turbine, larger generators per turbine result in fewer turbines which can increase the efficiency, higher energy production and profitability of the overall project. This can also benefit the environment.
- **Market supply constraints for certain turbines including older technology:**
Due to current considerable demand for wind energy across the world the demand for wind turbines is outstripping supply of certain manufacturers and thus waiting times have increased to the degree that projects are having to consider alternative models if their projects are to be implemented timeously.

The main reason for the proposed increase in the hub height and rotor diameter is to ensure that the most efficient wind turbines available on the market can be used at the time of construction. It is however important to note that the final turbine model and specifications will only be determined once the project is selected as a preferred bidder in the Department of Energy’s (DoEs) future Renewable Energy Independent Power Producer Procurement Programme’s (REIPPPP) bidding rounds.

4 IMPACTS RELATED TO PROPOSED AMENDMENTS

In order to ascertain if further input would be required in relation to the above-mentioned proposed amendments, each of the specialist studies conducted during the EIA phase of the development was investigated in terms of its applicability. The following determinations were made:

Table 7: Investigation of EIA Phase Specialist Studies

Agriculture	As the turbines are still within the assessed footprint, the agricultural specialist was commissioned to comment on whether the changes in turbine dimensions will influence their findings. As per the specialist’s comment letter of 20 September 2019 (Appendix C5), no changes in the nature of the impacts were identified.
Avifauna	An avifauna specialist was commissioned to assess the impact of the proposed amendment to the turbine dimensions and the extent to which the amendment

	will change the level or nature of impacts that were previously assessed and authorised.
Bats	A bat specialist was commissioned to assess the impact of the proposed amendment to the turbine dimensions and the extent to which the amendment will change the level or nature of impacts that were previously assessed and authorised.
Biodiversity (fauna and flora)	As the turbines are still within the assessed footprint, the biodiversity specialist was commissioned to comment on whether the changes in turbine dimensions will influence their findings. As per the specialist's comment letter of 20 September 2019 (Appendix C5), no changes in the nature of the impacts were identified.
Heritage	As the turbines are still within the assessed footprint, the heritage specialist was commissioned to comment on whether the changes in turbine dimensions will influence their findings. As per the specialist's comment letter of 20 September 2019 (Appendix C5), no changes in the nature of the impacts were identified.
Noise	A noise specialist was commissioned to assess the impact of the proposed amendment to the turbine dimensions and the extent to which the amendment will change the level or nature of impacts that were previously assessed and authorised.
Socio-Economic	As the proposed amendments are not expected to have an impact from a socio-economic perspective, the socio-economic specialist was commissioned to comment on whether the changes in turbine dimensions will influence their findings. As per the specialist's comment letter of 20 September 2019 (Appendix C5), the proposed amendments will not change the nature of the socio-economic impacts identified during the original study and will not lead to the change in ratings
Surface Water	As the turbines are still within the assessed footprint, the surface water specialist was commissioned to comment on whether the changes in turbine dimensions will influence their findings. As per the specialist's comment letter of 20 September 2019 (Appendix C5), no changes in the nature of the impacts were identified.
Visual	A visual specialist was commissioned to assess the impact of the proposed amendment to the turbine dimensions and the extent to which the amendment will change the level or nature of impacts that were previously assessed and authorised.

A summary of the Specialist's findings commissioned as part of this amendment process is provided below.

4.1 Avifauna Impacts

Chris van Rooyen *et al.* of Chris van Rooyen Consulting were requested to revisit their avifaunal impact assessment of 2014 for the proposed Dwarsrug WEF considering the proposed amendments. The impact which is specifically relevant in this instance is the risk of priority species mortality due to collisions with the turbines in the operational phase. The assessment report is attached as **Appendix C1**.

4.1.1 Re-assessment of Collision Mortality Impact

The avifaunal specialists conducted a re-assessment of the potential collision impact in order to establish if the original pre-mitigation assessment of by Van Rooyen *et al.* (2014) should be revised in light of the proposed new turbine specifications. The increase of 77.7% in rotor swept area per turbine is significant, and unless the number of turbines is reduced, it will result in an increase in the overall collision risk. However, should the number of turbines reduce significantly, it will result in the collision rating remaining unchanged, or even reducing, depending on the extent of the reduction in the number of turbines (see also **Section 4.1.2** below).

Given the significant proposed increase in rotor swept area, it is concluded that the original pre-mitigation impact significance rating of “**low**” for potential collision mortality will not be valid anymore, should the proposed change in the turbine dimensions be applied to the current lay-out of 70 turbines. In that case, a collision risk rating of “**medium**” would be more appropriate.

4.1.2 Revised Mitigation measures

The mitigation measures originally proposed for the Dwarsrug WEF by Van Rooyen *et al.* (2014) need to be revisited in light of two factors:

- The proposed increase in the rotor diameter will result in an increased risk of collisions for priority species (see **Section 4.1.2** above).
- The “Best Practice Guidelines for Avian Monitoring and Impact Mitigation at Proposed Wind Energy Development Sites in Southern Africa”, (Jenkins *et al.* 2011) revised in 2015, requires that either all, or part of the pre-construction monitoring is repeated if there is a time period of three years or more between the data collection and the construction of the wind farm. This re-assessment is necessary in order to take cognisance of any changes in the environment which may affect the risk to avifauna, and to incorporate the latest available knowledge into the assessment of the risks. In order to give effect to this requirement, nest searches were repeated in June 2019 to ensure up to date information on the breeding status of priority species at the proposed Dwarsrug WEF.

Since the original Bird Specialist Study was completed in 2014, the local knowledge with regard to the impacts of wind turbines on avifauna has increased significantly with the experience gained from operational wind farms, see for example (Ralston-Patton *et al.* 2017). This has also resulted in the publication of two new sets of guidelines, one for Cape Vultures (Pfeiffer *et al.* 2018) and one for Verreux’s Eagles (Ralston-Patton 2017), while work is almost finished on new guidelines for Black Harriers. Guidelines for a range of other sensitive species are also planned, including Martial Eagles, as they have proven to be highly vulnerable to wind turbine collisions.

The site contains two Martial Eagle nests on the Aries – Helios 400kV transmission line, which runs through the northern part of the project area. Both nests are used as alternative nests by the pair of eagles, e.g. one nest was active in 2016, and the other in 2019. The average territory size of a large eagle represents an important area which can contribute to conservation planning and should be considered the absolute minimum area for conservation (Ralston-Patton 2017). GPS tracking of Martial Eagles in the Kruger National Park indicates average territory sizes of 110km² (Percy Fitzpatrick Institute 2015), which equates to a 6km circular zone around the nest. Given the proven vulnerability of

the species to wind turbine collisions which is now firmly established, 5-6km should be taken as the minimum turbine-free buffer zone around a Martial Eagle nest¹.

The following revised mitigation measure is proposed to ensure that the post-mitigation significance remains at a “low” level:

- The 2km no turbine buffer zones around the Martial Eagle nests on the Aries – Helios 400kV transmission line should be converted to a 6km minimum turbine zone. Within this area, every effort should be made to restrict the number of turbines to a minimum. Ideally, no turbines should be present within a 5km zone around the nests. Those turbines remaining within the 6km zone should be mitigated through the painting of one blade (black or red), or through an alternative, proven deterrent strategy.

Should the above buffer zones and associated mitigation measures be implemented the post mitigation impact rating would remain unchanged.

4.2 Bat Impacts

The original bat impact assessment, and Bat Monitoring Assessment for the proposed Dwarsrug WEF was undertaken by Animalia Consultants (Pty) Ltd. As these specialists are no longer undertaking bat assessments, Stephanie Dippenaar Consulting was appointed to undertake an assessment of the project amendments with regard to the potential impacts to bats. The assessment report is attached as **Appendix C2**.

The main negative impact of turbines on bats is the encroachment into air space where bats forage or commute. As the proposed increased turbine dimensions will result in a larger rotor swept area and greater overall height per turbine, the bat impact relevant to this amendment is the change in risk of direct collision of bats in flight with moving turbine blades.

4.2.1 Literature Review

Current scientific literature was reviewed to gain insight into the relationship between turbine size and bat mortalities to aid in the assessment of the impacts of greater turbine hub height and rotor diameter. The literature was also reviewed with a view to identifying effective mitigation measures for the relevant impacts.

Given that a greater turbine hub height would increase the height of the lower blade tip from the ground, it was concluded that the risks for lower flying bat species would be reduced. The increased height of the upper-most blade tip and the greater rotor swept area of the larger turbines would however result in an increased mortality risk for open-air high-flying species.

¹ It should be recognised that Martial Eagle territories in an arid environment like Bushmanland are likely to be much larger than in the mesic Lowveld of the Kruger National Park, therefore a 6km turbine free buffer should be seen as an absolute minimum.

4.2.2 Sensitivity Map

The sensitivity map presented during the EIA phase identified areas of moderate bat sensitivity and designated a buffer area of 100m around the demarcated areas. The final EIA report recommended that turbines located within the sensitivity areas and buffers receive priority during the operational monitoring study and also priority for application of mitigation measures if found to be necessary during operation.

Considering the increase in overall height and rotor sweep area for this amendment, the classification of the sensitivity areas as moderate is insufficient for effective protection and conservation of local bat fauna. The sensitivity areas must be upgraded to high sensitivity with a minimum buffer zone of 200 m. High sensitivity entails the full exclusion of turbines from sensitivity areas as well as their buffer zones. Turbine blade tips must also be excluded from entering the buffer areas.

The turbine layout should be approved by a bat specialist upon finalisation of turbine specifications.

4.2.3 Impact Assessment

Section 5 of the final report assesses the impact of Dwarsrug WEF on bats. Of the impacts identified in the EIA, only bat mortalities due to direct blade impact or barotrauma during foraging activities, is relevant to this amendment. The impact was identified as moderate (score of -45) without mitigation and was reduced to low (score of -24) with the mitigation of adhering to the bat sensitivity map.

The only concrete mitigation recommendation from the final EIA report is the micro siting of turbines out of sensitivity areas and the flagging of three turbines encroaching on the delineated sensitivity area/buffer. Section 6 of the final report describes the potential mitigation measures that may be employed on Dwarsrug WEF based on the results of an operational monitoring programme. The final EIA report describes the need for mitigation implementation to be an adaptive management approach that will require turbine mitigation to be implemented immediately and in real time when required. In order to keep the impact rating as low, it is recommended that all turbines are prevented from freewheeling from the start of operation, as bat activity is markedly higher over low wind speed periods. Preventing freewheeling should not affect energy production significantly and will be a significant bat conservation mitigation measure.

Considering the greater turbine dimensions proposed in the amendment application, the impact ratings would remain unchanged from the last assessment, if the following are adhered to:

- Apply the increased 'no-go' sensitivity buffer as described in **Section 4.2.2**;
- A bat specialist approves the final layout;
- All turbines are prevented from freewheeling at all times;
- A maximum of 60 turbines are deployed;
- A post construction bat monitoring programme must be put in place before operation and operational bat monitoring should start when turbines start to operate.

4.2.4 Conclusion

After review of relevant scientific literature and the long-term preconstruction monitoring report, it does seem likely that the requested amendments to the turbine dimensions proposed for the Dwarsrug wind energy facility would increase the negative impacts to bats as identified in the EIA. The risk of mortality

may be decreased for two recorded species (*Eptesicus hottentotus* and *Neoromicia capensis*) flying at lower heights above the ground as the lower blade tip height increases with larger turbine dimensions. However, there is a higher risk of mortality for high flying species (*Tadarida aegyptiaca*) as the rotor swept area and higher blade tip height are increased with larger turbine dimensions. Considering the greater turbine dimensions proposed in the amendment application, the impact ratings would remain unchanged from the last assessment, on condition of the implementation of the increased 'no-go' sensitivity buffer calculation recommended in **Section 4.2.2** of this report, as well as the restriction of freewheeling below cut-in speed, as mentioned in **Section 4.2.3**.

The turbine layout must adhere to the sensitivity areas and buffers; and the layout should be approved by a bat specialist upon finalisation of turbine specifications.

To reduce bat mortality risk, a three-pronged consideration must be used when selecting the appropriate turbine technology for the wind farm:

- Turbine dimensions with a greater hub height (to increase lower blade tip height and reduce collision risk with lower flying species);
- Turbine dimensions with the smallest rotor diameter (to decrease total tip height and reduce collision risk with high flying species); and
- Least number of turbines required to generate the total megawatt output of the facility.

An operational monitoring study must be implemented immediately upon construction of the wind farm and already be in place when turbines are starting to operate. All applicable mitigation measures should be incorporated in the EMPr and mitigation measures recommended by the Bat Specialist during the operational monitoring study must be implemented immediately and in real time.

4.3 Noise Impacts

Morné de Jager of Enviro Acoustic Research (EAR) was requested to revisit his Environmental Noise Impact Assessment (ENIA) conducted in 2014 for the proposed Dwarsrug WEF in light of the proposed amendments. The assessment report is attached as **Appendix C3**.

The revised assessment is based on an increase in the hub height and rotor diameter from 150m up to 200m, and in the absence of any other turbine specifications, assumes a turbine with a sound power emission level 109dBA, this being a worst-case scenario.

All of the proposed wind turbines are further than 2000m from any potential noise-sensitive receptors and even with the higher potential sound power emission level (worst-case of 109 dBA), the maximum projected noise level will be less than 35 dBA at the closest Noise Sensitive Development (NSD).

Because of the **low significance** of the noise impact, changing the wind turbine specifications has no advantages or disadvantages in terms of acoustics. Considering the location of the wind turbines and the potential noise impact, it is my opinion that the change will not increase the significance of the noise impact. A full noise impact assessment with new modeling will not be required and the findings and recommendations as contained in the previous document (report MS-DWEF/ENIA/201411-Rev 0) will still be valid.

4.4 Visual Impacts

SiVEST's in-house visual specialist team has revisited their Visual Impact Assessment (VIA) conducted in 2014 for the proposed Dwarsrug WEF in light of the proposed amendments. The assessment report is attached as **Appendix C4**.

In assessing the proposed amendments, the visual specialist found that the increased height as proposed will increase the visibility of the turbines and extend the area from which the turbines will be visible (viewshed). This will be exacerbated by the lack of natural screening elements in the broader study area resulting from the relatively flat terrain and the prevalence of low shrubland vegetation cover. It is however important to note that visual impacts are only experienced when there are receptors present to experience this impact. The original VIA for this development found that the broader study area is not typically valued for its tourism significance and there is limited human habitation resulting in relatively few potentially sensitive receptors in the area. In light of this and given the relatively remote location of the proposed Dwarsrug Wind Farm, the extended viewshed will not incorporate any additional receptors within the 8km assessment zone.

Visual impacts resulting from the larger turbines would be greatest within a 1km to 2km radius, from where the increased height of the structure would be most noticeable. The VIA for Dwarsrug identified five (5) potentially sensitive receptors within the visual assessment zone, all of which are farmsteads situated more than 2kms from the buildable area. One these receptors is approximately 4km from the buildable area, while the remaining four receptors are located more than 5km from the buildable area. While the larger turbines would be more visible from these receptors, the overall impact is expected to remain largely unchanged from these distances. Although the larger turbines may be visible from some farmhouses outside the 8km assessment zone, at this distance it is likely that the turbines will merge to some degree with the surrounding landscape and as such impacts resulting from the increased turbine height will be minimal.

It should be noted that two WEFs, namely Khobab and Loeriesfontein 2 have recently been developed in relatively close proximity to the proposed Dwarsrug WEF. Each of these developments includes some 61 wind turbines with associated infrastructure as well as 132kV grid connections to Helios Substation. All of this development in combination is resulting in a significant level of transformation of the natural environment in this area which will reduce the significance of visual impacts resulting from the proposed amendments.

The overall impact rating conducted for the Dwarsrug Wind Farm VIA revealed that the proposed wind farm is expected to have a low negative visual impact rating during construction and a medium negative visual impact rating during operation, with relatively few mitigation measures available. In light of the above comments, the increase in the proposed turbine height will not change this impact rating. Furthermore, no additional recommendations or mitigation measures will be required, and all of the mitigation measures set out in the VIA remain valid.

4.5 Summary of Changes in Impact Ratings

It should be noted that none of the specialists identified any changes in the likely impacts during the construction and decommissioning phases of the project resulting from the proposed amendment.

Potential changes in impacts during the operational phase of the project were identified by the Avifaunal and Bat specialists, although in both instances the impact ratings would be reduced and remain unchanged with the implementation of additional mitigation measures. No changes in the impacts were identified by the Noise and Visual specialists.

A summary of the changes is provided in **Table 8** below.

Table 8: Summary of changes in overall impact ratings

Specialist Study	Impact	Original Pre-Mitigation Rating	Original Post Mitigation Rating	Revised Pre-Mitigation Rating	Revised Post-Mitigation Rating
Avifauna	Collisions of priority species with the turbines in the operational phase.	Low (-)	Low (-)	Medium (-)	No change
Bats	Impacts of artificial lighting at night on insect prey composition, bat foraging dynamics and species diversity.	Low (-)	Low (-)	No change	No change
	Bat mortalities due to direct blade impact or barotrauma during foraging activities.	Medium (-)	Low (-)	No change	No change
	Change of species composition due to artificial roosting space provided by building roofs and overhangs.	Medium (-)	Low (-)	No change	No change
Noise	Increased noise levels at receptors dwelling.	Low (-)	N/A	No change	No change
Visual	Potential visual impacts from the WEF and associated infrastructure include: <ul style="list-style-type: none"> ▪ Alteration of the natural character of the study area and exposure of potentially sensitive visual receptors to visual impacts. ▪ Perception of the development as an unwelcome visual intrusion, particularly in more natural undisturbed settings. 	Medium (-)	Medium (-)	No change	No change

5 NEW / REVISED MITIGATION MEASURES

In addition to assessing the impact of the proposed amendment to the turbine dimensions, specialists were requested to provide measures to ensure avoidance, management and mitigation of any impacts

associated with such proposed change and identify any changes required to the EMPr. New and/or revised mitigation measures provided by the specialists are outlined in **Table 9** below.

Table 9: New / Revised mitigation measures identified in respect of the proposed amendments

Specialist Study	New Mitigation Measures
Avifauna	The 2km no turbine buffer zones around the Martial Eagle nests on the Aries – Helios 400kV transmission line should be converted to a 6km minimum turbine zone. Within this area, every effort should be made to restrict the number of turbines to a minimum. Ideally, no turbines should be present within a 5km zone around the nests. Those turbines remaining within the 6km zone should be mitigated through the painting of one blade (black or red), or through an alternative, proven deterrent strategy.
	The revised mitigation measures are subject to a walk-through by the avifaunal specialist prior to the construction commencing, to confirm the location and status of all priority species nests within the area of influence of the wind farm.
Bats	The sensitivity areas must be upgraded to high sensitivity with a minimum buffer zone of 200 m. High sensitivity entails the full exclusion of turbines from sensitivity areas as well as their buffer zones. Turbine blade tips must also be excluded from entering the buffer areas.
	Turbine layouts must adhere to the sensitivity areas and buffers, and the layout should be approved by a bat specialist upon finalisation of turbine specifications.
	All turbines are prevented from freewheeling at all times.
	A maximum of 60 turbines are deployed.
	A post construction bat monitoring programme must be put in place before operation and operational bat monitoring should start when turbines start to operate.
Noise	N/A
Visual	N/A

6 ADVANTAGES / DISADVANTAGES OF THE PROPOSED AMENDMENTS

As required in terms of Section 32(1)(a)(ii) of the 2014 EIA Regulations, (as amended), the advantages and disadvantages of the proposed amendments are outlined in **Table 10** below.

Table 10: Advantages / Disadvantages of the Proposed Amendments

	Advantages	Disadvantages
GENERAL	The proposed increase in hub height and rotor diameter will ensure that the most efficient wind turbines available on the market can be used at the time of construction.	Changes in turbine dimensions may increase environmental impacts (see below).
	Better fit for purpose technology is available today to suit the wind resource of the site, thus allowing for the optimisation of the project, driving improved overall efficiency.	
	Larger turbines have larger generators per turbine and resulting in the need for fewer turbines. This can increase the efficiency, energy production and profitability of the overall project while also benefiting the environment.	
AVIFAUNA	The proposed amendment would be advantageous from a bird impact perspective if the number of turbines is reduced as a result of the amendment, and the revised buffer zone and associated mitigation are implemented.	Should the turbine dimensions increase as proposed, and the number of turbines remain unchanged at 70, it would increase the risk of collisions and it would then be a disadvantage from the bird impact perspective.
BATS	The risk of bat mortality may be decreased for two recorded bat species (<i>Eptesicus hottentotus</i> and <i>Neoromicia capensis</i>) flying at lower heights above the ground as the lower blade tip height increases with larger turbine dimensions.	There is a higher risk of mortality for high flying species (<i>Tadarida aegyptiaca</i>) as the rotor swept area and higher blade tip height are increased with larger turbine dimensions.
NOISE	N/A	N/A
VISUAL	N/A	N/A

7 PUBLIC PARTICIPATION

In terms of Chapter 6 of the EIA Regulations, 2014, (as amended), a Part 2 Amendment Application requires a 30-day Public Participation Process (PPP). Accordingly, the following PPP process has been undertaken for the Dwarsrug WEF:

7.1 Notification of Affected Landowners and Provincial Authority

All affected landowners, as well as the relevant provincial authority, namely the Northern Cape Department of Environment and Nature Conservation (NC DENC), were notified about the EA Amendment Application via email prior to submission of the application to the DEA on 6th August 2019. Proof of these notifications is provided in **Appendix D6**.

7.2 Notification of Potential Interested and Affected Parties (I&AP's)

The advertising process was followed in compliance with Regulation 41 of the EIA Regulations, 2014 (as amended).

Advertisements (in English and Afrikaans) were placed in the “Noordwester” local newspaper on Friday the 13th of September 2019. Proof that the above-mentioned advertisements were placed is provided in **Appendix D2**.

In addition, site notices (in English and Afrikaans) were erected on the boundary of the application site. A copy of the site notices which were erected is provided in **Appendix D1**. Proof of the site notices, (including Global Positioning System (GPS) coordinates) which were erected will be included in the Final EA Amendment Assessment Report.

As I&APs and stakeholders responded to these advertisements, they were registered on the project database and sent all relevant information as the amendment process progressed.

7.3 Comment and Review of Draft EA Amendment Assessment Report

The Draft EA Amendment Assessment Report is being made available on SiVEST's website² to all I&APs, key stakeholders and OoS / Authorities for comment and review for a period of 30 days, from **Friday 27 September 2019 to Monday 28 October 2019**, excluding public holidays. In addition, the key stakeholders / OoS / authorities will be sent electronic copies (on CD) of the Draft Report (including all appendices) during the 30-day comment and review period (see **Section 7.8**).

Written notice was given to all registered I&APs, key stakeholders and OoS / Authorities on the database that the Draft EA Amendment Assessment Report was available for comment and review (**Appendix D1**). Electronic copies (CD) of the report were also distributed on written request. All comments received throughout the EA amendment process (including comments received during the Report's commenting period) will be incorporated into the Final EA Amendment Assessment Report, which will then be submitted to the competent authority (namely the DEA) for decision-making.

² <http://www.sivest.co.za/>, click on Downloads, then browse to the folder '15659 Dwarsrug Amendment'

Additionally, all comments received throughout the EA amendment process will also be included in the Comments and Response Report (C&RR) (**Appendix D5**).

7.4 Stakeholders and I&APs

I&APs, key stakeholder and/or OoS / Authorities, were identified using:

- Email, sms, fax and post notifications to all I&APs key stakeholder and OoS / Authorities on the project database (Proofs included in **Appendix D1**).
- Referrals.

A full database list of registered I&APs, key stakeholder and OoS / Authorities was compiled and is included in **Appendix D3**.

7.5 Announcing the Opportunity to Participate

The opportunity for I&APs, key stakeholder and OoS / Authorities to participate in the EA amendment process was communicated in the following manner:

- All affected landowners, as well as the relevant provincial authority (NC DENC), were notified about the EA Amendment Application via email prior to the application being submitted to the DEA on 6th August 2019 (**Appendix D6**);
- Notification letters, advising of the EA amendment process and comment period were distributed (via email, fax, post and sms) on Friday the 27th of September 2019 (Notification letter included in **Appendix D1**. Remaining notification proof will be included in Final EA Amendment Assessment Report); and
- The Draft EA Amendment Assessment was made available to the public for review on SiVEST's website for a period of 30 days from **Friday the 27th of September 2019 to Monday 28 October 2019** (Proof to be included in Final EA Amendment Assessment Report).

7.6 Proof of Notification

Proof of notification of the I&APs is included in **Appendix D**. More specifically, the types of proofs will be as follows:

- Proof of notification of affected landowners and relevant provincial authority (namely NC DENC) about the EA Amendment Application (**Appendix D6**);
- Site notice text (**Appendix D1**);
- Photographs and GPS Coordinates of site notices (Proof to be included in Final EA Amendment Assessment Report), and
- Proof of advertisements (namely tear-sheets) in the "Noordwester" local newspaper (**Appendix D2**); and
- Correspondence to and from registered I&APs and key stakeholders (**Appendix D4**).

7.7 Comments and Response Report (C&RR)

Issues, comments and concerns raised throughout the EA amendment process (including comments received during the commenting period for the Draft EA Amendment Assessment Report) will be

captured in the Comments and Response Report (CRR) (**Appendix D5**), as and when they are received. The C&RR provides a summary of the issues raised, as well as the responses provided to I&APs, key stakeholders and OoS / Authorities. This information will be used to feed into the evaluation of environmental and social impacts and will also be taken into consideration when finalising the EA Amendment Assessment Report. All comments received to date have been included in the C&RR.

7.8 Distribution to Organs of State (OoS) / Authorities

Table 11 below includes all the key stakeholders / OoS / authorities who will be sent electronic copies (on CD) of the Draft EA Amendment Assessment Report (including all appendices) at the start of the 30-day comment and review period. The report will be accompanied by a cover letter, a copy of which is included in **Appendix D7**. The remaining proofs of distribution (i.e. email notification) will be included in the Final EA Amendment Assessment Report.

It should be noted that all key stakeholders / organs of state / authorities will be contacted near the end of the 30-day comment and review period and will be reminded to submit comments before this period closes. Comments received from key stakeholders / OoS / authorities during the 30-day comment and review period will be incorporated into the Final EA Amendment Assessment Report, which will then be submitted to the competent authority (namely the DEA) for decision-making.

Table 11: Distribution of Draft EA Amendment Assessment Report to OoS

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF THE DWARSRUG WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE						
DISTRIBUTION OF THE DRAFT EA AMENDMENT REPORT TO ORGANS OF STATE FOR COMMENT						
TITLE	SURNAME	NAME	POSITION	POSTAL ADDRESS	EMAIL ADDRESS	DATE OF DISTRIBUTION
HANTAM LOCAL MUNICIPALITY						
Mr	Van Wyk	Riaan	Environmental Officer	Private Bag X14 CALVINIA 8190	municipalmanager@hantam.gov.za vanwykjr@hantam.gov.za	Friday 27 September 2019
NAMAKWA DISTRICT MUNICIPALITY						
Mr	Loubser	Jannie	Manager: Planning	Private Bag X20 SPRINGBOK 8240	janniel@namakwa-dm.gov.za	Friday 27 September 2019
DEPARTMENT OF WATER AND SANITATION (DWS)						
Ms	Makungo	Ester	Environmental Officer	Private Bag X6101 KIMBERLEY 8300	makungoe@dws.gov.za	Friday 27 September 2019
Mr	Mahunonyane	Moses	Director: Institutional Establishment	Private Bag X6101 KIMBERLEY 8300	MahunonyaneM@dws.gov.za	Friday 27 September 2019
NORTHERN CAPE DEPARTMENT AGRICULTURE, LAND REFORM & RURAL DEVELOPMENT						
Mr	Cloete	Alexander		P.O.Box 65 CALVINIA 8190	alexander@hantam.co.za	Friday 27 September 2019
NORTHERN CAPE DEPARTMENT OF TRANSPORT, SAFETY AND LIAISON						
Ms	Vilakazi	Ntobeko	MEC	Private Bag X1368 KIMBERLEY 8300	NEVilakazi@ncpg.gov.za	Friday 27 September 2019
DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES (DAFF)						
Northern Cape Department						
Ms	Mans	Jacoline	Chief Forester	Koelenhof 306 Schroder Street UPINGTON, 8800	jacolinema@daff.gov.za	Friday 27 September 2019
Provincial Department						

**ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF THE DWARSRUG WIND FARM NEAR LOERIESFONTEIN,
NORTHERN CAPE PROVINCE**

DISTRIBUTION OF THE DRAFT EA AMENDMENT REPORT TO ORGANS OF STATE FOR COMMENT

TITLE	SURNAME	NAME	POSITION	POSTAL ADDRESS	EMAIL ADDRESS	DATE OF DISTRIBUTION
Ms	Marubini	Mashudu	Delegate of the Minister	Private Bag X120 PRETORIA 0001	MashuduMa@daff.gov.za	Friday 27 September 2019
Ms	Buthelezi	Thoko	Directorate Land-use & Soil Management - AgriLand Liaison office	Private Bag X120 PRETORIA 0001	Thokob@nda.agric.za	Friday 27 September 2019
NORTHERN CAPE DEPT OF ENVIRONMENT AND NATURE CONSERVATION (NCDENC)						
Mr	Fisher	Brian	Director Environmental Impact Management	Private Bag X86102 KIMBERLEY 8300	bfisher@ncpg.gov.za	Friday 27 September 2019
Mr	Mthombeni	Thulani		Private Bag X86102 KIMBERLEY 8300	tmtho@webmail.co.za	Friday 27 September 2019
DEPARTMENT OF SPORT, ARTS & CULTURE: HERITAGE RESOURCE UNIT						
Provincial - Northern Cape Department						
Mr	Lenyibi	Patrick	Manager: Heritage Resources	Private Bag X5004 KIMBERLEY 8300	plenyibi@ncpg.gov.za	Friday 27 September 2019
SOUTH AFRICAN NATIONAL ROADS AGENCY SOC Ltd (SANRAL) - WESTERN REGION						
Ms	Abrahams	Nicole	Environmental Coordinator	Private Bag X19 BELLVILLE 7535	abrahamsn@nra.co.za	Friday 27 September 2019
NORTHERN CAPE DEPARTMENT OF ROADS AND PUBLIC WORKS						
Mr	Roelofse	Jaco	Director: Planning & Design	PO Box 3132 Kimberley 8300	roelofse.j@vodamail.co.za	Friday 27 September 2019
SOUTH AFRICA HERITAGE RESOURCE AGENCY (SAHRA)						
Ms	Higgitt	Natasha	Heritage Officer: Northern Cape	PO Box 4637 CAPE TOWN 8000	nhiggitt@sahra.org.za	Friday 27 September 2019
DEPARTMENT OF MINERAL RESOURCES (DMR)						

**ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF THE DWARSRUG WIND FARM NEAR LOERIESFONTEIN,
NORTHERN CAPE PROVINCE**

DISTRIBUTION OF THE DRAFT EA AMENDMENT REPORT TO ORGANS OF STATE FOR COMMENT

TITLE	SURNAME	NAME	POSITION	POSTAL ADDRESS	EMAIL ADDRESS	DATE OF DISTRIBUTION
Mr	Ravhogoni	Ntsundeni	Regional Manager	Private Bag x6093 KIMBERLEY 8300	Ntsundeni.Ravhogoni@dmr.gov.za	Friday 27 September 2019
ESKOM						
Mr	Geeringh	John	Chief Planner: Eskom Transmission	PO Box 1091 JOHANNESBURG 2000	GeerinJH@eskom.co.za John.Gheeringh@eskom.co.za	Friday 27 September 2019
SQUARE KILOMETRE ARRAY (SKA)						
Dr	Tiplady	Adriaan	Manager: Site Categorisation	PO Box 522 SAXONWOLD 2132	atiplady@ska.ac.za	Friday 27 September 2019
SA CIVIL AVIATION AUTHORITY (SA CAA)						
Ms	Stoh	Lizell	Obstacle Specialist	Private Bag X73 HALFWAY HOUSE 1685	strohl@caa.co.za	Friday 27 September 2019
AIR TRAFFIC AND NAVIGATION SERVICES (ATNS)						
Ms	Morobane	Johanna	Manager: Corporate Sustainability and Environment	Private Bag X15 KEMPTON PARK 1620	JohannaM@atns.co.za	Friday 27 September 2019
Ms	Masilela	Simphiwe	Obstacle Evaluator	Private Bag X15 KEMPTON PARK 1620	SimphiweM@atns.co.za	Friday 27 September 2019
TRANSNET FREIGHT RAIL						
Mr	Fiff	Sam	Environmental Manager: Freight Rail	PO Box 255 BLOEMFONTEIN 9300	sam.fiff@transnet.net	Friday 27 September 2019
TELKOM						
Ms	Bester	Amanda	Wayleave Officer	Private Bag X20700 BLOEMFONTEIN 9300	WayleaCR@telkom.co.za BesterAD@telkom.co.za	Friday 27 September 2019

**ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF THE DWARSRUG WIND FARM NEAR LOERIESFONTEIN,
NORTHERN CAPE PROVINCE**

DISTRIBUTION OF THE DRAFT EA AMENDMENT REPORT TO ORGANS OF STATE FOR COMMENT

TITLE	SURNAME	NAME	POSITION	POSTAL ADDRESS	EMAIL ADDRESS	DATE OF DISTRIBUTION
Ms	van den Heever	Heleen	Wayleave Officer	Private Bag X20700 BLOEMFONTEIN 9300	WayleaCR@telkom.co.za	Friday 27 September 2019
SENTECH						
Mr	Koegelenberg	Johan	Renewable Projects	Private Bag X06 Honeydew 2040	koegelenbergj@sentech.co.za	Friday 27 September 2019
ENDANGERED WILDLIFE TRUST (EWT)						
Mr	Leeuwner	Lourens	Renewable Energy Project Manager	Private Bag X11, Modderfontein, 1609, Johannesburg	lourensl@ewt.org.za	Friday 27 September 2019
WILDLIFE & ENVIRONMENT SOCIETY OF SOUTH AFRICA (WESSA)						
Mr	Griffiths	Morgan	Environmental Governance Programme Manager	PO Box 12444, Centrahil, Port Elizabeth, 6006, South Africa	morgan.griffiths@wessa.co.za	Friday 27 September 2019
BIRDLIFE SOUTH AFRICA (BLSA)						
Mr	Booth	Jonathan	Policy Manager	Private Bag X16 PINEGOWRIE 2123	advocacy@birdlife.org.za	Friday 27 September 2019
Ms	Ralston	Samantha		Private Bag X16 PINEGOWRIE 21223	energy@birdlife.org.za	Friday 27 September 2019

8 REVISED LAYOUT

In light of revisions to the sensitive areas identified by the Avifaunal and Bat specialists, as well as the mitigation measures recommended by these specialists, Mainstream has further refined the proposed layout for Dwarsrug Wind Farm. This new layout takes into account the following specialist concerns:

- **Avifauna:**
 - a 5km “No-Go” zone around the Martial Eagle nests on the Aries-Helios 400kV transmission line;
 - a “High Sensitivity” zone between 5km and 6km from the Martial Eagle nests.
- **Bats:**
 - all areas of sensitivity, inclusive of a 200m buffer, must be upgraded to “High Sensitivity”.
 - a maximum of 60 turbines are deployed.

Revised areas of sensitivity in relation to the previously assessed layout are shown in **Figure 2** below. In light of the fact that the previously assessed buildable area now encroaches into the revised sensitive areas, Mainstream has clipped the buildable area to ensure that the sensitive areas are avoided. As a result, the number of turbines in the layout has been reduced to 44. **Figure 3** below shows the revised areas of sensitivity in relation to the refined layout.

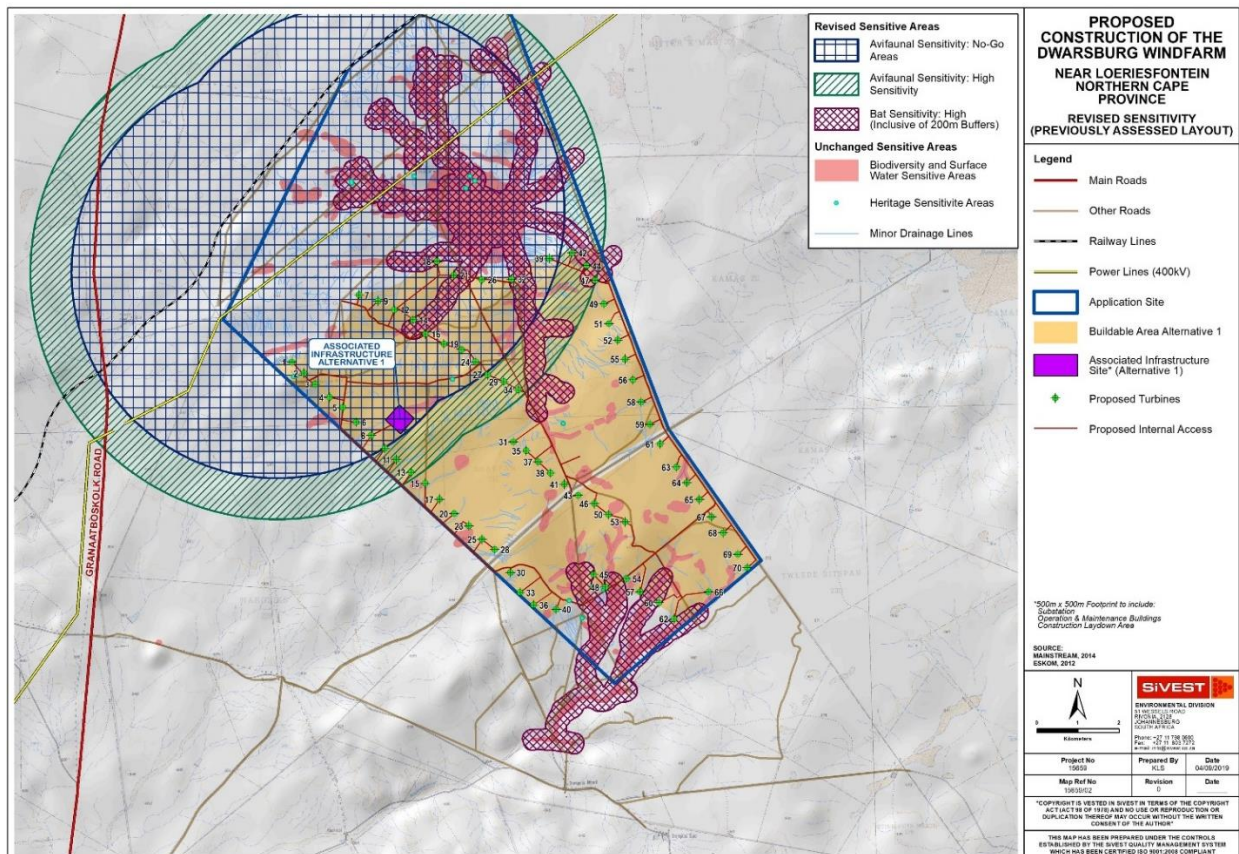


Figure 2: Revised areas of sensitivity in relation to the previously assessed layout

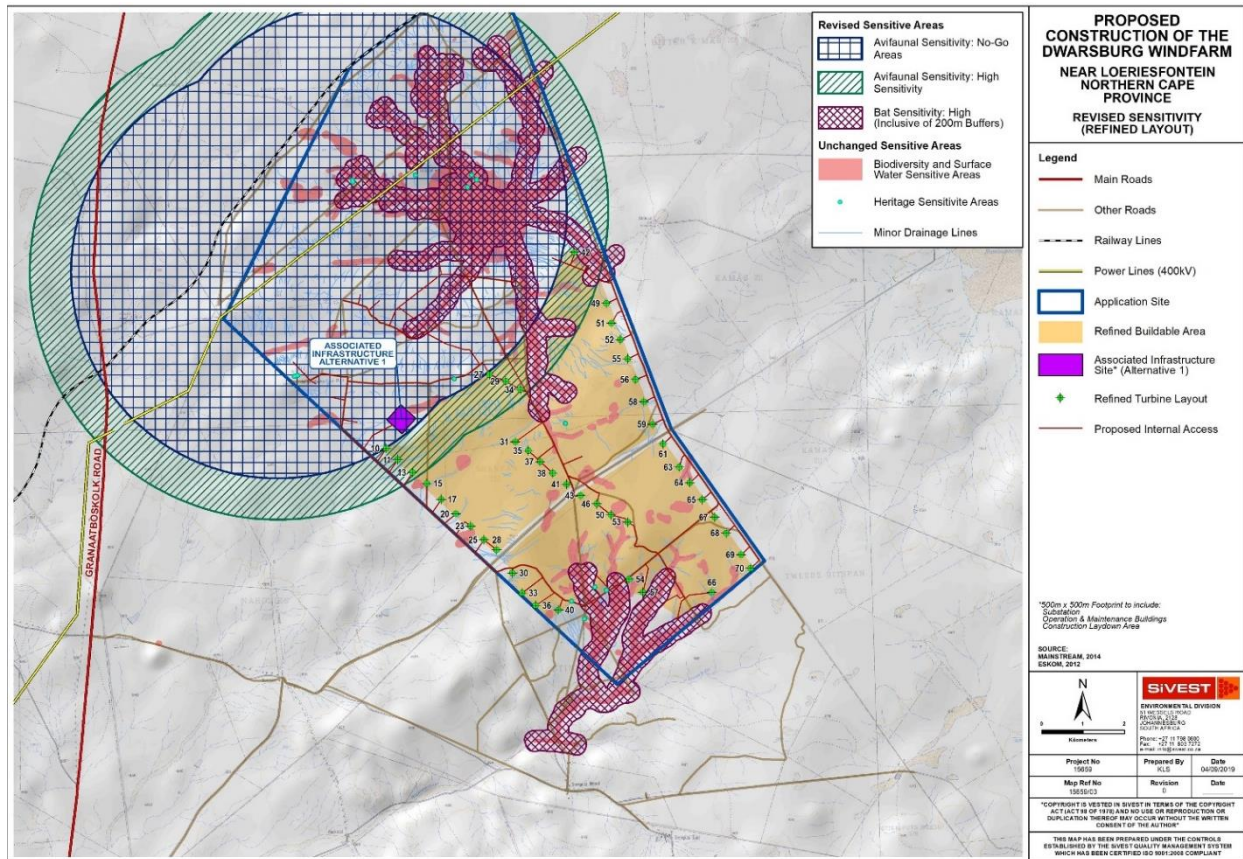


Figure 3: Revised areas of sensitivity in relation to the refined layout

9 CONCLUSION AND RECOMMENDATIONS

The aforementioned and associated specialist comments and revised reports provide an assessment of the potential impacts, advantages and disadvantages associated with the proposed amendments to the turbine specifications to allow for an increase in the wind turbine hub height and blade length.

In light of the fact that the proposed turbines would still be within the development footprint already assessed, it was determined that the proposed amendments would only require further assessment from avifaunal, bat, noise and visual specialists. While the proposed amendments would not result in any new environmental risks or impacts, negative impacts could potentially increase in significance in respect of avifauna and bats. Specialist studies did however determine that potential negative impacts resulting from the proposed amendments would remain unchanged with the implementation of specific new mitigation measures. Impacts remain unchanged in respect of noise and visual.

The proposed WEF layout has been refined to incorporate the recommendations and mitigation measures provided by the Avifaunal and Bat specialists. This has resulted in a reduction in both the size of the buildable area and the number of turbines in the layout (now 44).

Having received feedback from the various specialists, the advantages and disadvantages were explored providing an indication of the potential benefits and drawbacks of the proposed EA changes. From the assessment, the advantages outweigh the disadvantages mainly due to the fact that the larger turbines will reduce the number of turbines required.

A public participation process is being undertaken to obtain any comments received by I&APs on the proposed amendments for the Dwarsrug 140MW Wind Farm. The public review and comment period will be undertaken from **Friday the 27th of September 2019 to Monday the 28th of October 2019** over a 30-day period (excluding public holidays). Any comments raised and responses to these comments and concerns will be integrated into the Final Amendment Assessment Report.

9.1 Details of Amendments being Applied For

In light of the above, details of the amendments being applied for are outlined below.

9.1.1 Amendment to Number of Turbines³

Based on the recommendations of the specialists, it is requested that the EA dated 28 September 2015 be amended as follows:

Technical Details (Page 11)

From:

Number of Turbines	70
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To:

Number of Turbines	44
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Scope of Authorisation: Paragraph No 1 (Page 11):

From:

The construction of the Dwarsrug Wind Energy Facility and its associated infrastructure with a maximum of 70 wind turbines with a total capacity of 140MW as described above is hereby approved.

To:

The construction of the Dwarsrug Wind Energy Facility and its associated infrastructure with a maximum of 44 wind turbines with a total capacity of 140MW as described above is hereby approved.

Specific Conditions

Turbines Position: Paragraph No 125 (Page 26)

From:

The 70 approved turbines must be placed in a manner to avoid high visibility areas, "no-go"

³ An amendment to the number of turbines was not initially under consideration and as such was not indicated in the amendment application form. The reduction in the number of turbines is now being proposed in response to the findings and recommendations put forward in the amendment assessment report compiled by the Bat Specialist.

areas as well as its buffers.

To:

The 44 approved turbines must be placed in a manner to avoid high visibility areas, "no-go" areas as well as its buffers.

9.1.2 Amendment to Authorised Turbine Dimensions

It is requested that the following technical details be included on Page 11 of the EA dated 28 September 2015:

From:

Hub height from ground level	150m.
Rotor diameter	150m.

To:

Hub height from ground level	Up to 200m.
Rotor diameter	Up to 200m.

9.1.3 Amendment to Contact Details for the Holder of the EA

The previous holder of the EA is no longer employed by Mainstream and therefore the name of the holder and the relevant contact details as described on page 2 of the EA should be amended:

From:

South Africa Mainstream Renewable Power Developments (Pty) Ltd

Mr Michael Mangnall

PO Box 45063

CLAREMONT

7735

Telephone Number: (021) 657 4052

Fax Number: (021) 671 5665

Cell phone Number: (073) 871 5781

Email Address: Eugene.Marais@mainstreamrp.com

To:

South Africa Mainstream Renewable Power Developments (Pty) Ltd

Mr Eugene Marais

PO Box 45063

CLAREMONT

7735

Telephone Number: (021) 657 4040

Fax Number: (021) 671 5665

Email Address: Eugene.marais@mainstreamrp.com

9.2 Environmental Impact Statement

SiVEST Environmental Division, as the EAP, is therefore of the opinion that:

- The magnitude and rating of the majority of the environmental impacts of the proposed amendments are expected to remain the same as those already identified in the original EIA Report.
- Although the proposed amendments are expected to result in increased negative impacts in respect of Avifauna and Bats, new mitigation measures have been provided to ensure that these impacts are reduced to their original level of significance.
- The buildable area for the proposed WEF has been refined to incorporate the recommendations and mitigation measures put forward by the relevant specialists.
- The EA should be amended in line with the specifications as proposed.
- The increased risks and impacts identified can be mitigated to acceptable levels provided the revised / additional mitigation measures recommended by the Avifauna and Bat specialists (see **Table 9**) are implemented.

It is trusted that this Draft EA Amendment Assessment Report provides the reviewing authority with sufficient information to make an informed decision regarding the requested amendments.

10 REFERENCES

- Almond, J.E. 2011. Palaeontological Desktop Study for the Proposed Mainstream Wind Farm Near Loeriesfontein, Namaqua District Municipality, Northern Cape Province.
- Broughton, E., 2014: Environmental Impact Assessment for the Proposed Construction of the Dwarsrug Wind Farm Near Loeriesfontein, Northern Cape Province: Socio Economic Impact Study, Urban-Econ Development Economists
- De Jager, M. (2014). "Proposed development of the Dwarsrug Wind Energy Facility near the town of Loeriesfontein, Northern Cape Province". Enviro-Acoustic Research cc, Pretoria.
- Fourie, W., 2014: Dwarsrug Wind Energy Facility Heritage Impact Report, PGS Heritage and Grave Relocation Consultants.
- Fyfe, A., and Taylor, S., 2014: Proposed Development of the Dwarsrug Wind Farm near Loeriesfontein, in the Northern Cape Province: Surface Water Impact Assessment Report, SiVEST Environmental.
- Gibb, A., and Evans, V., 2015: Proposed Construction of the Dwarsrug Wind Farm, near Loeriesfontein, Northern Cape Province: Visual Impact Assessment Report – Impact Phase, SiVEST Environmental.
- Groenewald, G., 2014: Palaeontological Desktop Assessment for the Construction of the Dwarsrug Wind Energy Farm on the Farms Brakpan 212 and Stinkputs North 229, Near Loeriesfontein, Namaqua District Municipality, Northern Cape Province, PGS Heritage and Grave Relocation Consultants.
- Kruger, C., and Moir, M., 2014: Fourth Progress Report of a 12 Month Long Term Bat Monitoring Study for the Proposed Dwarsrug Wind Energy Facility, Northern Cape, Animalia Consulting.
- Lanz, J., 2014: Agricultural and Soils Impact Assessment for Proposed Dwarsrug Wind Farm near Loeriesfontein, Northern Cape Province, EIA Phase Report.
- Todd, S., 2014: Mainstream South Africa Dwarsrug Wind Energy Facility: Fauna and Flora Specialist Impact Assessment Report, Simon Todd Consulting.
- Van Rooyen, C., Froneman, A., and Laubscher, N., 2014: Dwarsrug Wind Energy Facility Loeriesfontein, Northern Cape: Bird Impact Assessment Report, December 2014, Chris Van Rooyen Consulting.



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