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Environmental Consultants

Impact Assessments - Environmental Management Programs - Compliance Monitoring - Process Review

PROPOSED SPRINGBOK WIND ENERGY FACILITY NEAR SPRINGBOK, NORTHERN CAPE PROVINCE

APPLICATION FOR AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION: ENVIRONMENTAL ASSESSMENT REPORT (DEA Reference number: 12/12/20/1721/AM4)

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PROJECT DETAILS

DEA Ref No: 12/12/20/1721/AM4

TITLE: Proposed Springbok Wind Energy Facility near Springbok, Northern Cape: Application for Amendment of Environmental Authorisation

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ABBREVIATIONS

CBA	Critical Biodiversity Area
CEMP	Construction Phase Environmental Management Programme
DEA	Department of Environmental Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIA Report	Environmental Impact Assessment Report
EMP(r)	Environmental Management Programme Report
GN	Government Notice
Ha	Hectare
HIA	Heritage Impact Assessment
HNC	Heritage Northern Cape
I&APs	Interested and Affected Parties
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act 25 of 1999)
OEMP	Operational Phase Environmental Management Programme
PPP	Public Participation Process
REDZs	Renewable Energy Development Zones
SARHA	South African Resources Heritage Agency
SCC	Species of Conservation Concern
SPV	Special Purpose Vehicle
WEF	Wind Energy Facility
WTG	Wind Turbine Generators

1 INTRODUCTION

1.1 INTRODUCTION AND BACKGROUND

Mulilo Springbok Wind Power (Pty) Ltd (hereafter referred to as the Applicant) is applying for an amendment to the Environmental Authorisation (EA) in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA) and Environmental Impact Assessment (EIA) Regulations (2014) for the proposed Springbok Wind Energy Facility (WEF) near Springbok in the Northern Cape Province.

The original Environmental Impact Assessment process for the project was completed by DJ Environmental Consultants (Pty) Ltd in 2010 on behalf of Mulilo Renewable Energy (Pty) Ltd (now Mulilo Springbok Wind Power (Pty) Ltd). Environmental Authorisation (EA) for the 55.5MW Springbok Wind Power Generation Facility was granted by the Department of Environmental Affairs (DEA) on 27 July 2011. In particular, the Applicant's preferred Alternative A1 (comprising 37 wind turbine Generators (WTG) with a generating capacity of 1.5MW per turbine resulting in an optimal generation capacity of 55.5MW per annum) has been approved by DEA.

The authorised WEF is located approximately 3 km north-east of the town of Springbok, in the Northern Cape. The WEF and associated infrastructure would be located on the following farms: Farm No. 134 Portion 19, Farm No. 134 Portion 17, Farm No. 132 Portion 0 (Remaining Extent), Farm No. 946 Portion 0 (Remaining Extent), Farm No. 215 Portion 0 (Remaining Extent), Farm No. 132 Portion 1 (Remaining Extent), Farm No. 635 Portion 0, Farm No. 133 Portion 9 (Remaining extent). The site forms part of the Nama Khoi Local Municipality located in the Namakwa District Municipality in the Northern Cape Province.

An Application for Amendment of the EA was submitted to DEA in 2011 to change the Special Purpose Vehicle (SPV) name from "Mulilo Renewable Energy (Pty) Ltd" to "Longyuan Mulilo Springbok Wind Power (Pty) Ltd". This amendment to the EA was granted by DEA on 24 October 2011. In March 2014, Longyuan Mulilo Springbok Wind Power (Pty) Ltd submitted a second Application for Amendment of the EA to DEA, i.e. for an extension of the validity period of the EA, and amendment to the property descriptions included in the EA (to correct editorial errors). DEA granted the amendment of the EA on 27 June 2014. On 2 March 2015, Longyuan Mulilo Springbok Wind Power (Pty) Ltd submitted a third Application for Amendment of the EA to DEA, i.e. to amend the project description included in the EA (minor refinements to the project layout, a reduction in the number of turbines proposed and an increase in the turbine size and generating capacity of the WEF). The amendment of the EA was refused¹ by DEA on 2 July 2015. In February 2016, Longyuan Mulilo Springbok Wind Power (Pty) Ltd submitted a fourth Application for Amendment of the EA to DEA, i.e. to extend the validity period of the EA, as well as to amend the name of the holder from "Longyuan Mulilo Springbok

¹ The reasons for the refusal included the following: DEA stated that the proposed increase in the generation capacity of the authorised facility from 55.5MW to 100MW constitutes a listed or specified activity, and triggers activity 1 of GN R. 984 of the EIA Regulations, 2014 (albeit that this listed activity is already authorised by DEA for the project). Furthermore, DEA indicated that the report dated March 2015 submitted by the Applicant to DEA for the proposed amendments did not include the completed 12 months bat monitoring which would have been further required for the decision making process.

Wind Power (Pty) Ltd” to “Mulilo Springbok Wind Power (Pty) Ltd”. DEA granted the amendment of the EA on 18 May 2016.

Mulilo Springbok Wind Power (Pty) Ltd is now applying for an amendment of the EA, to amend the project description of the proposed WEF (including a reduction in the number of turbines proposed and increase in turbine dimensions and generation capacity of each turbine), as well as refinements to the proposed layout, as outlined in Section 2 below. The proposed amendments have required re-assessment of the potential impacts associated with the proposed project, and have therefore required an update to the specialist studies that were undertaken during the EIA for the project. The findings of the specialists relating to the proposed amendments are discussed in Section 3 of this report.

Holland & Associates Environmental Consultants has been appointed by the Applicant to undertake the requisite Application for Amendment of the Environmental Authorisation for the proposed project, in accordance with the National Environmental Management Act (NEMA) (No. 107 of 1998) EIA Regulations (2014), as amended. **This Application for Amendment relates to the EA granted in respect of the proposed project by DEA on 27 July 2011, as amended.**

This report has been prepared in accordance with the requirements of the NEMA EIA Regulations (2014), as amended (Part 2 (Regulations 31 and 32) of GN 326)), and should be read in conjunction with the Application for Amendment of the Environmental Authorisation form that was couriered to DEA on 8 December 2017 (refer to Appendix B), as well as the Environmental Impact Report (dated December 2010) for the approved project (refer to Appendix F). This report provides an assessment of all impacts related to the proposed amendments, outlines the advantages and disadvantages associated with the proposed amendments and outlines the measures to ensure avoidance, management and mitigation of impacts associated with the proposed changes².

1.2 ENVIRONMENTAL LEGAL REQUIREMENTS

1.2.1 Application in terms of the NEMA 2014 EIA Regulations

In terms of the NEMA EIA Regulations (2014), as amended, the proposed amendments to the project description constitutes a “change in scope” (i.e. substantive amendment of the EA). Accordingly, an Application for Amendment of the EA must be undertaken in terms of Part 2 (“Amendments where a change in scope occurs”), Regulations 31 and 32 of GN R. 982, as amended (GN 326), and submitted to DEA for authorisation. In this regard, after submission of the Application for Amendment of the Environmental Authorisation to DEA, the holder of the EA must submit a report reflecting:

² Note: Changes to the EMPr are not included in this amendment application, given that the EMPr and Final Layout Plan for this project have not been submitted to DEA for approval as yet (in terms of Conditions of Authorisation 3.1 and 6.4 of the EA, respectively). Should the proposed amendment of the project description result in updates to the mitigation measures put forward by the specialists, the EMPr would be amended accordingly in due course, when it is submitted to DEA for final approval, as required in terms of Conditions of Authorisation 3.1, 6.4 and 6.5 of the EA.

- “(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”;* (Note: Changes to the EMPr are not specifically included in this amendment application, given that the EMPr and final layout for this project have not been submitted to DEA for approval as yet (in terms of Conditions of Authorisation 3.1 and 6.4 of the EA, respectively). Where the proposed amendment of the project description has resulted in updates to the mitigation measures put forward by the specialists, such mitigation measures are included in this report, reflecting the changes that will need to be included in the finalisation of the EMPr (together with other relevant updates), in due course, when the EMPr is submitted to DEA for final approval, as required in terms of Conditions of Authorisation 3.1, 6.4 and 6.5 of the EA³).

As indicated previously, the Application for Amendment of the EA form was couriered to DEA on 8 December 2017. All of the specialists that undertook specialist studies for the original EIA for the proposed Springbok WEF in 2010 were re-appointed to undertake re-assessments of the potential environmental impacts (within their areas of expertise), to determine the implications, if any, of the proposed amendments. A report on the application for the amendment for the EA (i.e. this report) was compiled, including the findings of the updated specialist investigations, which are summarised in Section 3 below. Refer to Appendix C for the specialist Addendum reports.

As required in terms of the NEMA EIA Regulations (2014), as amended, a public participation process (including a 30 day comment period on the Environmental Assessment Report for the Application for Amendment of the EA) is being undertaken for the proposed amendment application. Refer to Section 4 below for a summary of the public participation process. The final Application for Amendment of the EA Environmental Assessment Report will be submitted to DEA at the end of the 30 day Interested and Affected Party (I&AP) comment period⁴, for decision making.

1.2.2 Transitional arrangements in terms of the NEMA EIA Regulations (2014)

On 4 December 2014 the Minister of Environmental Affairs promulgated regulations in terms of Chapter 5 of NEMA, viz the Environmental Impact Assessment ("EIA") Regulations 2014 (Government Notice ("GN") No. R. 982, R. 983, R. 984 and R. 985 in Government Gazette No. 38282 of 4 December 2014). These regulations came into effect on 8 December 2014, and replace the EIA Regulations that were promulgated in 2010 (which superseded the 2006 EIA Regulations) and also introduce new provisions regarding EIA's. The 2014 EIA Regulations were further amended on 7 April 2017 (GN 324, GN 325, GN 326, GN 327).

³ This approach was confirmed and accepted telephonically and via email with DEA (Mr Muhammad Essop) on 20 January 2015 and via email with Masina Litsoane on 16 January 2018.

⁴ A copy of the report will also be submitted to DEA at the commencement of the I&AP public comment period

Transitional arrangements were provided for in the amendments made to NEMA and are provided in Chapter 8 of the 2014 EIA Regulations. It is our understanding that an Environmental Authorisation issued in terms of the 2006 NEMA EIA Regulations, must be regarded to be an Environmental Authorisation issued in terms of the 2014 EIA Regulations, as amended. (The Environmental Authorisation for this project was issued in terms of the 2006 NEMA EIA Regulations). Activities for which authorisation was granted in terms of the 2006 EIA Regulations include Items 7, 12, 16(b) of GN R. 386; and Items 1(a), 1(l), and 2 GN R. 387. (Note: Activity 15 of R386 which was applied for, was not authorised in the EA, as DEA stated that it was no longer listed in terms of the then new EIA Regulations (2010)⁵. Given that the 2010 EIA Regulations have been superseded by the 2014 EIA Regulations, it is our opinion that the similarly listed road activities (in terms of the 2014 EIA Regulations), should be added back into the EA, as authorised activities, given that they were assessed in the EIA process and applied for).

Table 1 below sets out the 2014 listed activities applicable to the proposed project, all of which are similarly listed to the assessed 2006 listed activities for the proposed project.

Table 1: Authorised EIA Activities (2006 EIA Regulations) and the similarly listed activities in terms of the 2014 EIA Regulations (as amended)

2006 EIA Regulations (Authorised)		2014 EIA Regulations, as amended		Description
Activity No(s):	Description of the relevant Activity(ies) in writing as per GN R386	Activity No(s)	Description of the relevant Basic Assessment Activity(ies) in writing as per Listing Notice 1 (GN R.983, as amended (i.e. GN 327)	Description of the portion of the development as per the project description that relates to the applicable listed activity.
N/A	N/A (refer to Activity 1(l) of GN R387 below) (i.e. the construction of facilities or infrastructure, including associated structures or infrastructure, for the transmission and distribution of above ground electricity with a capacity of 120 KV or more).	11	The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more.	Construction of transmission line with voltage of 66kV, outside urban areas.
7	The aboveground storage of a dangerous good, including petrol, diesel, liquid petroleum gas or paraffin, in containers with a combined capacity of more than 30	N/A	N/A (Refer to Activity 10 of GN 985)	Storage of hazardous substances during the construction phase, including for example, fuels, oils, etc.

⁵ NOTE: Item 15 of GN R. 386 was applied for however was not specifically authorised in the DEA EA dated 27 July 2011. In this regard, the Environmental Authorisation states that “Activity applied for as listed in GN R. 386 15 is no longer listed in terms of the new Regulations, 2010 and is thus not authorised”. Given that the 2010 EIA Regulations have been superseded by the 2014 EIA Regulations, it is our opinion that the similarly listed activities (in terms of the 2014 EIA Regulations) for Activity 15 of GN R. 386 (relating to road activities), should be added back into the EA, as authorised activities, given that they were assessed in the EIA process and applied for.

	cubic metres but less than 1000 cubic metres at any one location or site.			
12	The transformation or removal of indigenous vegetation of 3 hectares 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).	27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation. (Refer also to Activity 12 of GN R.985, as amended & Activity 15 of GN R. 984, as amended, below).	Should less than 20ha of indigenous vegetation be cleared for the proposed project, Activity 27 of GN R984, as amended, would be triggered. It is however likely that more than 20ha would be cleared, in which case Activity 15 of GN R.984, as amended, would apply). (Approximately 27.5ha of currently natural vegetation would likely be permanently lost or degraded for the authorized project, and approximately 21ha for the proposed amended alternative).
15 ⁶	<p><i>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.</i></p> <p><u>*(Note: Activity 15 was assessed and applied for in the original EIA for the project. The activity was however not authorised by DEA in the EA dated 27 July 2011 for the following reason provided by DEA: "Activity applied for as listed in GN R. 386 15 is no longer listed in terms of the new Regulations, 2010 and is thus not authorised".</u></p> <p><u>Given that the 2010 EIA Regulations have been superseded by the 2014 EIA Regulations, it is our opinion that the similarly listed road</u></p>	56	<p>The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre – (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres.</p> <p>Refer also to Activity 4 of GN 985, as amended (GN 324) below.</p>	<p>Whilst existing roads and tracks would be utilised in most of areas of the site, existing gravel roads may need to be upgraded, or new sections of road constructed. Access roads would have a width of approximately 4.5m. Turning circles of 15m may be required for the trucks.</p>

⁶ The Application for Environmental Authorisation for the proposed WEF in Springbok was applied for in terms of NEMA EIA Regulations (2006), i.e. GN R. 386/387. Environmental Authorisation for the proposed project was issued on 27 July 2011, during the transitional arrangements between the 2006 EIA Regulations and the 2010 EIA Regulations. Since Activity 15 (which was applied for in the application in terms of the 2006 EIA Regulations) was no longer listed in terms of the 2010 Regulations, DEA decided not to authorise (and include) Activity 15 in the EA (albeit that the EA was issued in terms of the 2006 EIA Regulations, and not the 2010 EIA Regulation). It is our considered opinion that the similarly listed road activities (in terms of the 2014 EIA Regulations, i.e. Activity 56 of GN R. 983, Activities 4 and 18 of GN R. 985), should be added back into the EA, as authorised activities, given that they were assessed in the EIA process and applied for.

	<u>activities (in terms of the 2014 EIA Regulations), should be added back into the EA, as authorised activities, given that they were assessed in the EIA process and applied for.</u>			
16(b)	The transformation of undeveloped, vacant or derelict land to – (b) 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 1 hectare.	28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.	Transformation of the land for the construction of the Wind Energy Facility, and associated infrastructure.
Activity No(s):	Description of the relevant Activity(ies) in GN R387	Activity No(s)	Description of the relevant Scoping & EIA Activity(ies) in writing as per Listing Notice 2 (GN R984, as amended)	Description of the portion of the development as per the project description that relates to the applicable listed activity
1(a)	The construction of facilities or infrastructure, including associated structures or infrastructure, for – (a) 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 1 hectare.	1	The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more...	The proposed project entails the construction and operation of a wind power generation facility. The generation capacity of the WEF would be 55.5MW.
1(l)	The construction of facilities or infrastructure, including associated structures or infrastructure, for – (l) the transmission and distribution of above ground electricity with a capacity of 120 kilovolts or more.	N/A	N/A. (Refer to Activity 11 of GN R983, as amended, above).	The wind turbines will generate electricity at a voltage of 22/33 KV which will be stepped up with a transformer to 66 KV which will lead over a distance to the national grid at the substation.
2	Any development activity, including associated structures and infrastructure, where the total area of the developed area is, or is intended to be, 20 hectares or more.	15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance	The project would likely require the clearance of an area of more than 20ha of indigenous vegetation. (It is anticipated that approximately 27.5ha of currently natural vegetation would likely be permanently lost or degraded for the authorized project, and

			with a maintenance management plan.	approximately 21ha for the proposed amended alternative).
		Activity No(s):	Describe the relevant Basic Assessment Activity(ies) in writing as per Listing Notice 3 (GN R985, as amended)	Describe the portion of the development as per the project description that relates to the applicable listed activity
N/A	<u>N/A. Refer to Activity 15 of GN 386 (which was assessed in the EIA and applied for, but not included in the EA by DEA for the following reason provided by DEA: “Activity applied for as listed in GN R. 386 15 is no longer listed in terms of the new Regulations, 2010 and is thus not authorised”. As indicated above, however, given that the 2010 EIA Regulations have been superseded by the 2014 EIA Regulations, and that the EA was issued in terms of the 2006 EIA Regulations, it is our opinion that the similarly listed road activities (in terms of the 2014 EIA Regulations), should be added back into the EA, as authorised activities, given that they were assessed in the EIA process and applied for.</u>	4	The development of a road wider than 4 metres with a reserve less than 13,5 metres in (g) the Northern Cape (ii) outside urban areas, in (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas.	The proposed development includes the construction of new access roads, where required. Some of these roads would be wider than 4m (i.e. approximately 4.5m – 5m). The proposed development site is located within 5km of Goegap Nature Reserve. Sections of the site are located within identified Critical Biodiversity Areas
N/A	N/A. (Refer to Activity 7 of GN R386 above).	10	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in (g) Northern Cape (ii) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland (iii) outside urban areas, in (ee) Critical Biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans. (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres away from any other protected area	Storage of hazardous substances during the construction phase, including for example, fuels, oils, etc. The site is located outside of urban areas, and within 5 km from the Goegap Nature Reserve. Sections of the site are located within CBAs.

			identified in terms of NEMPAA or from the core areas of a biosphere reserve.	
N/A	N/A (refer to Activity 12 of GN R386 and Activity 2 of GN R387 above)	12	The clearance of an area of 300 square metres or more of indigenous vegetation in (g) the Northern Cape (i) within any critically endangered or endangered ecosystem listed in terms of Section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial biodiversity Assessment 2004, (ii) within critical biodiversity areas identified in bioregional plans.	The proposed project would require the clearance of more than 300m ² of indigenous vegetation. The vegetation type is "Least Threatened". Sections of the site are located within identified Critical Biodiversity Areas.
N/A	Refer to Activity 15 of GN 386 (which was assessed in the EIA and applied for, but not authorised by DEA for the following reason: "Activity applied for as listed in GN R. 386 15 is no longer listed in terms of the new Regulations, 2010 and is thus not authorised"). Given that the 2010 EIA Regulations have been superseded by the 2014 EIA Regulations, it is our opinion that the similarly listed road activities (in terms of the 2014 EIA Regulations), should be added back into the EA, as authorised activities, given that they were assessed in the EIA process and applied for.	18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre in (g) the Northern Cape (ii) outside urban areas, in (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans, (gg) Areas within 10km from national parks or world heritage sites or 5km from any protected area identified in terms of NEMPAA or the core area of a biosphere reserve; (ii) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.	Existing access roads may need to be upgraded as part of the proposed development, to accommodate heavy vehicles, particularly during the construction phase. In some instances, existing roads may need to be widened by more than 4m (particularly where turning circles are required). The project site is located outside of urban areas, and within 5 km from the Goegap Nature Reserve. Sections of the site are located within CBAs. Some of the roads to be upgraded may be located within 100m of a watercourse (drainage line).

As is reflected in Table 1, the listed activities in respect of which environmental authorisation was applied for and/or been granted by the DEA for the project are similarly listed to Activities 11, 27, 28 and 56 of GN No. R.983, Activities 1 and 15 of GN No. R.984 and Activities 4, 10, 12, and 18 of GN No. R.985 in the 2014 EIA Regulations, as amended. In the circumstances, the proposed amendments to the project description (referred to in detail in Section 2) will not, on their own, trigger any listed activities requiring environmental authorisation.

1.3 DETAILS AND EXPERTISE OF THE EAP WHO COMPILED THIS REPORT

Nicole Holland of Holland & Associates Environmental Consultants prepared this report on the Application for Amendment of the Environmental Authorisation. The qualifications of the Environmental Assessment Practitioner (EAP) are outlined below.

Table 2: Details and Expertise of EAP

Name	Academic Qualifications	Registration	Expertise
Nicole Holland	BSc(Hons) Environmental and Geographical Science	Registered as Professional Natural Scientist with SACNASP, field of Environmental Science, Reg. No 400306/06. Member of the IAIAAsa (International Association for Impact Assessment (Western Cape branch)). Founding Member of the Environmental Assessment Practitioners Association of South Africa.	Nicole has over 15 years of experience in the environmental management field and has extensive experience in managing environmental impact assessments and the associated public participation processes for projects including, amongst others, renewable energy projects, water supply infrastructure, wastewater treatment works, housing and resort developments, cemeteries, road upgrades, pipelines and waste sites, amongst others. Nicole is a registered Professional Natural Scientist (Environmental Scientist) with the South African Council for Natural Scientific Professions, and is an active member of the South African affiliate of the International Association for Impact Assessment (IAIAAsa).

The *Curriculum Vitae* of the EAP is included in Appendix D.

The requirement for independence of the environmental consultant is aimed at reducing the potential bias in the environmental process. It should be noted that neither Holland & Associates Environmental Consultants nor any of its sub-consultants have any interests in secondary or downstream developments that may arise out of the amendment of the EA application.

Refer to Appendix E for the details of the EAP and the EAP's Declaration of Interest.

1.4 DETAILS OF SPECIALISTS

Table 3 below outlines the specialist studies that were undertaken as part of the original EIA for the project, and which have been updated by the respective specialists to inform the application for amendment of the EA process. Copies of the original specialist studies, as well as the original EIA report, are included in electronic format in Appendix F.

Table 3: Details of Specialists

Specialist study	Specialist
Botanical	Mr Nick Helme (Nick Helme Botanical Surveys)
Birds	Dr Rob Simmons (Birds and Bats Unlimited Environmental Consultants)
Bats (Original 2010 report)	Professor David Jacobs (University of Cape Town)
Bats (Pre-construction monitoring)	Mr Werner Marais and Ms Monika Moir (Animalia Zoological & Ecological Consultation)
Reptiles	Professor Le Fras Mouton (University of Stellenbosch)
Noise	Mr Demos Dracoulides (Demos Dracoulides and Associates Environmental Engineers (DDA))
Visual	Ms Karen Hansen (Karen Hansen ⁷ Landscape Architects)
Archaeology	Mr Jonathan Kaplan (Agency for Cultural Resource Management)
Palaeontology	Dr John Almond (Natura Viva cc)
Heritage	Mr Ron Martin (Ron Martin Heritage Consultancy)
Traffic	Christoff Krogshoopers/Pieter Arangie (ITS Engineers)
Socio-economic	Alex Kempthorne (Urban-Econ Development Economists)

Refer to each of the respective specialist studies included in Appendix C for the details of the specialists (including their CVs) and Declarations of Interest.

Note: The 12 month pre-construction bird monitoring was undertaken by Birds Unlimited (Dr Rob Simmons and Marlei Martins), and was completed in 2015. The 12 month pre-construction bat monitoring study was undertaken by Animalia Zoological & Ecological Consultation, and was completed in 2016. The findings of the aforementioned pre-construction monitoring studies have informed the re-assessment of potential impacts on birds and bats associated with the proposed amendments.

1.5 ASSUMPTIONS AND LIMITATIONS

1.5.1 Assumptions

In undertaking this investigation and compiling the report on the Application for Amendment of the EA, it has been assumed that:

- The information provided by the Applicant and specialists is accurate, unbiased and valid at the time it was provided.

⁷ Note – the visual impact assessment undertaken as part of the original EIA for the proposed project in 2010 was undertaken by Ms Hansen whilst under the employment of Viridian Consulting Landscape Architects. Ms Hansen no longer works for Viridian and, given that she was the specialist that undertook the VIA for the original EIA, was appointed to undertake the re-assessment of potential visual impacts in light of the proposed amendments.

- The scope of this investigation is limited to assessing the environmental impacts as associated with the proposed amendment to the project description and layout, as outlined in Section 2 of this report.
- The baseline environmental information and assessment methodology contained in the EIA report (December 2010) and associated specialist reports is accurate and valid, and is not repeated in the current report. Copies of the original specialist studies, as well as the original EIA report, are included in electronic format in Appendix F.
- Specialists have utilised the same methodology for assessing the significance of potential impacts associated with the proposed changes, in order to comparatively assess the approved project versus the proposed amended project.

1.5.2 Limitations and gaps in knowledge

- The layout of the WEF included in the EIA and this amendment application process is preliminary. The layout for the proposed WEF will be finalised (which may include micro-siting of some turbines) and submitted to DEA for approval in due course, as required in terms of Condition of Authorisation 6.4 and 6.5 of the EA dated 27 July 2011. All available biodiversity information will be used in the finalisation of the layout plan, as required in terms of Condition of Authorisation 6.4 of the EA.

2 PROPOSED AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION

2.1 MOTIVATION AND DESCRIPTION OF PROPOSED AMENDMENTS

As onshore wind energy facilities (WEF) receive continued support worldwide from governments and energy regulators, technological improvements are being seen on a constant basis. In order to ensure that a WEF has the smallest possible footprint per total installed capacity, the wind turbine generators (WTG) are evolving in higher yielding and more efficient generating units. As the engineering loads and fatigues are better understood on the units, it allows the designers and engineers to design the most optimal and highest yielding WTGs for the specific terrain and climatic conditions.

Mulilo Springbok Wind Power (Pty) Ltd proposes to increase the generating size of the WTG's for the Springbok WEF in order to align to current international WTG models, while reducing the number of WTGs at the WEF. The proposed amendments of the EA, which include an amendment to the project description (including refinement of the proposed layout), as well as an update to the contact details of the holder of the EA and project title of the EA, are outlined in Section 2.1.1 below. Refer to Section 2.1.2 for the specific sections of the EA to be amended, and to Section 2.1.3 for the motivation for the proposed amendments.

2.1.1 Proposed amendments to the project description (including layout)

The following amendments to the project description of the project are proposed:

- Reducing the number of turbines from 37 to a maximum of 25;
- Increasing the hub heights from 80m to a maximum of 140 m (except for turbines numbers 4, 8, 15 & 16, which would have a maximum hub height of 105m).
- Increasing the rotor diameters from 88 m to a maximum of 160 m.
- Increasing the WTG generation capacity per turbine from the approved 1.5MW to encompass a range of 2.0 MW to 4.5 MW.

The total generation capacity of the wind energy facility will remain 55.5MW (as authorised by DEA).

Table 4 below outlines the proposed project components to be amended, the approved description of the components, as well as the proposed amendment.

Table 4: Proposed amendments to project description

Component	Approved	Proposed amendment
Number of turbines	37	Maximum of 25 (i.e. potential range of 12 turbines @ 4.5 MW to 25 turbines @ 2.0 MW – 2.2 MW)
Generation capacity per turbine	1.5 MW	2.0 MW – 4.5 MW
Generation capacity of the WEF	55.5 MW	Same as authorised (55.5 MW)
Rotor diameter	88 m	Maximum 160 m
Hub height	80 m	Maximum 140 m (except for turbines 4, 8, 15 & 16, which would have a maximum hub height of 105m).
Temporary construction pad	40 x 20 m	40 x 40 m
Permanent affected area (foundation size)	16 x 16 m and 2 m deep	16 x 16 m and 3 m deep

(Note: The Application for Amendment of the EA will assess the “worst case scenario” of 25 turbines @ 2.0 MW – 2.2 MW per turbine with the understanding that should the Applicant use 4.5 MW turbines (which would have the same maximum dimensions as the 2.0 MW – 2.2 MW turbines outlined in Table 4 above), then the Applicant would reduce the number of turbines to 12. It is furthermore noted that the generation capacity of the WEF would remain 55.5 MW as authorised by DEA).

The EIA Report for the project (December 2010) stated that “*Each turbine, with the underground base and the crane lifting pad, occupies an area of 15 by 15 metres*”. It also stated that “*In terms of the foundations, a 16 by 16 metre wide and two metre deep foundation would be required for the turbine*” and “*the area required for construction is 40 by 20 meters*”. In terms of the proposed amendments, the turbine hardstands will increase to an area of 40m by 40m. These construction related footprints are however temporary and will be rehabilitated as far as possible once construction has been completed (Mulilo Springbok Wind Power (Pty) Ltd, 2017).

The Applicant has indicated that the proposed amendments to the WTG’s are the upper limits of possible future WTG sizing, and if the Springbok WEF is to be constructed in the next few years, the actual WTG sizing will be in the middle range. The windfarm’s turbine sizing will be dependent on what turbines are on the market at the time of project tendering. The application for amendment of the EA therefore makes provision for a possible range of 2.0MW - 4.5MW turbines (with the total generation capacity of the WEF of 55.5MW).

Refinements to the WEF layout are also proposed. Refer to Figure 1 for the proposed amended layout compared to the layout included in the original EIA, and Appendix A, for a site map of the proposed Springbok WEF indicating turbine locations and associated infrastructure (including access roads and distribution network). (Note: The proposed amended layout is similar to the proposed amended layout that was included in the previous Application for Amendment of the EA for this project in 2015. Minor refinements have however been made to some of the turbine positions to address the recommendations of the 12 month pre-construction bat monitoring study).

It should be noted that, as required in terms of Condition 6.4 of the EA, the Applicant will still submit a final layout plan for the entire wind energy facility for approval to DEA in due course, before commencement.

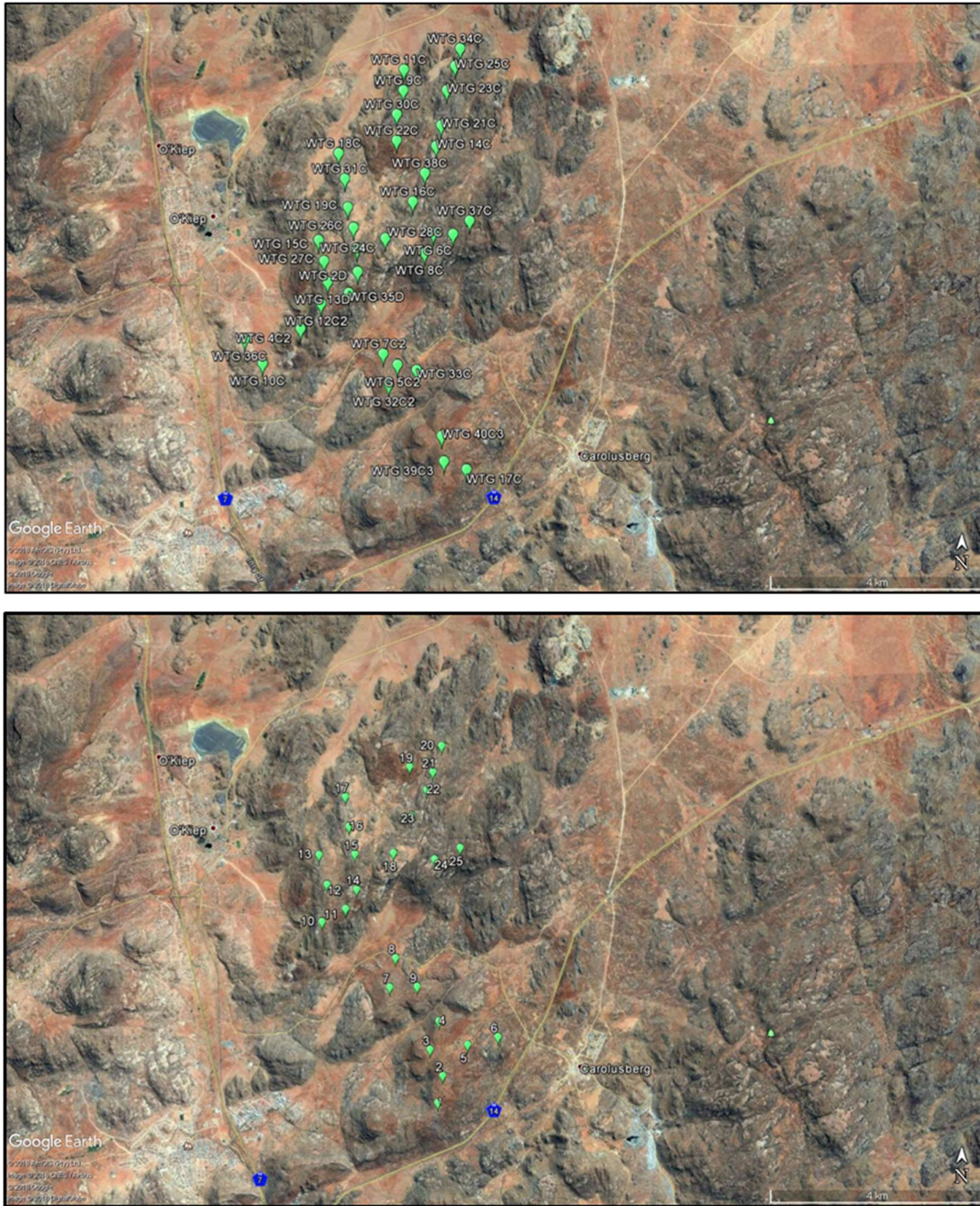


Figure 1 - Authorised Layout (top) and Proposed Amended (Preliminary) Layout (bottom) of WTG positions

2.1.2 Amendment to project title of the EA

The title of the EA currently states the following: “*Proposed 55.5MW Springbok wind power generation facility on the farm O’Nabapeep near Springbok, Northern Cape Province*”. The Applicant proposes to remove the reference to “Farm O’Nabapeep” in the project title of the EA, given that the project is located over a number of properties, as described in the amended EA dated 27 June 2014 (as amended, 18 May 2016) and Section 1 of this report.

2.1.3 Update to the contact details of the holder of the EA

The holder of the EA (Mulilo Springbok Wind Power (Pty) Ltd) has recently moved office premises and therefore wishes to update the postal and telephone details for the holder of the EA, as outlined in Section 2.2.3 below.

2.2 PROPOSED CONDITIONS/ PARTS OF THE EA TO BE AMENDED

The proposed amendments outlined in Section 2.1 above would require an amendment to the following text in the Environmental Authorisation for the project:

➤ **Proposed amendment of Condition of Authorisation 1.1. on page 4 of the EA:**

The proposed amendments to the project description outlined in Section 2.1 above will require an amendment to page 4 of the EA, sub-section titled “Scope of authorisation”, Condition 1.1 which currently states:

“The preferred alternative A1 (37 wind turbine Generators (WTG) with a generating capacity of 1.5MW per turbine resulting in an optimal generation capacity of 55.5MW per annum) is approved”.

The proposed amendment of Condition 1.1 (with marked up changes) is as follows:

“The ~~preferred~~-amended alternative A1 (~~37~~ maximum of 25 wind turbine generators (WTG) with a generating capacity of ~~1.5MW~~ 2.0MW to 4.5MW per turbine resulting in an optimal generation capacity of 55.5MW per annum) is approved”.

The proposed amendment of Condition 1.1 (without marked up changes) is as follows:

“The amended alternative A1 (maximum of 25 wind turbine generators (WTG) with a generating capacity of 2.0MW to 4.5MW per turbine resulting in an optimal generation capacity of 55.5MW per annum) is approved”.

➤ **Proposed amendment of Condition of Authorisation 1.5 on page 4 of the EA:**

Condition 1.5. currently states the following:

“The recommendations and mitigation measures recorded in the EIAR dated December 2010 must be adhered to”.

The proposed Amendment of Condition 1.5. (with marked up changes) is as follows:

“The recommendations and mitigation measures recorded in the EIAR dated December 2010, and associated updates included in the specialist Addendum reports (2017/ 2018), must be adhered to”.

The proposed Amendment of Condition 1.5 (without marked up changes) is as follows:

“The recommendations and mitigation measures recorded in the EIAR dated December 2010, and associated updates included in the specialist Addendum reports (2017/2018), must be adhered to”.

➤ **Proposed amendment of Condition of Authorisation 3.1 on page 6 of the EA:**

Condition 3.1 currently states the following:

“The Environmental Management Plan (EMP) submitted as part of application for environmental authorisation must be amended and submitted to the Department for written approval prior to commencement of the activity. The recommendations and mitigation measures recorded in the EIAR dated December 2010 must be incorporated as part of the EMP. Once approved, the EMP must be implemented and adhered to. The amended EMP must also include the following...”:

The proposed Amendment of Condition 3.1 (with marked up changes) is as follows:

“The Environmental Management Plan (EMP) submitted as part of application for environmental authorisation must be amended and submitted to the Department for written approval prior to commencement of the activity. The recommendations and mitigation measures recorded in the EIAR dated December 2010 and associated updates included in the specialist Addendum reports (2017/2018) must be incorporated as part of the EMP. Once approved, the EMP must be implemented and adhered to. The amended EMP must also include the following...”:

The proposed Amendment of Condition 3.1 (without marked up changes) is as follows:

“The Environmental Management Plan (EMP) submitted as part of application for environmental authorisation must be amended and submitted to the Department for written approval prior to commencement of the activity. The recommendations and mitigation measures recorded in the EIAR dated December 2010 and associated updates included in the specialist Addendum reports (2017/2018) must be incorporated as part of the EMP. Once approved, the EMP must be implemented and adhered to. The amended EMP must also include the following...”:

➤ **Proposed amendment of the project title on page 1 of the EA dated 27 July 2011 (and amendment of the EA dated 18 May 2016):**

The project title on page 1 of the EA (27 July 2011) currently states the following:

“Proposed 55.5MW Springbok wind power generation facility on the farm O’Nabapeep near Springbok, Northern Cape Province”

The proposed Amendment of project title in the EA (with marked up changes) is as follows:

“Proposed 55.5MW Springbok wind power generation facility ~~on the farm~~ O’Nabapeep near Springbok, Northern Cape Province”.

The proposed Amendment of project title in the EA (without marked up changes) is as follows:

“Proposed 55.5MW Springbok wind power generation facility near Springbok, Northern Cape Province”.

➤ **Update of Holder of EA contact details (amendment of EA dated 18 May 2016):**

The contact details for the holder of the EA is currently as follows:

*“Mulilo Springbok Wind Power (Pty) Ltd”
Mr John Cullum
PO Box 50
CAPE TOWN INTERNATIONAL AIRPORT
7525*

*Telephone Number: (021) 934 5278
Fax Number: (021) 935 0505
Cell phone Number: (082) 565 4624
Email Address: jonny@mulilo.com”*

The proposed Amendment to the contact details of the holder of the EA (with marked up changes) is as follows:

*“Mulilo Springbok Wind Power (Pty) Ltd”
Mr John Cullum
PO Box 548
Howard Place
Cape Town
7540*

*Telephone Number: (021) 685 3240
Fax Number: 086 635 6809
Cell phone Number: (082) 565 4624
Email Address: jonny@mulilo.com*

The proposed Amendment to the contact details of the holder of the EA (without marked up changes) is as follows:

"Mulilo Springbok Wind Power (Pty) Ltd"
Mr John Cullum
PO Box 548
Howard Place
Cape Town
7540

Telephone Number: (021) 685 3240

Fax Number: 086 635 6809

Cell phone Number: (082) 565 4624

Email Address: jonny@mulilo.com"

2.3 MOTIVATION FOR PROPOSED AMENDMENTS

2.3.1 Amendment of project description (including layout)

As indicated previously, as onshore wind energy facilities (WEF) receive continued support worldwide from governments and energy regulators, technological improvements are being seen on a continual basis. In order to ensure that a WEF has the smallest possible footprint per total installed capacity, the wind turbine generators (WTG) are evolving in higher yielding and more efficient generating units. As the engineering loads and fatigues are better understood on the units, it allows the designers and engineers to design the most optimal and highest yielding WTGs for the specific terrain and climatic conditions.

Mulilo Springbok Wind Power (Pty) Ltd wishes to increase the generating size of the WTG's in order to align to current international WTG models, while reducing the number of WTGs at the WEF. The general benefits of using larger sized turbines, compared to older generation turbines are:

- Improved grid code compliance and voltage regulation, providing a more secured energy supply;
- Improved warranted power and noise curves;
- Decrease in WTG load fatigue, maintenance costs and downtime;
- Decrease in the road area coverage per installed capacity;
- More efficiently yielding the wind energy resource, and reducing the need for further WEF development to increase the total installed capacity.

Ensuring that the newer generation WTG can be used at the Springbok WEF, would offset a new 'virgin' greenfield WEF development, as the WEF is situated on a formerly mined and explored mountain range. Furthermore, the proposed site in Springbok is adequately positioned for a WEF, due to the following attributes:

- Excellent consistent wind resource;
- Eskom substation positioned close to the WEF, with minimal distance required for the transmission lines to be built;

- Most accessible positions have been chosen, with the least impact on the environment and construction costs;
- The Wind Energy Facility is located in a central position in the Northern Cape/ Namaqualand, thereby being able to offset any electrical losses that occur due to transmitting electricity to the region”.

(Mulilo Springbok Wind Power (Pty) Ltd, 2017)

Refinements to the WEF layout are also proposed, and accommodate the recommendations of the 12 month pre-construction bird and bat monitoring studies. The bat sensitivity map indicates potential roosting and foraging areas, including High Bat Sensitivity areas due to elevated levels of bat activity and bat diversity. These High Bat Sensitivity areas have been designated as ‘no-go’ areas due to expected elevated rates of bat fatalities as a result of wind turbines. Thus, turbines located within these High Sensitivity areas (namely turbines 3, 12, 15 and 23) have been relocated, as per the proposed updated WEF layout (see Figure 1 and Appendix A) (Animalia, 2015). Furthermore, a follow up vegetation survey of the southern part of the study area, undertaken by the botanical specialist, Nick Helme, in November 2014, identified constraints which were used to help place the amended turbine layout (Helme, 2017). The proposed amended layout of the turbines will require changes to the location of supporting infrastructure (refer to Appendix A for turbine positions, access roads and distribution network).

Note: Since the approval of the project in 2011, the DEA has undertaken a Strategic Environmental Assessment (SEA) for wind and solar photovoltaic PV energy in South Africa. This was initiated to streamline the regulatory environmental requirements for Strategic Integrated Projects (SIPs) while safeguarding the environment, namely SIP 8 which aims to facilitate the implementation of sustainable green energy initiatives. The SEA identifies areas where large scale wind and solar PV energy facilities can be developed in terms of SIP 8 and in a manner that limits significant negative impacts on the environment, while yielding the highest possible socio-economic benefits to the country. These areas are referred to as Renewable Energy Development Zones (REDZs). Eight proposed REDZ and five Power Corridors were approved by Cabinet in 2016 (Refer to Figure 2 below).

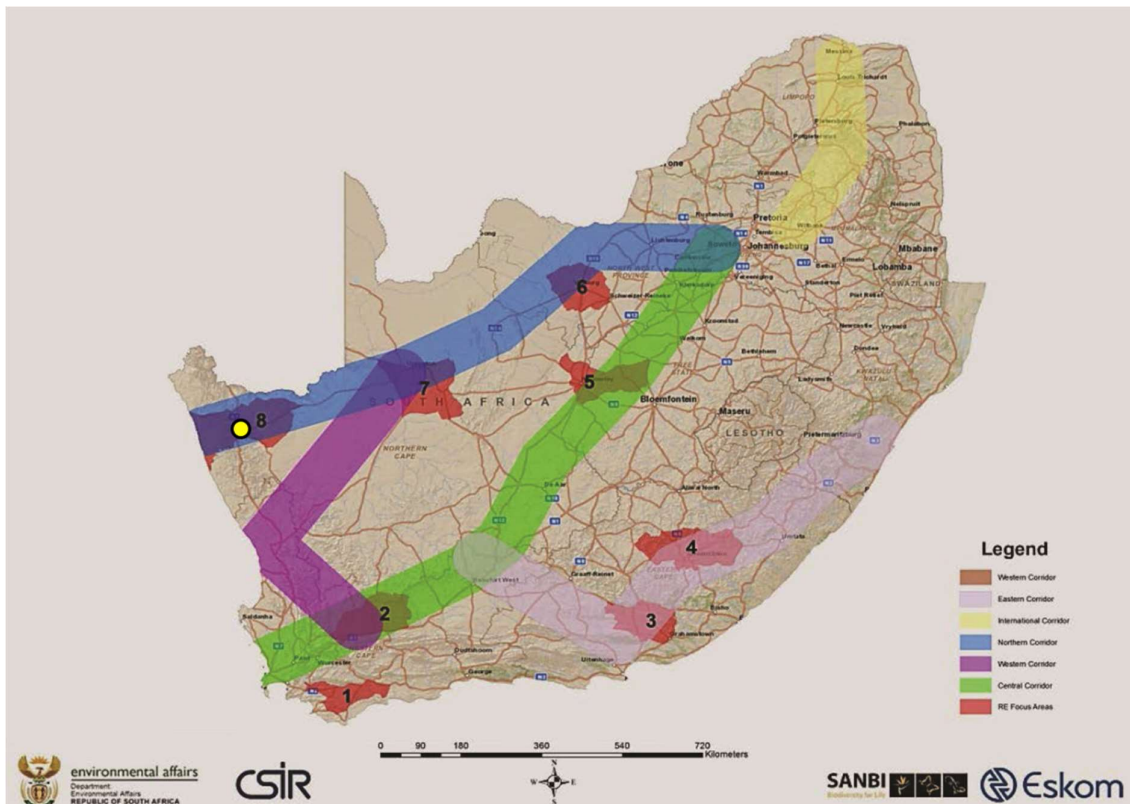


Figure 2 - Map showing the location of the REDZ and associated Power Corridor. The location of the Springbok WEF within Focus Area 8 and the Northern Corridor is indicated by the yellow circle (Source: www.csir.co.za)

The Springbok WEF falls within the Focus Area 8 demarcated area, which means that the proposed facility is in line with the criteria of the SEA in identifying this area as being of strategic importance for wind development (<https://www.csir.co.za/national-wind-solar-sea>). The benefit of the proposed project falling within a REDZ will allow for proactive and socialised infrastructure which could enable sustained growth in the wind and solar PV energy sector. Since these REDZ are determined on a national strategic level, the suitability of the site for a wind PV development is supported, depending on the site specific assessment and impacts identified during the EIA phase.

2.3.2 Amendment of project title in EA

The Applicant proposes to remove the reference to “Farm O’Nabapeep” in the project title of the EA, given that the project is located over a number of properties, as described in the amended EA dated 27 June 2014 (as amended, 18 May 2016), and Section 1 of this report. Reference to only “Farm O’Nabapeep” in the title of the EA may therefore lead to confusion for the affected landowners.

2.3.3 Amendment to contact details of the holder of the EA

The holder of the EA (i.e. the Applicant) has recently moved office premises and therefore wishes to update the contact details for the holder of the EA.

3 ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS

The potential environmental impacts associated with the proposed amendments have been assessed and described in the following section of this report. In this regard, all of the specialists that undertook specialist studies for the original EIA for the proposed Springbok WEF, as well as the 12 month pre-construction bird and bat monitoring studies, have undertaken a re-assessment of the potential environmental impacts (within their area of expertise), to determine the implications of the proposed amendments, if any. The following specialist investigations were undertaken:

- Impacts on vegetation (also referred to as botanical impacts);
- Impacts on avifauna (birds);
- Impacts on bats;
- Impacts on reptiles;
- Noise impacts;
- Visual impacts;
- Heritage impacts (including archaeological and paleontological impacts);
- Traffic impacts; and
- Socio-economic impacts.

Refer to Table 3 included in Section 1.4 above for the list of specialists.

The updated specialist studies, outlining the implications, if any, of the proposed amendments in terms of environmental impacts, are summarised below, and are included in Appendix C. (Note: Following the issuing of the Terms of References to the specialists and the submission of the specialist addendum reports, refinements to the proposed amendments relating to the hub heights of four of the turbines was required, in order to address the recommendations of the bird specialist. In particular, the bird specialist recommended that the hub height of Turbine numbers 4, 8, 15 and 16 be reduced from the proposed maximum height of 140m, to a maximum height of 105m, to minimise potential impacts on birds to acceptable levels (refer to Avian Addendum Report included in Appendix C2). The proposed amendment to the project description was refined accordingly, and the specialists were requested to issue a further specialist comment to address the implications, if any, of the proposed hub height of 105m for the aforementioned four turbines. The specialist comments are included with the respective specialist Addendum Reports, in Appendix C).

Note: The proposed amendments described in Section 2 are referred to as “the proposed Amended Option” in this section, whilst the authorised project (as described in the EIA Report (2010) and EA) is referred to as “the Authorised Project”.

3.1 AMENDMENT OF THE PROJECT DESCRIPTION AND LAYOUT

3.1.1 Impacts on vegetation

The WEF and associated infrastructure would be located in the vegetation type known as Namaqualand Klipkoppe Shrubland, which occurs on rocky, granite derived soils in the area. This is a botanically diverse vegetation type, and is part of the Succulent Karoo biome (Mucina & Rutherford 2006). The vegetation type is relatively widespread and covers large parts of the rocky hills between Springbok and Nuwerus – some 150km to the south. Due mainly to the relative lack of intensive crop agriculture in this arid region, this vegetation type is still largely intact, and is therefore not regarded as a Threatened vegetation type on a national basis (Rouget *et al* 2004) (Helme, 2015). However, there are significant areas of botanical sensitivity on site, including a large area designated as a terrestrial Critical Biodiversity Area (CBA) (mainly in the southern half of the site).

a) Potential Impacts

As for the Authorised Project, the key ecological issues associated with the potential development of a WEF in the study area include (Helme 2017):

- Degradation and loss of currently largely pristine natural habitat, notably Namaqualand Klipkoppe Shrubland.
- Cumulative impacts of loss and degradation of Namaqualand Klipkoppe Shrubland throughout the region.
- Loss of literally tens of thousands of plants (most being legally Protected Species) within the development footprints for the roads, crane pads and turbine foundations.
- Possible erosion resulting from road construction on relatively steep, rocky slopes.
- Minor disruption and loss of current ecological connectivity across the study area, and associated habitat fragmentation.
- Loss of significant portions of mapped Critical Biodiversity Areas, and impacts on achievement of national conservation targets for affected habitat units.

The primary direct impact associated with the project is the permanent loss of natural vegetation (and associated possible Species of Conservation Concern (SCC)) within some of the development footprints due to the internal access roads, the turbine footprints, the substation, and power line tower footprints (insignificant). Potential sources of vegetation loss (mostly irreversible) include excavation and sand piles for large foundations, blasting for some of the foundations, excavation of the cable trenches, the laydown areas and construction camp, and turning circles, crane tracks and roads alongside the power line. Fewer, larger turbines as proposed for the Amended Proposed Option would mean incrementally smaller overall disturbance areas (Helme 2017).

i) Construction Phase Impacts

Potential construction phase impacts include:

- Permanent loss of natural vegetation; and
- Long term but reversible loss of natural vegetation.

Permanent Loss of Natural Vegetation:

Less than 5% of the proposed permanent development footprints will impact on natural vegetation of Very High botanical sensitivity. Approximately 70% will be in areas of Medium and High botanical sensitivity, and about 25% will be in areas of Low botanical sensitivity. It is estimated that the Authorised Project would result in the permanent loss or degradation of approximately 27.5ha of currently natural vegetation, and approximately 21ha for the proposed Amended Option. In a regional context, the botanical specialist indicated that the permanent loss of 21-27ha of vegetation of a Least Threatened type is of Medium negative significance. Infrastructure that will be located within Very High sensitivity areas include Turbine 1, part of the road between turbines 3 and 4, and short parts of the road between turbines 14 and 24.

No significant populations of SCC are likely to be impacted (by either the Authorised Project or proposed Amended Option), although the confidence level in this prediction is low given the seasonal constraints on the site surveys undertaken, the large size of the site, and the cryptic nature of many of the species (Helme, 2017).

If all Very High botanical sensitivity areas and Critical Biodiversity Areas are avoided by the proposed layout, then the overall construction phase impacts could be reduced to Low – Medium negative overall (Helme, 2017).

Long term but reversible loss of natural vegetation:

The existing natural vegetation will be severely disturbed (but not permanently lost) in various areas, mainly as a result of heavy machinery movement through some sensitive areas, road construction (cut and fill, and material sliding down slope), cable trench excavation through sensitive areas (Authorised Project only), power line construction (where it goes through areas of natural vegetation) and the associated piling and scraping of soil for foundations, roads and crane pads close to or in natural vegetation. Most of these areas (exact area unknown but estimate to be 35ha -50ha for the Authorised Project, and 25ha – 40ha for the proposed Amended Option) should eventually recover to a significant degree (if natural vegetation is maintained in the adjacent areas), but the crushed and dug up vegetation could take up to 20 years (and possibly longer if rainfall is below average) to recover to a point where 80% of the original diversity is once again present. Succulent and bulb species, being poorly disperse and habitat specific, will be particularly impacted. Certain species may not return for many additional years due to changes in soil structure (compaction or chemical changes) (Helme 2017).

Primary sources of long term disturbance will be the large crane (that is used to erect the turbines); laydown areas next to turbines; cable trenches; turning circles; blasting for turbine foundations; construction damage associated with the access roads and the construction of the new power line.

In the regional context, this reversible but long term loss of 35ha – 50ha (Authorised Project) or 25ha – 40ha (proposed Amended Option) of natural vegetation of a Least Threatened type is of Medium significance.

ii) Operational Phase Impacts

Indirect ecological and botanical impacts usually occur at the operational phase, and are often difficult to identify and quantify. Some possible indirect negative effects on the vegetation (shading, disturbance of wind flow, etc.) are likely to be minimal and are not assessed further in Helme's botanical assessment.

Indirect impacts are likely to have a minor impact on the site, due to the extensive areas of available habitat that will not be disturbed by the proposed project. Helme (2017) noted that, perhaps the most important indirect impact is that of habitat fragmentation, the primary source of which will probably be the extensive network of internal access roads that would have to be built. The construction of the access roads would likely require extension cut and fill, and the soil disturbance caused may provide ideal conditions for the introduction and establishment of invasive alien species – in the form of annuals, grasses and herbs. All other infrastructure will also have some negative impact on habitat integrity, albeit it to a lesser degree.

The potential impact for indirect botanical impacts during the operational phase has been rated as Low negative (before and after mitigation) for both the Authorised Project and proposed Amended Option.

iii) Cumulative Impact

The proposed WEF is likely to have a Very Low negative cumulative impact in the region, as there are very large areas of undisturbed natural habitat remaining, with few current threats to habitat integrity other than overgrazing and fairly small scale quarrying and mining, and no other WEF are present in the area.

It should be noted that the establishment of a WEF in the area may encourage and facilitate the establishment of other WEFs in the area (this typically happens in many areas overseas, due to the presence of established transmission line infrastructure), and these would then have an important negative, cumulative impact (Helme 2017).

iv) Positive Impacts

The proposed WEF is unlikely to have any direct positive botanical or ecological impacts, apart from the small global scale positive impact of helping to reduce CO₂ emissions by generating "clean energy". If a biodiversity offset is implemented as part of the authorisation requirements, then this could also have a strong positive ecological impact, particularly if it facilitates the expansion of an existing conservation area such as the nearby Goegap Nature Reserve into priority conservation areas (Helme, 2017).

v) Impact Summary

The overall development disturbance footprint for the proposed Amendment Option is likely to be about 20 – 30% smaller than for the Authorised Project, and will thus have a slightly lower botanical impact. The proposed Amendment Option will impact on largely the same type of habitat and species as the Authorised Project.

Anywhere from 40ha – 60ha (depending on the number of turbines) of Medium, High and Very High Sensitivity natural vegetation is likely to be degraded or permanently lost due to the proposed amended development layout. The overall botanical impact, although clearly slightly lower than for the Authorised Project, is still best described as Medium negative at a regional scale, before mitigation. If livestock is not removed from the project area during the operational phase but a suitable biodiversity offset is implemented (the latter being strongly recommended mitigation requirement by the botanical specialist), then the overall botanical impact after mitigation could be reduced to Low negative (Helme, 2017).

Table 5. Summary table for overall (combined direct and indirect) botanical impacts of the Authorised Project and proposed Amended Option (Source: Helme, 2017)

Alternative	Extent of impact	Duration of impact	Intensity	Impact Reversible	Irreplaceable loss of resources	Probability of occurrence	Status of the impact	Degree of confidence	Level of significance (before mitigation)	Significance after mitigation
Authorised alternative	Local	Long term to Permanent	Medium	Mostly not	Medium-High	High	Negative	High	Medium negative	Medium negative
Proposed, Amended Alternative	Local	Long term to Permanent	Medium	Mostly not	Medium	High	Negative	High	Medium negative (although slightly lower than for the authorized alternative)	<u>Low negative</u>

b) Mitigation

The following mitigation is regarded as reasonable and feasible and is factored into the assessment of the proposed Amended Option and is thus regarded as essential (Helme 2017). (Note: All but two of the proposed mitigation measures were included in the original botanical assessment report and EIA for the project (i.e. for the Authorised Project). Additional mitigation measures required as a result of the proposed Amended Option are underlined below for ease of reference):

- Turbine 1 should be moved at least 80m east, out of the Very High sensitivity area. This new position would be at the same altitude and would still be more than 360m from Turbine 2, and is unlikely to compromise its efficiency.
- An ECO must be permanently on site throughout the road construction, cable laying, turbine foundation excavation and blasting, and during the erection of the turbines.
- Any excavation, including those for any cables, must be supervised by the ECO. No excavations may be left open for more than 1 week, and they should preferably be

closed up within 1 day, using the carefully stockpiled soil or rock that came out of the trench. In the case of turbine foundations large volumes of soil and rock will be displaced by the concrete, and this should not be dumped on any undisturbed natural vegetation, but must rather be set aside within a portion of the turning circle of the trucks that deliver the components, or within the cane pad area, and must be spread over the foundations once the turbines are erected, or used as access road fill elsewhere on the site.

- In order to minimise blasting and excavation disturbance, all electrical cabling between turbines and between turbines and the substation must be above ground rather than buried.
- Construction operations in all areas other than mapped Low sensitivity areas (refer to Figures 3 & 4 in Appendix C1) should be restricted to the dry season (15 October – 1 May) to minimise damage to seasonal plants such as bulbs.
- No dumping or temporary storage of any materials may take place outside the designated and demarcated laydown areas.
- No cement or concrete may be spilled, dropped or offloaded anywhere except within designated development footprints.
- A CEMP and OEMP should be drawn up, which must outline management steps for all the areas of natural vegetation on the site.
- Appropriate alien vegetation management must be undertaken in the 3.8km long powerline servitude and along the edges of all on-site infrastructure on an annual basis for the first four years after construction, and this should be audited by a qualified botanist or conservation official every two years (in August or September). No spraying of herbicide should be allowed anywhere on site, due to impacts on adjacent non-target species.
- Should the amended layout be authorised and should the project become operational, a suitable biodiversity offset must be implemented within one year of any such operational commencement. This means that the Applicant must appoint a suitably qualified and experienced biodiversity offset specialist to facilitate this process within 3 months of the project becoming operational. The biodiversity offset specialist will work together with the botanical specialist and the Northern Cape conservation authorities (who manage the nearby Goegap Nature Reserve) to plan all aspects of the offset required. This offset will be the primary means of mitigating the Medium negative residual botanical impacts, and depending on the quantum could reduce the botanical impacts to Low negative or even Neutral (Helme, 2017).

c) Conclusion

- The entire site supports Namaqualand Klipkoppe Shrubland vegetation, which is not regarded as a threatened vegetation type on a national basis. However, there are significant areas of botanical sensitivity on site, including a large area designated as a terrestrial CBA. Both the Approved Project and the proposed Amended Option avoid the main northeast ridge where SCC were recorded (Helme, 2017).
- From a botanical perspective the facility would be better located in a lower sensitivity area on the surrounding plains, where it would have a lower overall botanical impact (Helme, 2017).

- The Authorised Project is likely to have a Medium negative botanical impact (before and after mitigation, which unfortunately did not include a biodiversity offset or removal of livestock) (Helme, 2017).
- The overall development disturbance footprint for the proposed Amended Option is likely to be 20-30% smaller than for the Authorised Project, and will thus have a slightly lower botanical impact. The proposed Amended Option will impact on largely the same type of habitat and species as the authorised alternative (Helme, 2017).
- From 40-60ha (depending on the number of turbines) of Medium, High and Very High sensitivity natural vegetation is likely to be degraded or permanently lost due to the proposed Amended Option development layout, including significant areas within mapped CBAs (Helme, 2017).
- Overall botanical impact, although clearly slightly lower than for the Authorised Project, is still best described as Medium negative at a regional scale, before mitigation (Helme, 2017).
- If a suitable biodiversity offset is implemented then the overall botanical impact of the proposed Amended Option after mitigation could be reduced to Low negative, and this is therefore strongly recommended by the botanical specialist (Helme, 2017).

Refer to Appendix C1 for the Addendum to the Botanical Impact Assessment report.

3.1.2 Impacts on avifauna

The potential impacts on avifauna associated with the project were previously reported on by Dr Rob Simmons in 2010 and again in 2015 (Simmons 2010, Simmons and Martins 2015 of Birds & Bats Unlimited). The pre-construction monitoring for sensitive birds (undertaken by Birds & Bats Unlimited) indicated that nine collision-prone bird species were found to use the area, seven of which are red-listed species. Four of the RDB species have a very low likelihood of occurrence on the site (< 1%), and were therefore deemed unlikely to be negatively affected by the turbines. Refer to Table 6 below.

Table 6: Seven Red Data Species identified in the avian EIA Report (Simmons and Martins, 2015) (Source: Simmons & Martins, 2017)

Common name	Conservation status	Relative importance of local population ¹	Susceptibility to collision	Susceptibility to electrocution	Susceptibility to disturbance	Likelihood of occurrence* [our records]**
Black Stork	Near Threatened	Low?	High	High	High	1% [0%]
Verreaux's Eagle	Vulnerable	Moderate	High	Low	Medium	29% [100%]
Black Harrier	Vulnerable*	Moderate to High	High	-	Moderate	9% [0%]
Martial Eagle	Vulnerable	Low?	Moderate	High	Moderate	7% [8%]
Lanner Falcon	Near-threatened	Low?	High	Moderate	-	4% [17%]
Ludwig's Bustard	Vulnerable	Low?	High	Moderate	Moderate	1% [0%]
Red Lark	Vulnerable	High	Low	Low	Moderate	1% [0%]

1. An indication whether the population is a core, or marginal, one relative to the main population

*Likelihood is based on the reporting rate: the number of times recorded divided by the number of bird atlas cards =43.

**Likelihood of occurrence based on our own records on site over six visits x two area (WEF and Control), divided by 12]

The threatened species that remain vulnerable to potential impacts at the Springbok WEF include:

- Verreaux's Eagle *Aquila verreauxii* – a *Vulnerable* species (Taylor et al. 2015) and No. 2 on the list of collision-prone species. This species has a 100% chance of occurring on site as it breeds there (Simmons and Martins, 2015).
- Martial Eagle *Polemaetus bellicosus* – a *Vulnerable* species (Taylor et al. 2015) and No. 5 on the list of collision-prone species. This species has a 7-8% chance of occurring on site but does not breed there (Simmons and Martins, 2015).
- Lanner Falcon *Falco biarmicus* – a *Vulnerable* species (Taylor et al. 2015) and No. 22 on the list of collision-prone species. This species has a 17% chance of occurring on site and may breed there (Simmons and Martins, 2015).

Two additional species that are not Red Data species in South Africa but are vulnerable to collisions at the Springbok WEF are:

- Booted Eagle *Aquila pennatus* – ranked 55th in the Top 100 collision-prone birds. This species was recorded on 25% of all visits to the site. It is known to breed within the wind farm site.
- Jackal Buzzard *Buteo rufofuscus* – ranked 42nd in the Top 100 collision-prone birds. This species was recorded on 75% of all visits, and thus has a high chance of occurring.

a) Potential Impacts

Simmons & Martins (2017) indicated that there are three major ways that wind farms can influence birds:

- 1) Through displacement and disturbance (birds avoid the area, through the disturbance caused by the operation of the turbines);
- 2) Through habitat loss and fragmentation (the infrastructure phase and building directly destroys or divides habitat); and
- 3) Through direct mortality (birds are struck by the turbines and die).

According to Simmons & Martins (2017), the effects of the proposed amendments to the authorised project are both positive (reduced number of turbines and, thus, disturbance or displacements of birds), and negative (increased probability of fatalities) for a suite of collision-prone birds (some red listed). Collision with the turbine blades of the WEF, and associated power line network, are the biggest potential risk with turbines placed on the upland ridges or near foraging areas.

Implications to birds from the proposed amendments:

- Hub height and blade length:

Simmons & Martins (2017) reported that recent international research (specifically the Loss *et al* study, which used a data set from 53 wind farms in the USA), has shown that there was a *significant* effect of increasing height on bird fatalities. Therefore, the increase in hub height from 80m to 140m is predicted to have some influence on the background mortality rates for birds such as eagles (Simmons & Martins, 2017). Simmons & Martins concluded that, given their statistical model (refer to Appendix 1 of Appendix C2) and the fact that twice as many eagle flights occur at these heights, between two-fold and four-fold more avian fatalities are forecast by increasing turbines from 80m to 140m (Simmons & Martins, 2017).

- Siting of turbines:

Following the release of the avian findings in the original EIA report (2010), the number of turbines in areas around the two known active Verreault's Eagle and Booted Eagle nests were reduced. During site visits (Simmons and Martins 2015), it was noted that flights by two or more collision-prone eagle species were recorded within 150m of the following turbines:

- WTG 4
- WTG 8
- WTG 15
- WTG 16

Given that collisions are more likely with taller turbines, these four turbines are most likely to cause negative impacts (direct fatalities).

- Number of turbines versus increased hub height

Increasing hub heights to 140m for the 25 turbines is forecast to have a marked negative affect on avian fatalities (Simmons & Martins, 2017). Refer to Appendix C2a for the model forecasting undertaken by Simmons & Martins, 2017).

i) Construction Phase Impacts

The potential construction phase impacts associated with the proposed Amended Option include:

- Direct mortality, disturbance or avoidance of area around the wind farm for the raptors identified as at risk, due to disturbance, or impacts with turbine blades and overhead lines during construction.

The significance of this potential impact was rated as **Low negative** (before and after mitigation) for both the Authorised Project and Proposed Amended Option. Refer to Table 7 below.

Table 7: Summary table for impacts on avifauna for Authorised Project and Proposed Amendment Option: Construction Phase (Source: Simmons & Martins, 2017)

Nature: Direct mortality, disturbance or avoidance of area around the wind farm for the raptors identified as at risk, due to disturbance, or impacts with turbine blades and overhead lines during construction				
	Authorised Project		Proposed Amendment	
	Pre-mitigation	Post mitigation	Pre-mitigation	Post mitigation
Extent	Local	Local	Local	Local
Duration	Short term	Short term	Short term	Short term
Magnitude	Low	Low	Low	Low
Probability	Distinct Probability	Distinct Probability	Distinct Probability	Distinct Probability
Reversibility	High	High	High	High
Irreplaceable loss of species	No (Both Verreaux's and Booted Eagles may suffer short term disturbance, displacement, and loss of breeding but return after construction)		No (Both Verreaux's and Booted Eagles may suffer short term disturbance, displacement, and loss of breeding but return after construction)	
Significance	Low	Low	Low	Low

ii) Operational Phase Impacts

The potential operational phase impacts associated with the proposed Amended Option include:

- Direct mortality, disturbance or avoidance of area around the wind farm for the raptors identified as at risk, due to disturbance, or impacts with turbine blades and overhead lines during operations.

The significance of this potential impact was rated as Medium-High negative (before mitigation) and Medium negative (after mitigation) for the proposed Amended Option, as opposed to Medium Negative (before mitigation) and Low negative (after mitigation) for the Authorised Project. Refer to Table 8 below. This is largely due to the increase in hub heights and blade length associated with the proposed amendments.

Table 8: Summary table for impacts on avifauna for Authorised Project and Proposed Amendment Option: Operational Phase (Source: Simmons & Martins, 2017)

Nature: Direct mortality, disturbance or avoidance of area around the wind farm for the raptors identified as at risk, due to disturbance, or impacts with turbine blades and overhead lines during operations				
	Authorised Project		Proposed Amendment	
	Pre-mitigation	Post mitigation	Pre-mitigation	Post mitigation
Extent	Local	Local	Local	Local
Duration	Very High	Very High	Very High	Very High
Magnitude	Moderate	Low	High	Moderate
Probability	Highly Probable	Distinct Probability	Highly Probable	Distinct Probability
Reversibility	Low	Medium	Low	Medium
Irreplaceable loss of species	No (Verreaux's Eagles are not uncommon and rarer. Booted Eagles may be less susceptible to collision and displacement)		No (Verreaux's Eagles are not uncommon and rarer. Booted Eagles may be less susceptible to collision and displacement)	
Significance	Medium	Low	Medium-High	Medium

iii) Cumulative Impact

Cumulative impacts are those that will impact the avian communities in and around the Springbok development, mainly by other renewable energy facilities (wind and solar) and associated infrastructure in the Nama and Succulent Karoo biome. The bird specialist indicated that there are nine renewable energy developments within a 50-km radius of the Springbok WEF, that are currently on record with DEA, and all but four are approved (Simmons & Martins, 2017). One is lapsed/ withdrawn and is omitted from further calculations. Most are south and east to the Springbok site, and eight of the nine sites are solar PV. The total output from the eight approved sites is 410MW.

The impact of the WEFs proposed in the Northern Cape is expected to be negative and arise from disturbance, displacement and collision for birds around the wind turbines. The associated infrastructure will also impact species in the form of impacts with un-marked power lines. The direct impact of the wind farms (refer to Table 5 of Appendix C2) was gauged using unpublished data released by Birdlife South Africa for fatalities at 6 wind farms in South Africa (Ralston-Paton et al. 2017). About 4.1 birds/turbine/yr, or ~2.43 birds/MW/year are killed annually. If a total of 280MW is generated per year from the sole (Nama-Khoi Municipality)

wind farm, then Simmons & Martins (2017) estimates <680 birds killed per year there. For the remaining seven solar farms (omitting the lapsed/ withdrawn Biesjesfontein site), totalling 130MW, the total number of fatalities is estimated at 585 birds. In total about 1,265 avian fatalities are predicted as the cumulative total for all renewable energy sites within 50-km of Springbok. This is likely to be a maximum figure given that unpublished reports from elsewhere report no fatalities for solar farms but some displacement. About 4% of the total of the wind farm fatalities are expected to be threatened Red Data raptors (data from Ralston-Paton et al. 2017). Thus, Simmons & Martins predicted a maximum of 27 threatened raptors may be included in this total per year without mitigation. Simmons therefore concluded that the likely cumulative impact varies from medium to high without mitigation, but added that careful mitigation can reduce this to acceptable levels.

The significance of the potential cumulative impacts was rated as **Medium negative** (before and after mitigation) for both the Authorised Project and Proposed Amended Option. Refer to Table 9 below and Appendix C2.

Table 9: Summary table for cumulative impacts on avifauna for Authorised Project and Proposed Amendment Option (Source: Simmons & Martins, 2017)

	Cumulative Impact with Authorised project	Cumulative Impact with Proposed Amended Option
Extent	Regional	Regional
Duration	Long-term	Long-term
Magnitude	Moderate	Moderate
Probability	Most likely	Most likely
Significance	Medium	Medium
Status	Negative	Negative
Reversibility	Medium	Medium
Loss of resources/species	Possible	Possible
Can impacts be mitigated	Probably, Yes	Yes

b) Mitigation

The recommended mitigation measures include of the following (Simmons & Martins 2017):

- For the construction phase:
 - No construction within 500m of Verreux's Eagle nests during their early breeding season (May to June) or small chick rearing season (June – July). This applies to Turbines 7 and 9 in the southern sections of the site. For breeding Booted Eagles, the seasons to avoid are August – September.
 - Avoid blasting or causing noise disturbance in the same seasons anywhere within 3km of active nests for all Red Data Species.
- For the operational phase:
 - No siting of turbines in high risk areas where collision prone raptors are shown to be perching or flying or aerially abundant.
 - Specifically reducing the hub heights (to 105m) and blade lengths of the turbines WTGs 4, 8, 15 and 16 as the most likely turbines to experience

- fatalities of Verreaux's and Booted Eagles. (The Applicant has complied with this recommended mitigation, as per the proposed amendments outlined in Section 2).
- Maintaining or even increase the grazing pressure (by sheep and goats) on the wind farm site to reduce the attractiveness of the site for mammal-eating raptors (livestock compete with hyrax and mice for food resources and reduce the prey available for large-medium raptors).
 - In accordance with the Adaptive Management Plan, appropriate mitigation measures, such as curtailment at specific environmental conditions or during high-risk periods (i.e. post construction monitoring shows 1 Red Data species killed at these turbines per year) then the use of appropriate automatic shut down or deterrent technology, will have to be implemented in the case of mortality of Red Data species (defined as: 1 Red Data species killed per year).
 - The operational monitoring study design must determine the exact environmental conditions as well as the turbines that require appropriate mitigation measures.
 - Two adaptive management mitigations are recommended if Red Data species are found to be killed:
 - The automated "multi-sensor" video system, presently under test by J Avni, which deters incoming birds or feathers the blades, or turns off turbines as collision-prone species approach within 500m of these turbines.
 - Investigate painting half a blade black to deter raptors as undertaken by Norwegian wind farms to reduce white-tailed Eagle deaths with great success (Stokke et al. 2017, cited in Simmons & Martins, 2017)
 - All overhead powerlines to be fitted with diurnal and nocturnal bird diverters to reduce collisions and burying all internal powerlines in the WEF, wherever possible. Simmons & Martins (2017) noted that they understand that some rare small succulent plants can be displaced by attempting to bury lines in rocky terrain, so only areas where this impact is avoided should this be attempted.
- For cumulative impacts:
 - Avoiding all nest areas and foraging/roosting areas of Red Data species in the siting of said facilities. Appropriate buffers around nests (e.g. 3km for Verreaux's Eagles) should be applied, particularly to the most collision-prone species;
 - The turbines 4, 8, 15 and 16 are likely to be the riskiest due to flight paths of eagles and they should be replaced with turbines of lower hub height (105m);
 - If operational phase monitoring indicates that one or more Red Data bird are killed at any turbine, then it is recommended that multi-sensor deterrent/shut down systems are placed on those turbines;
 - Multi-sensor radar detection of collision-prone birds can deter birds through audible or visual deterrence to prevent birds from approaching close to the turbines;
 - Intense short-wave radiation (Foss et al. 2017, cited in Simmons & Martins, 2017) should be tested as a deterrent;
 - If audible or visual deterrence is ineffective then selective stopping of turbines should be tried;

- Marking all new overhead powerlines with bird diverters to avoid large birds colliding with them;
- Reduce leakages (in the pipe crossing the wind farm site) and cover all water points so they are not visible from above to prevent/reduce arid-zone species being attracted to them;
- Introduce livestock into the area around the turbines to reduce the attractiveness of the habitat to raptors through increased grazing pressure reducing prey populations.

c) Conclusion

The proposed amendments (i.e. 25 turbines with hub heights of 140m) is likely to incur more fatalities than the authorised 37 turbines of 80m height. However, with suitable mitigations, i.e. either (i) the four most “risky” turbines (i.e. turbine numbers 4, 8 15 & 16) have their hub heights reduced to 105m and blade length reduced; and (ii) all turbines killing one or more Red Data birds per year will need to be fitted with automated deterrent or shut-down on demand, then the Applicant can reduce their environmental/ avian footprint to acceptable levels. Simmons & Martins (2017) recommends a minimum of 12 months’ post-construction monitoring to determine the effects of the wind farm on the Red Data species identified as at risk. With these mitigations, the avian specialist can recommend that the Springbok wind farm, as amended, can be allowed to proceed (Simmons & Martins, 2017). (Note: The Applicant has reduced the hub height to 105m for the four “risky” turbines (turbine numbers 4, 8 15 & 16), as indicated in the proposed amendments outlined in Section 2).

3.1.3 Impacts on bats

The initial EIA bat sensitivity assessment (undertaken by Professor David Jacobs in 2010) assessed the original (currently authorised) turbine layout of 37 turbines. The subsequent 12-month Pre- construction Bat Monitoring Study was carried out by Animalia Zoological and Ecological Consultation (referred to herein as “Animalia”) between March 2015 to September 2016⁸, and assessed the latest 25 turbine layout. Accordingly, the proposed amendment to the number of turbines and layout does not change from that assessed in the pre-construction bat monitoring study.

The final Pre-construction Bat Monitoring report presented a bat sensitivity map indicating sensitive roosting and foraging areas, as well as listed mitigation measures to be implemented (Moir 2017). The proposed Springbok WEF turbine layout is respectful of the bat sensitivity map and does not encroach on any bat sensitive areas and their buffers (Figure 3).

The factors of the proposed amendment that affect the original bat assessment are as follows:

- An increase in the overall tip height from 124m to 230m
- An increase in the lowest tip height from 36m to 90m.

⁸ the final report was issued in November 2016

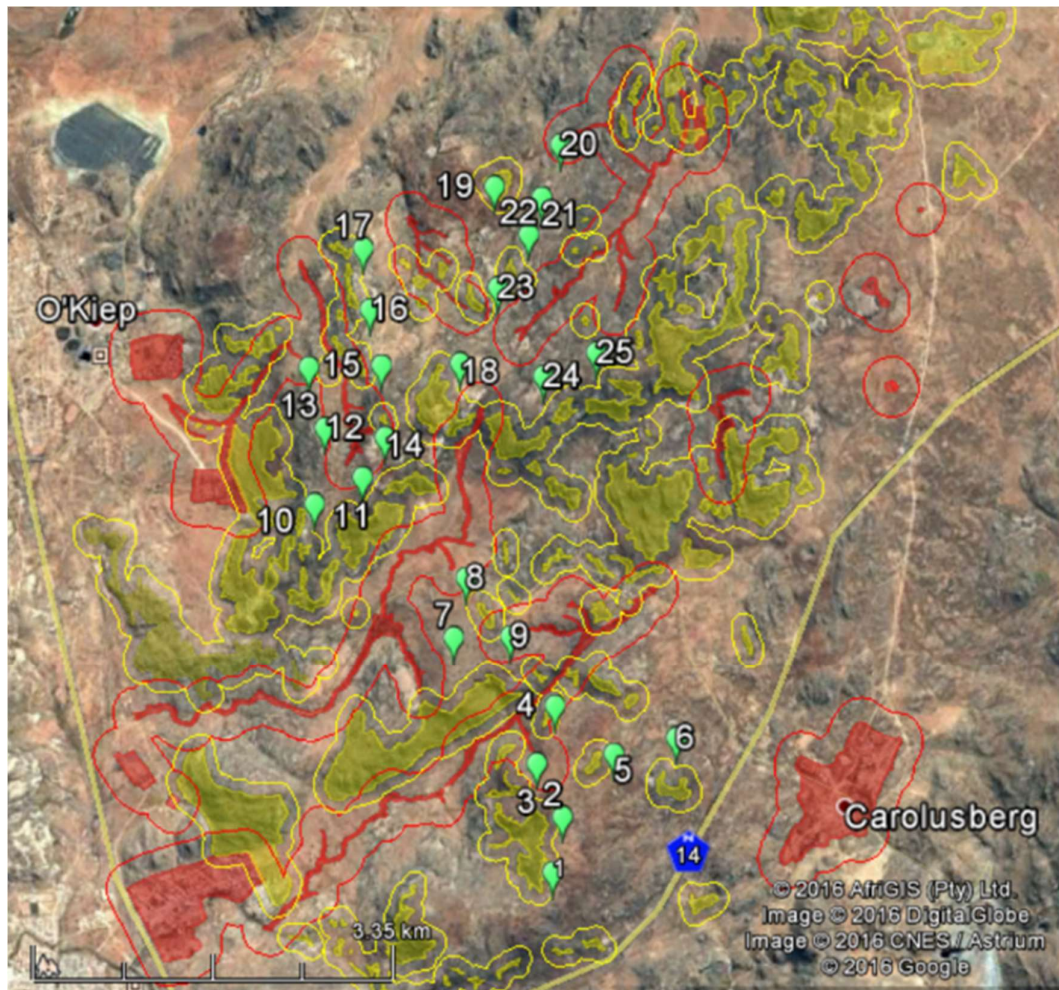


Figure 3 - Bat sensitivity map of the Springbok WEF site as presented in the Final Preconstruction Monitoring Report. Red polygons are High bat sensitivity areas and buffers. Yellow polygons are Moderate bat sensitivity areas and buffers.

Note: Whilst Animalia undertook the re-assessment of potential impacts on bats associated with the proposed amendments, Animalia's findings were provided to Professor Jacobs (the original bat specialist for the EIA for the project) for review and endorsement. Prof Jacobs stated the following: *"I am providing an endorsement of the 12 month pre-construction monitoring report dated November 2016 and the Amendment report dated February 2017, compiled by Animalia Zoological & Ecological Consultation (Pty) Ltd. on the likely impact on bats of the amendment to the generating capacity of turbines at the proposed Springbok Wind Energy Facility, Northern Cape. I concur with the reports' assessment of the likely impact on bats of the proposed facility as well as the report's recommendations on all mitigation measures and restrictions"* (Jacobs, 2017). Both Animalia's Addendum Report and Prof Jacob's endorsement thereof are included in Appendix C3.

a) Potential Impacts

i) Construction Phase Impacts

As per the Authorised Project, the potential construction phase impacts associated with the proposed Amended Option may include:

- Destruction of bat roosts due to earthworks and blasting; and
- Loss of foraging habitat.

Table 10 below is an excerpt from the assessment table for potential construction phase impacts included in the Addendum to the Bat Impact Assessment, indicating the significance rating for both the Authorised Project and proposed Amended Option.

Table 10: Impacts on Bats: Significance ratings: Construction Phase (Source: Moir, 2017)

	AUTHORISED PROJECT		PROPOSED AMENDMENT	
	Pre-Mitigation Significance Rating	Post Mitigation Significance Rating	Pre-Mitigation Significance Rating	Post Mitigation Significance Rating
Destruction of bat roosts due to earthworks and blasting	High (-)	Low (-)	High (-)	Low (-)
Loss of foraging habitat	Medium (-)	Low (-)	Medium (-)	Low (-)

ii) Operational Phase Impacts

As per the Authorised Project, the potential operational phase impacts associated with the proposed Amended Option may include:

- Bat mortalities due to direct blade impact or barotrauma during foraging activities (not migration): If the impact is too severe (e.g. in the case of no mitigation) local bat populations may not recover from mortalities.
- Artificial lighting: During operation, strong artificial lights that may be used at the turbine base or immediate surrounding infrastructure, the light will attract insects and thus bats. This will significantly increase the likelihood of blade collision and barotrauma to bats foraging around such lights. Additionally, only certain species of bats will readily forage around strong lights, whereas others avoid such lights even if there is insect prey available, which can draw insect prey away from other natural areas and thereby artificially favour only certain species.

Table 11 below is an excerpt from the assessment table for potential operational phase impacts included in the Addendum to the Bat Impact Assessment, indicating the significance rating for both the Authorised Project and proposed Amended Option.

Table 11: Impacts on Bats: Significance ratings: Operational Phase (Source: Moir, 2017)

	AUTHORISED PROJECT		PROPOSED AMENDMENT	
	Pre-Mitigation Significance Rating	Post Mitigation Significance Rating	Pre-Mitigation Significance Rating	Post Mitigation Significance Rating
Bat mortalities due to direct blade impact or barotrauma during foraging	Very High (-)	Low (-)	Very High (-)	Low (-)
Artificial lighting	Medium (-)	Low (-)	Medium (-)	Low (-)

Note: Turbines 4, 8, 15 and 16 are currently proposed to have a hub height of 105m (as recommended by the avian specialist) however with the rotor diameter remaining at a maximum of 160m. This would result in the lowest rotor swept point to be 25m from ground level, which is lower than usual and may significantly impact the portion of bats utilising the lower airspaces. The high flying Free-tailed bats that dominated the site also showed a high abundance at lower heights above ground. This expected increased impact on bats, results in turbines 4, 8, 15 and 16 to require more stringent mitigation measures imposed on them (refer to Table 12 below).

iii) Decommissioning phase

The following impacts were identified and assessed for the decommissioning phase of the project:

- Loss of foraging habitat

Table 12 below is an excerpt from the assessment table for potential decommissioning phase impacts included in the Addendum to the Bat Impact Assessment, indicating the significance rating for both the Authorised Project and proposed Amended Option.

Table 12: Impacts on Bats: Significance ratings: Decommissioning Phase (Source: Moir, 2017)

	AUTHORISED PROJECT		PROPOSED AMENDMENT	
	Pre-Mitigation Significance Rating	Post Mitigation Significance Rating	Pre-Mitigation Significance Rating	Post Mitigation Significance Rating
Loss of foraging habitat within the site boundaries.	Medium (-)	Low (-)	Medium (-)	Low (-)

Cumulative impacts

The re-assessment of impacts undertaken by Moir (2017) indicates that the potential cumulative impacts associated with the proposed amendments (i.e. relating to the abovementioned construction, operational and decommissioning impacts) will remain the same as those for the Authorised Project, i.e. the proposed amendments will not result in an increased level or change in the nature of potential cumulative impacts.

b) Mitigation

- The blades of all turbines of the Springbok WEF must be feathered below manufacturers cut in speed and not allow for free-wheeling. This must be implemented at the onset of operation. Bat activity is markedly higher over low wind speed periods. Preventing free-wheeling should not affect energy production significantly and will be a significant bat conservation mitigation measure.
- To further minimize cumulative impacts from wind farms on bats, the mitigation table below is recommended to be applied to several high-risk turbines at the onset of turbine operation. The identified turbines are numbered 3, 4, 9, 12, 14, 15 and 23. Note: For turbines 4, 8, 15 and 16, the mitigation schedule in Table 14 below is recommended to be implemented from the onset of operation.

Table 13: The recommended mitigation schedule for turbines 3, 9, 12, 14, and 23 (Source: Moir, 2017)

Terms of mitigation implementation	
Peak activity (times to implement curtailment/ mitigation)	10 September - 25 October over the period of sunset to 06:00
Environmental conditions in which to implement curtailment/ mitigation	Wind speed below 4.0m/s and Temperature above 10°C
Autumn peak activity (times to implement curtailment/ mitigation)	15 January – 1 February over the period of sunset to 05:30
Environmental conditions in which to implement curtailment/ mitigation	Wind speed below 4.0m/s and Temperature above 16°C

The mitigation schedule in Table 14 below is based on the passive data collected. They infer mitigation be applied during the peak activity periods and times, and when the advised wind speed (measured at nacelle height) and temperature ranges are prevailing simultaneously. It considering conditions in which 85% of bat activity occurred.

Table 14: The recommended mitigation schedule for turbines 4, 8, 15 and 16 (Source: Marais, 2017)

Terms of mitigation implementation	
Peak activity (times to implement curtailment/ mitigation)	10 September - 25 October over the period of sunset to 06:00
Environmental conditions in which to implement curtailment/ mitigation	Wind speed below 6.0m/s and Temperature above 10°C
Autumn peak activity (times to implement curtailment/ mitigation)	15 January – 1 February over the period of sunset to 05:30
Environmental conditions in which to implement curtailment/ mitigation	Wind speed below 4.5m/s and Temperature above 16°C

The curtailment outlined above must be applied initially at the start of the wind farm operation during the climatic conditions and time frames outlined in Tables 13 and 14 above. The impacts on bats will be monitored during the operational phase monitoring, and the

recommended mitigation measures and levels of curtailment may be adjusted according to the results of the operational monitoring study. This is an adaptive management approach, and it is crucial that any suggested changes to the initial proposed mitigation schedule be implemented within maximum 2 weeks from the date of the recommendation, unless the recommendation refers to a time period later in the future (e.g. the following similar season/climatic condition) (Moir, 2017).

c) Conclusion

A change to the rotor diameter and hub height of the authorised turbines may increase the risk of impact on bats during the operational phase of the WEF, as an increased blade size increases the airspace in which bat mortality may occur during wind turbine operation. The proposed amendments would however not increase the potential impacts on bats during the construction or decommissioning phases. Whilst the proposed amendments to the turbine dimensions would result in a lowered impact on low flying species that are active near vegetation clutter, such as *Neoromicia capensis* the amended turbine size may have an increased impact on high flying bat species, such as *Tadarida aegyptiaca*, based on increased airspace in which mortality is a risk. The increase in turbine dimensions is significant and thus it triggered an increased negative impact in bat mortalities due to direct blade impact or barotrauma during foraging activities, which has resulted in the need for strict application of mitigation measures as described above, in order for the proposed amendments to be acceptable from a bat sensitivity and impact perspective (Moir, 2017).

The curtailment outlined above must be applied initially at the start of the wind farm operation during the climatic conditions and time frames outlined in Table 13 and 14 above. The impacts on bats will be monitored during the operational phase monitoring, and the recommended mitigation measures and levels of curtailment may be adjusted according to the results of the operational monitoring study. This is an adaptive management approach, and it is crucial that any suggested changes to the initial proposed mitigation schedule be implemented within maximum 2 weeks from the date of the recommendation, unless the recommendation refers to a time period later in the future (Moir 2017).

See Appendix C3 for the Addendum to the Bat Impact Assessment Report as well as the endorsement thereof provided by bat specialist, Prof David Jacobs.

3.1.4 Noise Impacts

As indicated in the original Noise Impact Study (2010) and original EIA Report for the project (2010), the existing noise environment within which the project site is located is generally rural. Potentially sensitive receptors within the study area include:

- Communities in Okiep, Bergsig, Carolusberg, Concordia, and Springbok.
- Local dwellings and farmhouses around and within the proposed site.

The wind farm project (as authorised) may introduce additional noise sources into the local rural noise environment. The project's main noise sources and activities include:

- The construction equipment and activities during the construction phase.
- The wind turbines and transformer at the WEF substation during the operational phase.

Given that the proposed amendments include, amongst others, increased size of turbines as well as refinements to the WEF layout, Demos Dracoulides of Demos Dracoulides and Associates Environmental Engineers (DDA) was appointed to undertake an update to the specialist noise study for the project, to determine the implications of the proposed amendments, if any, in terms of potential noise impacts. The findings of the updated report are summarised below and are included in Appendix C4.

a) Potential Impacts

i) Construction Phase Impacts

According to Dracoulides (2017), construction activities will remain the same (as the authorised project), accordingly the findings of the original noise impact study (2010) are expected to be applicable to the proposed amendments. The duration of potential construction phase noise impacts is however expected to be shorter (since only 25 or less turbines will be constructed instead of 37). The potential noise impact associated with both the Approved Project and Proposed Amended Option for the construction phase is Low (Negative).

Table 15: Noise Impacts: Construction Phase (Source: Dracoulides, 2017)

Option	Nature of Impact	Extent of Impact	Duration of impact	Intensity	Probability of occurrence	Status	Degree of confidence	Significance	Mitigation Measure	Significance after mitigation
CONSTRUCTION PHASE										
Authorised Project	Noise	Local	Short-term	Low	Probable	Negative	High	Low	N/A	N/A
Proposed Amended Option	Noise	Local	Short-term	Low	Probable	Negative	High	Low	N/A	N/A

ii) Operational Phase Impacts

Predicted Noise Levels:

Noise modelling for the proposed Amended Option has shown that during the operational phase of the project, turbine's operation generated 40dB(A) noise levels at approximately 500m from the turbine locations. Beyond 1200m, the noise levels were below 30 dB(A). The noise levels which exceeded 40 dB(A) were contained within the site boundaries and did not reach any of the surrounding communities of Carolusberg, Concordia, Okiep, Bergsig and Springbok. During night-time the noise contour lines were found to extend approximately 5% further than the daytime ones. Similar to the daytime conditions, the 35 dB(A) noise levels were well contained within the site boundaries, except for some small areas close to Okiep and Carolusberg. However, the 35 dB(A) level did not reach these residential areas. Refer to Appendix C4 for detailed modelling results.

In addition to the above-mentioned modelled noise levels, additional comparisons were produced comparing the noise level decrease or increase due to the shift from the Authorised Project to the Proposed Amended Option. These comparisons are shown in Figure 2-3 and Figure 2-4 of Appendix C4 for the daytime and the night-time respectively (where negative values indicate noise reductions due to the fact that some of the WTGs will be moved, and positive values indicate noise level increases due to the utilisation of larger WTGs and due to location shift). For daytime conditions, a noise level increase of 4 dB(A) above the daytime guideline of 45 dB(A) for rural areas will be well contained within the site boundaries and will not reach any communities around the site. Similarly, a noise level increase of 4 dB(A) above the night-time guideline of 35 dB(A) for rural areas will be primarily contained within the site boundaries and will not reach any communities around the site, apart from the south-eastern site boundary close to Carolusberg. However, no noise level increase above the 35 dB(A) is expected at the Carolusberg community receptors (refer to Figure 2-4 in Appendix C4).

Noise Levels at Discrete Receptors:

In addition to the noise contour maps, the noise levels were calculated at several discrete receptors along the site's boundaries, at noise-sensitive receptors and at the noise monitoring positions (MP01, MP02 and MP04). The predicted daytime sound levels at all receptors were below the SANS daytime guideline for rural districts of 45 dB(A). Similarly, the night-time noise levels were below the relevant rural guideline of 35 dB(A) for most receptors, except for receptors R6, R12 and R14, due to their close proximity to the wind turbines. Dracoulides (2017) however indicated that these exceedances are not considered significant, since firstly they were between 2 and 4 dB(A), and secondly due to the fact that noise levels at the closest communities of Okiep and Carolusberg were well below 32 dB(A) and 30 dB(A) respectively. As can be seen from Table 2-1 in Appendix C4, the predicted noise levels at certain locations, such as Concordia, Bergsig and Springbok, were below 20 dB(A). This indicates that there will be no influence on the existing noise levels in these areas, and the noise impact there will be negligible (Dracoulides, 2017). Dracoulides (2017) furthermore noted that the resulting noise levels represent a worst-case scenario, as the turbine⁹ with the higher sound emissions was utilised for the modelling. If a turbine with lower sound emissions is chosen, the resulting noise levels will be lower by 1 to 3 dB (Dracoulides, 2017).

Table 16: Noise Impacts: Operational Phase (Source: Dracoulides, 2017)

Option	Nature of Impact	Extent of Impact	Duration of impact	Intensity	Probability of occurrence	Status	Degree of confidence	Significance	Mitigation Measure	Significance after mitigation
OPERATIONAL PHASE										
Authorised Project	Noise	Local	Long-term	Medium	Probable	Negative	High	Low-Medium	Relocation of WTGs	Low
Proposed Amended Option	Noise	Local	Long-term	Low	Probable	Negative	High	Low	N/A	Low

⁹ The selection of the wind turbine manufacturer has not been finalised yet for the WEF. Currently, two manufacturers are being considered, i.e. Acciona and Siemens. As a worst-case scenario, the highest sound power of these turbines of 108.4 dB(A) for a wind speed of 15 m/s at hub height was used for the noise modelling.

In light of the above, it is evident that the significance rating of the potential noise impacts during the operational phase of the WEF would be reduced to Low (Negative) for the Proposed Amended Option, in comparison to the Authorised Project, due to the reduction of the turbine number and their positioning to locations further away from residential areas (Dracoulides, 2017).

iii) Cumulative Impact

No cumulative impacts associated with the proposed amendments to the EA have been identified by the specialist.

b) Mitigation

No additional mitigation measures are required. The general recommendations in the main noise impact report (Dracoulides 2010) regarding construction and operation, including the noise monitoring should be adhered to.

In addition, if fewer turbines than 25 are finally used at the Springbok WEF, Dracoulides (2017) recommends that the turbines that should be first eliminated are those closer to Okiep, i.e. No 23: (X=781071, Y=6720563) and No 10 (X=781182, Y=6721242).

c) Conclusion

Based on the proposed WTG number (reduced from the authorised 37 turbines), sound emissions and resulting noise levels, Dracoulides (2017) concluded the following:

- The construction impact of the Proposed Amended Option for the Springbok WEF will be the same as in the original noise impact report (Dracoulides 2010), i.e. Low (Negative).
- The Proposed Amended Option for the WEF will have no or very little effect on the existing noise levels in the local communities of Bergsig, Concordia, Carolusberg, Springbok and Okiep.
- The overall impact rating for the Proposed Amended Option is considered to be Low (Negative). (The significance rating of the potential noise impacts during the operational phase of the WEF would be reduced to Low (Negative) for the Proposed Amended Option (in comparison to the Authorised Project which was rated as Low – Medium (Negative)), due to the reduction of the turbine number and their positioning to locations further away from residential areas (Dracoulides, 2017).

Refer to Appendix C4 for the Addendum to the Noise Impact Assessment Report.

3.1.5 Visual Impacts

In determining the significance of the potential visual impacts associated with the proposed amendments to the project description, the visual specialist (Ms Karen Hansen) noted the following:

- 25 turbines would result in 30% fewer turbines (12 turbines would result in 66% fewer turbines);
- Reduced visual clutter from transmission lines throughout the site;
- The turbines have increased in total height from 124m to 220m, a factor of 77%;
- The mast diameter could increase by up to 25%; and
- Permanently affected local ground area at each turbine is not increased.

The site area, the disposition of the proposed turbines in the landscape and other infrastructure is similar to the original scheme (Hansen 2017).

Population centres from which the development (both the Authorised Project and Proposed Amended Option) would be seen include Springbok, Okiep, Concordia, Wheel Julie, Carolusberg and Nababeep. In terms of transport corridors, travellers going either direction on the N7 between Okiep and Springbok would be affected. Receptors travelling in and out of Springbok on the N14 could be affected. Receptors using the road between Okiep and Concordia, and those using the R355 from the south-east, would be visually aware of the WEF. The Goegap Nature Reserve is close to Carolusberg, and would be visually impacted on since the proposed turbines would be within 2.5km of the Reserve and this would result in a noticeable visual impact (Hansen 2017).

a) Potential Impacts

i) Construction Phase Impacts

Potential visual impacts during the construction phase of the WEF include:

- Impact of initial site works, construction camps, site set up, laying services, ground works
- Impact of construction of access roads, hauling and delivery of construction materials

The above impacts were rated as Medium (Negative) without mitigation, and Medium – Low (Negative) with mitigation, and Medium (Negative) without mitigation, and Low (Negative) with mitigation, respectively, for the Proposed Amended Option (Hansen, 2017).

ii) Operational Phase Impacts

Potential visual impacts during the operational phase include:

- Impact on receptors living and working locally of the change in site character from rural upland to industry; impact on road users
- Impact of the colours, finishes, heights of the infrastructure

In comparing the Authorised Project to the Proposed Amended Option in terms of potential visual impacts, the Proposed Amended Option provides turbines that would be 77% more dominant in the landscape, as they have greater mass and would be easier to see. The visual clutter would be reduced with the Proposed Amended Option and the visual scale increased. The Proposed Amended Option provides a WEF that could become an effective gateway and landmark, and would appear more high tech in appearance which may be

eventually seen elsewhere in South Africa, in appropriate locations (Hansen, 2017). The WEF would have a High (Negative) significance rating (for both the Authorised Project and Proposed Amended Option, (which is a combination of intensity, extent and duration ratings), and the degree of that high rating would be somewhat greater than for the Authorised Project due to the increased height and rotor length (Hansen, 2017).

Table 17 below provides a combined comparative assessment of visual impacts associated with both the Authorised Project and Proposed Amended Option (Hansen, 2017).

Table 17: Visual Impacts: Comparative assessment of visual impacts associated with the Authorised Project and the Proposed Amended Option (Source: Hansen, 2017)

Nature of Impacts	Authorised Project	Proposed Amended Option
Extent of the Visual Impact	Sub-regional	Sub-regional
Duration of Impact	Long term	Long term
Intensity or Magnitude	High reducing with distance to medium	High reducing with distance to medium-high
Probability	Definite	Definite
Degree of Confidence	High	High
Visual Exposure	High	High
Zones of Visual Influence or Theoretical Visibility	Varied from low to high with proximity	Varied from low to high with proximity
Visual Absorption Capacity	Low	Low
Compatibility with Surrounding Landscape	Incompatible	Incompatible
Potential Cumulative Visual Impacts	Possible	Possible
Significance of Visual Impact	High	High
Mitigation	Construction access, roads, footings, buildings, transmission masts, layout, materials and finishes	Construction access, roads, footings, buildings, transmission masts, layout, materials and finishes
Significance after Mitigation	Moderate High	Moderate High

iii) Cumulative Impact

The visual specialist noted that, as for the Authorised Project, the potential cumulative visual impact associated with the Proposed Amended Option is limited to the potential for other alternative energy proposals to be applied for in the future.

b) Mitigation

No changes to the mitigation measures put forward in the original visual impact assessment (2010) are required for the proposed amendments.

c) Conclusion

Change of Land Use and Landscape Character

The award of Environmental Authorisation in 2011 to the scheme referred to as the Authorised Project accepts the principle that a WEF of 37 WTG, 124m high may be established on this site. The change of land use and landscape character is accepted. The landform setting is of a scale to absorb this development.

The Proposed Amended Option, if 25 turbines would be constructed, offers 30% fewer turbines, 77% greater in scale, along with similar infrastructure elements as before. If 12 turbines would be constructed, the layout would offer 66% fewer turbines, 77% greater in scale.

Comparison of Visual Components:

- The *Proposed Amended Option* provides turbines that would be 77% more dominant on the landscape, because they have a greater mass and would be easier to see; however this scheme reduces the visual clutter.
- The proposed amended option provides a WEF that could become an effective gateway and landmark, and would appear more high tech which may be eventually seen elsewhere in South Africa.
- The WEF would have a High (Negative) significance rating, and the degree of that high rating would be somewhat greater than for the previously authorised project due to the increased height and rotor length.

The Proposed Amended Option with 25 turbines is acceptable from a visual standpoint and could proceed if mitigation measures would be undertaken and an environmental management plan instituted (Hansen 2017).

Refer to Appendix C5 for the Addendum to the Visual Impact Assessment.

3.1.6 Archaeological Impacts

The Archaeological Impact Assessment for the project, undertaken by Agency for Cultural Resource Management (ACRM) in 2010 provided a detailed description of the heritage resources within the study area. The significance of the heritage resources was again outlined in the Addendum to the Archaeology Impact Assessment, including the following:

- No archaeological remains were located during an assessment of the layout of the proposed wind turbines. The location sites for the turbines are situated at high altitudes (over 1000m ASL) on a formerly mined mountain range.
- Two indeterminate quartzite flakes of *low* (Grade 3C) significance were recorded in the proposed 3.8km long overhead powerline.

- A grave was recorded in the powerline servitude. All graves are rated as having *high* (Grade 2A) significance.
- The ruin of a collapsed stone kraal of *low* (Grade 3C) significance was recorded along the proposed transmission line route.
- No archaeological remains were found in the footprint area of the proposed substation.
- A Middle Stone Age (MSA) flake of *low* (Grade 3C) significance was recorded in the footprint area of Construction Camp 1.
- Several isolated MSA tools, and a few Later Stone Age lithics and some faded rock art of *low* (Grade C) significance were recorded close to the footprint area of Construction Camp 2.
- A Christian grave was recorded about 75m west of the rock art site/overhang on the edge of proposed Construction Camp 2. Graves are rated as having *high* (Grade 2A) significance (Kaplan 2010).

a) Potential Impacts

i) Construction Phase Impacts

As for the Authorised Project, the potential construction phase impacts associated with the proposed amendments include the following:

- The potential impact of the construction of the proposed Springbok WEF on archaeological resources.

The assessment of the above impact in terms of the proposed amendments is presented in Table 18 below.

Table 18: Archaeological Impacts: Construction Phase: Proposed Amended Option (Source: Kaplan, 2017)

Nature: The potential impact of the construction of the proposed Springbok WEF on archaeological resources		
	<i>Without mitigation</i>	<i>With mitigation</i>
<i>Extent</i>	Local	Local
<i>Duration</i>	Permanent	Permanent
<i>Cumulative impact</i>	Medium-Low	Low
<i>Probability</i>	Probable	Improbable
<i>Significance</i>	High (burials) & Low	Low
<i>Consequence</i>	High-Low	Low
<i>Reversibility</i>	High-Low	Low
<i>Degree of irreplaceable loss of resources?</i>	High-Low	Low
<i>Degree to which impact can be avoided, managed or mitigated?</i>	Medium-Low	Low

The archaeological specialist confirmed that the proposed Amended Option (i.e. amended Alternative 1 layout) will not result in any changes to the significance of the potential construction phase impacts assessed in the original AIA for the proposed project.

ii) Operational Phase Impacts

As for the Authorised Project, the potential operational phase impacts include the following:

- The potential impact of the operation of the proposed Springbok WEF on pre-colonial archaeological resources.

The assessment of the above impacts in terms of the proposed amendments is presented in Table 19 below.

Table 19: Archaeological Impacts: Operational Phase: Proposed Amended Option (Source: Kaplan, 2017)

Nature: The potential impact of the operation of the proposed Springbok WEF on pre-colonial archaeological resources		
	<i>Without mitigation</i>	<i>With mitigation</i>
<i>Extent</i>	Local	Local
<i>Duration</i>	Permanent	Permanent
<i>Cumulative impact</i>	High	Low
<i>Probability</i>	Improbable	Improbable
<i>Significance</i>	High (burials) & Low	Low
<i>Consequence</i>	High	Low
<i>Reversibility</i>	High	Low
<i>Degree of irreplaceable loss of resources?</i>	High	Low
<i>Degree to which impact can be avoided, managed or mitigated?</i>	Low	Low

The archaeological specialist confirmed that the proposed Amended Option (i.e. amended Alternative 1 layout) will not result in any changes to the significance of the potential operational phase impacts assessed in the original AIA for the proposed project.

iii) Cumulative Impact

Potential cumulative archaeological impacts are anticipated to be the same as for the Authorised Project. The proposed amendments will therefore not result in any additional or increased level of potential cumulative impacts associated with the project.

b) Mitigation

The Addendum to the Archaeological Impact Assessment identified the following mitigation and management actions:

- A walk through survey of the final power line corridor must be undertaken by a heritage specialist to identify areas where mitigation may be required.
- If stipulated by SAHRA, the position of the turbines in the final layout must be inspected by an archaeologist before construction. However, indications are that this is no longer required.
- During the construction phase, the rock art shelter and the identified graves should be cordoned off to ensure that no accidental damage to the heritage sites occurs.
- A report from the survey must be submitted to SAHRA APM unit for further comments.

c) Conclusion

From an archaeological perspective there are no fatal flaws and provided that the recommendations (for mitigation and management are implemented (Kaplan 2010)), there are no objections to the proposed development proceeding.

It is maintained that the proposed Amended Option (i.e. amended Alternative 1 layout) will not result in any changes to the significance of the impacts assessed in the original AIA for the proposed (Authorised) project (Kaplan 2017).

Refer to Appendix C6 for the Addendum to the Archaeological Impact Assessment Report.

3.1.7 Paleontological Impacts

A Palaeontological Assessment was undertaken by Dr John Almond of NaturaViva during the Scoping Phase of the original EIA process for the proposed Springbok WEF. The findings were that the site under consideration had very low palaeontological sensitivity. As a result, no further palaeontological mitigation was recommended for the project and no further assessment of this aspect was required in the EIA phase.

A comment (refer to Appendix C7) from the palaeontologist regarding the proposed amendments was however obtained and confirms that given the low palaeontological sensitivity of the entire project area, as outlined in the original Palaeontology Impact Assessment Report (Almond 2010) and updated assessment (2015), impacts on palaeontological heritage resources during the construction and operational phases of the WEF are rated as **Low (Negative)**.

Changes in technology, number, size and layout of the wind turbines will not have any significant effect on potential impacts on local palaeontological heritage, i.e. the proposed amended option will not result in new or additional palaeontological impacts, nor will the proposed amendments result in an increased level or nature of palaeontological impacts (Almond 2016).

a) Potential Impacts

The assessment of palaeontological impacts applies to the construction phase of the development, since significant palaeontological impacts are not anticipated during the operational and decommissioning phases (Almond, 2016).

(i) Construction Phase Impacts

Table 20: Palaeontological Impacts: Proposed Amended Option (Source: Almond, 2017)

<p>Nature & type of impact: Negative & direct viz. Disturbance, damage, destruction or sealing-in of fossil remains preserved at or beneath the ground surface within the development footprint, mainly due to surface clearance or bedrock excavations during the</p>

construction phase of the wind energy facility and associated infrastructure (e.g. transmission lines).		
Consequence of impacts: Loss of legally-protected, unique or rare fossil heritage resources which are then no longer available for scientific research, public education or other public record.		
	Without mitigation	With mitigation
Extent	Development footprint	Development footprint
Duration	Permanent	Permanent
Intensity	Low	Low
Magnitude	Low	Low
Reversibility	Non-reversible	Non-reversibility
Probability	Low	Low
Irreplaceable loss of resources	Unlikely	Unlikely
SIGNIFICANCE	LOW	LOW
Degree of confidence	High	High
Mitigation Measures: Impacts on fossil heritage may be meaningfully reduced by appropriate monitoring and specialist mitigation during the construction phase. On-going monitoring of all substantial bedrock excavations for chance fossil finds (notably vertebrate bones and teeth) by the ECO is recommended, with reporting of substantial new palaeontological finds to SAHRA for possible specialist mitigation. Specialist mitigation would involve recording, sampling and judicious collection of fossil material together with relevant geological data by a professional palaeontologist. Any fossils collected to be curated in an approved repository (e.g. museum, university).		
Residual Impacts: Likely to be very minor. Negative impacts due to loss of local fossil heritage will be partially offset by <i>positive</i> impacts resulting from professional mitigation (i.e. improved palaeontological database for Namaqualand).		
Cumulative impacts: Likely to be LOW, given the low palaeontological sensitivity of the Springbok region as a whole.		

ii) Operational Phase Impacts

Not applicable.

(iii) Cumulative impacts

Cumulative impacts posed by the Springbok WEF and other developments in the region cannot be realistically assessed given the absence of comprehensive data on these projects, including palaeontological heritage assessment for these projects. However, given the generally low to very low palaeontological sensitivity of the bedrocks in the Springbok region, cumulative impacts are like to be Low (Negative).

b) Mitigation

No additional or changes to the mitigation measures put forward in the original Palaeontology Impact Assessment (201) are required due to the proposed amendments.

c) Conclusion

The conclusions reached in the original palaeontological heritage assessment (Almond 2010) for this project still stand, i.e.:

“The two proposed development sites west and east of the N7 are of similar, very low palaeontological sensitivity. Therefore no further palaeontological mitigation is recommended for this project. Should substantial fossil remains such as mammalian bones or teeth be exposed during construction, however (e.g. in borrow pits for road material), SAHRA should be notified by the ECO so that appropriate mitigation can be undertaken.”

In light of the above, changes in technology, number, size and layout of the wind turbines will not have any significant effect on potential impacts on local palaeontological heritage, i.e. the proposed amended option will not result in any new or additional palaeontological impacts, nor will the proposed amendments result in an increased level or nature of palaeontological impacts (Almond 2016). The significance of potential palaeontological impacts for the Proposed Amended Option will therefore be Low (Negative), as for the Authorised Project.

Refer to Appendix C7 for the Addendum to the Palaeontological Impact Assessment Report.

3.1.8 Heritage Impacts

A full Phase 1 Heritage Impact Assessment was undertaken by Mr Ron Martin of Ron Martin Heritage Consultancy as part of the original EIA for the project in 2010. In undertaking the re-assessment of potential heritage impacts associated with the proposed amendments as part of this amendment application, Mr Martin indicated that the Statutory Framework and Related Information, Heritage Statement, and Historical Significance, Cultural Landscape and Archaeological Significance of the site remains the same as reported in the 2010 Heritage Impact Assessment and is therefore not repeated in this report. Furthermore, the addendum to the Heritage Impact Assessment (Martin 2017) reported that there are no changes in the significance of impacts when comparing the Proposed Amended Option (amended Alternative 1) and the Authorised Project (Alternative 1). The potential heritage impacts associated with the proposed amendments are however outlined below.

a) Potential Impacts

(i) Construction Phase Impacts:

As for the Authorised Project, the potential heritage impacts during the construction phase of the WEF, as per the impact assessment table included in the Addendum to the Heritage Impact Assessment (refer to Table 21 below) include the following:

- Heavy construction equipment (including cranes) will be present on the site.
- Heritage resources in old towns may be impacted upon by increased population (temporary construction workers).
- Abnormal load trucks and other equipment will have an impact on the old mining infrastructure, including the road network.

(ii) Operational Phase Impacts

As for the Authorised Project, the potential heritage impacts during the operational phase of the WEF, as per the impact assessment table included in the Addendum to the Heritage Impact Assessment (refer to Table 21 below) include the following:

- There will be 25, 140m high wind turbines on the mountain top in visually prominent positions

Refer to Table 21 below for the re-assessment of operational phase heritage impacts for the Proposed Amended Project.

Table 21: Heritage Impacts: Proposed Amended Option (Source: Martin, 2017)

Option	Nature of Impact	Extent of Impact	Duration of Impact	Intensity	Probability of occurrence	Status of the Impact	Degree of confidence	Level of significance	Mitigation measure	Significance after mitigation
CONSTRUCTION PHASE										
PROPOSED AMENDED OPTION	Heavy construction equipment (including 120+m-high cranes) will be present on site	Site and environs	Short-term	High	Highly probable	Negative	High	Medium	Attempt to position equipment away from visible ridgelines where possible. Duration will be short, though	Low
	Heritage resources in old towns may be impacted upon by increased population (temporary construction workers)	Region	Short-term	Medium	Highly probable	Neutral	High	Medium	Increase awareness of heritage resources and their value; use the opportunity to promote the resources of the region during this period	Low
	Abnormal load trucks and other equipment will have an impact on the old mining infrastructure, including the road network.	Region	Short-term	Medium	Probable	Negative	High	Low	Rehabilitation/Road repairs when and where required, using proper heritage guidelines (monitoring by local heritage body may be applicable)	Low
OPERATIONAL PHASE										
PROPOSED AMENDED OPTION	There will be 25, 140m high wind turbines on the mountain top in visually prominent positions	Site and immediate surroundings	Long-term	Low (less than previously approved alternative)	Probable	Neutral	High	Low	Apply mitigation measures as proposed in VIA; entrench these in EMP	Low

Whilst the significance of the potential operational phase heritage impacts for the Proposed Amended Option, before and after mitigation, are the same as for the Authorised project (i.e. Low (Negative)), the heritage specialist noted that the Proposed Amended Option is an improvement in heritage terms and impacts (i.e. the intensity of the potential operational phase heritage impacts) are subsequently lower (Martin, 2017).

(iii) Cumulative Impact

As with the Authorised Project, cumulative impacts relate to the permanent presence of the turbines within the receiving landscape, their long-term visual impact and their addition as a

contemporary layer to the industrial cultural landscape. These cumulative impacts have the potential to become neutral, even positive, elements within the landscape provided that the proposed mitigation measures are applied and included in the Environmental Management Plan for the project. Moreover, the motivation that the turbines be positively interpreted as a contemporary 21st-century layer to the cultural landscape, and their potential to be read as a landmark within the “gateway to South Africa” setting, would serve to accentuate the positive intrinsic value (Martin, 2017).

b) Mitigation

- That the development remains substantially in accordance with the Amended Alternative 1 (i.e. the Proposed Amended Option) as addressed and mitigated in the Addendum to the HIA report¹⁰;
- That the recommendations entrenched in the SAHRA APM RoD, as summarized in the AIA (as updated), are implemented.
- That the proposed development serves to provide a mechanism for the local communities to conduct a heritage program with the aim to re-interpret existing narrative while redressing gaps in the overall historical narrative in order to promote the celebration of a complete, holistic historical interpretation of the landscape that would be acceptable to all affected communities, especially in light of the impending WHS nomination, in terms of section 38(3)(d).
- That the mitigation measures proposed in the Visual Impact Assessment (as updated) be entrenched in the Environmental Management Plan (EMP) for the development in terms of the EIA regulations; and
- That failure to observe any of the abovementioned conditions will automatically result in HNC’s endorsement for these development proposals being withdrawn, thereby requiring a new submission to HNC in terms of NHRA Section 38(8)

c) Conclusion

There is no change in the significance of construction and operational phase heritage impacts when comparing the Proposed Amended Option and the Authorised Project. Consequently, the Phase 1 HIA and the addendum to the HIA indicated that there is sufficient information to conclude that the Proposed Amended Option can be allowed to proceed without any further heritage study needing to be undertaken, but subject to the mitigation measures and other recommendations contained in the Addendum to the heritage report (2017) and the ancillary specialist reports (i.e. the Visual Impact Assessment by Karen Hansen and the Archaeological Impact Assessment (AIA) by Jonathan Kaplan (as amended))- all as underpinned by its heritage indicators (Martin, 2017).

Refer to Appendix C8 for the Addendum to the Heritage Impact Assessment Report.

¹⁰ Note: No new or additional mitigation measures were included in the impact assessment tables for the proposed heritage impacts associated with the proposed amendments.

3.1.9 Impacts on Reptiles

The original 2010 specialist reptile impact assessment for the project, undertaken by Professor Le Fras Mouton of the University of Stellenbosch, identified two reptile habitats within the Springbok study area, namely open shrubland on yellow-brown loamy sand, and rocky habitat comprised of disintegrating boulder koppies and flat to gently sloping rock sheets. A total of 67 reptile species were identified as potentially occurring in the greater Springbok area (i.e. 3 tortoise species, 21 snake species, 43 lizard species). During the field survey, the presence of 9 species in the Springbok study area was confirmed, and it was concluded that only 2 of the 7 threatened species potentially occurring in the greater Springbok area are possibly present in the study area, namely:

- Speckled Padloper (*Homopus signatus*) listed as *Vulnerable*
- Fisk's Hose Snake (*Lamprophis fiskii*) listed as *Data Deficient* (Note: in the new redlist for reptiles (Bates et al. 2014) the latter is now listed as *Of Least Concern*, meaning that only one threatened reptile species potentially occurs on the Springbok WEF site (Mouton, 2017).

a) Potential Impacts

(i) Construction Phase and (ii) Operational Phase Impacts:

Four risk sources were identified to be potentially associated with the construction of the Springbok WEF, although they are all rated as of Low (Negative) significance:

- Direct mortality of reptile species during construction;
- Habitat destruction;
- Increase in road kills; and
- The barrier effect of roads and fences.

The proposed amendments to the WTG positions and associated infrastructure will not result in a change to the significance of the potential reptile impacts assessed in the original EIA for the Authorised Project and the potential impacts will thus remain of **Low (Negative)** significance for the Proposed Amendment Option, as summarized in Table 22 below.

Table 22: Impacts on Reptiles: (the same for the proposed amended option and the authorised project). (Source: Mouton, 2017)

Nature of Impact	Direct mortality during construction	Loss of reptile habitat	Increased road kill rate	Barrier effect of internal roads and fencing
Extent	Local	Local	Local	Local
Duration	Short-term	Long-term	Long-term	Long-term
Magnitude	Minor	Minor	Minor	Minor
Probability	Probable	Probable	Improbable	Improbable
Significance (Without mitigation)	Low	Low	Low	Low
Significance (After mitigation)	Low	Low	Low	Low

Status	Negative	Negative	Negative	Negative
Reversibility	Reversible	Irreversible	Reversible	Reversible
Irreplaceable loss of resources	Low	Low	Low	Low
Cumulative impacts	None	None	None	None

(iii) Cumulative Impact

No cumulative impacts were identified by the reptile specialist for the proposed amendments.

b) Mitigation

The Proposed Amended Option will not require any changes or additions to the mitigation measures recommended in the original 2010 specialist report on reptiles. The original recommendations that, from a humanitarian point of view, it should be standard practice during site clearing and construction activities to assist stranded animals to escape, and secondly, that fencing off the facility and managing the site as a reserve will be beneficial to the resident reptile fauna, remain applicable (Mouton, 2017).

c) Conclusion

The proposed amendments to the WTF positions and associated infrastructure (including associated footprint changes) will not result in a change to the significance of the impacts on reptiles assessed in the original EIA for the authorised project and the potential impacts will remain of Low (Negative) significance.

Although the impact ratings will not change, the reptile specialist indicated that the lower numbers of WTGs and the associated decrease in road area coverage of the proposed amended option must be considered as advantages as far as the impact of habitat loss, road kills, and the barrier effects of roads on reptiles are concerned. The disadvantage of the larger temporary construction pad per WTG in the proposed amended option would be offset by the lower number of WTGs (Mouton, 2017).

Refer to Appendix C9 for Addendum to the Reptile Impact Assessment Report.

3.1.10 Socio-Economic Impacts

The addendum to the 2010 Socio-Economic Impact Assessment was completed by Urban-Econ Development Economists, and found that both the Authorised Project and the Proposed Amended Option will have predominantly positive impacts on the economy of the local area, as the economy would be stimulated by increased economic activity from the different economic sectors.

a) Potential Impacts

(i) Construction Phase and (ii) Operational Phase Impacts:

The following impacts were identified and assessed for both the construction and operational phases, for both the Authorised Project and Proposed Amended Option, and are discussed in greater detail in the tables below:

- Stimulation of the local economy
- Increased government income
- Diversification of the local economy
- Employment creation and associated transfer of skills
- Increased pressure on infrastructure
- Altering land use patterns (operational phase only)
- Increased traffic and congestion
- Safety and security (construction phase only)
- Degree of correspondence with development planning (operational phase only)
- Loss of visual value (operational phase only)
- Noise, pollution and loss of tranquillity

For a detailed study of the abovementioned impacts, refer to the Addendum report contained in Appendix C10. The following table provides a comparison of the significance of socio-economic impacts that can be expected during the construction and operation phases for both the Authorised Project and the Proposed Amended Option, before and after mitigation.

Table 23: Summary of the significance of social impacts during construction and operation (Source: Urban Econ Development Economists, 2017)

	AUTHORISED OPTION				AMENDED OPTION			
	Construction		Operation		Construction		Operation	
	Pre-Mitigation	Post Mitigation	Pre-Mitigation	Post Mitigation	Pre-Mitigation	Post Mitigation	Pre-Mitigation	Post Mitigation
Stimulation of the local economy	Medium (+)	Medium (+)	Low (+)	Low (+)	Medium (+)	Medium (+)	Low (+)	Low (+)
Increase in government income	Low (+)	Low (+)	Low (+)	Low (+)	Low (+)	Low (+)	Low (+)	Low (+)
Diversification of the local community	Low (+)	Low (+)	Low (+)	Low (+)	Low (+)	Low (+)	Low (+)	Low (+)
Employment creation & associated transfer of skills	Low (+)	Low (+)	Low (+)	Low (+)	Low (+)	Low (+)	Low (+)	Low (+)
Increased pressure on infrastructure	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)
Altering land use patterns	N/A	N/A	High (+)	High (+)	N/A	N/A	High (+)	High (+)
Increased traffic and congestion	Low (-)	Low (-)	Insignificant	Insignificant	Low (-)	Low (-)	Insignificant	Insignificant
Safety and security	Low (-)	Low (-)	N/A	N/A	Low (-)	Low (-)	N/A	N/A
Degree of correspondence with	N/A	N/A	Low (+)	Low (+)	N/A	N/A	Low (+)	Low (+)

development planning								
Loss of visual value	Low (-)	Low (-)	High (-)	High (-)	Low (-)	Low (-)	High (-)	High (-)
Noise, pollution and loss of tranquillity	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)	Low (-)

(iii) Cumulative Impact

The potential cumulative socio-economic impacts would be similar for both the Proposed Amended Option as well as the Authorised Project (refer to Table 13 in Appendix C10).

Depending on the number of renewable energy facilities that are proposed to be built around the study area, it is highly likely that the demand for goods and services required for construction of similar facilities would grow. This could provide sufficient economies of scale and thus open opportunities for the establishment of new industries in the country, and new businesses in the local area, specifically in the sectors that are not well represented in the local economy. In addition, additional facilities could generate:

- Improved energy supply in the country.
- Reduced carbon emissions in generation of electricity.
- Improved labour productivity and employability of construction workers for similar projects.
- Possible development of local skills and expertise in research and development and manufacturing industries relate to wind technologies.

b) Mitigation

The proposed amendments will not require any changes or additions to the mitigation measures identified in the original socio-economic impact assessment (Urban Econ, 2017).

c) Conclusion

The proposed amendments will not result in a change to the significance of the socio-economic impacts assessed for the Authorised Project.

Both the Authorised Project and the Proposed Amended Option will have very similar socio-economic impacts, with estimated slight improvements in terms of efficiency of the system, but with slightly more negative effects in terms of visual impact. The new proposed amended option is slightly more attractive from a socio-economic perspective (Urban Econ, 2017).

Refer to Appendix C10 for the Addendum to the Socio-Economic Impact Assessment Report.

3.1.11 Traffic Impacts

The Traffic Impact Assessment conducted in October 2010 by ITS Engineers for the Authorised Project identified the following for turbine transport and construction:

- Approximately 65 truck loads will be required for each turbine foundation

- Approximately 20 abnormal truck loads are required to assemble and disassemble the cranes
- Approximately 10 abnormal truck loads are required for the transport of each turbine.

Additional construction phase transport requirements include transport of sand and aggregate, cement, water tankers, construction cranes, tower sections, nacelles and blades. It was further anticipated that most trips would originate from Cape Town via the N7, with trucks delivering raw material from Springbok and Okiep areas.

a) Potential Impacts

(i) Construction Phase and (ii) Operational Phase Impacts:

As for the Authorised Project, the potential construction phase impacts associated with the proposed amendments include the following:

- Heavy truck traffic will damage the road surface of the gravel roads
- Network and intersection operations
- Abnormal load trucks will have an impact on the regional road network

Potential operational phase impacts include the following:

- Additional vehicular trips as a result of the day to day operations will impact on the existing road network and intersection operations

The truck trip generation estimate in the October 2010 Traffic Impact Assessment (TIA) for the project was 1 400 trucks over a 12 month construction period. In re-assessing the potential traffic impacts associated with the proposed amendments, ITS Engineers have indicated that it is expected that, with the proposed amendment to the layout and configuration, the total number of trucks during the construction period will reduce to approximately 1 100 trucks. This results in a reduction of over 20% in the total truck traffic associated with the proposed amendment to Springbok Wind Energy Facility layout and configuration.

The original Traffic Impact Assessment (ITS Engineers, 2010) estimated that a total of 100 motor vehicle and truck trips would be generated during peak hours in the construction phase for the project, which had a Low (Negative) significance in terms of the transport impacts. A reduction in turbines for the Proposed Amended Option would result in a reduction in the abovementioned trips, therefore the associated transport impact will be less than that of the Authorised Project (ITS, 2017). No significant impacts are expected in terms of road safety and operations on the surrounding road network for both the Authorised Project and the Proposed Amended Option.

In 2010, the Traffic Specialist (ITS Engineers) recommended that the gravel roads should be upgraded with a permanent sealed surface. However, the average daily traffic (ADT) along these roads are low and does not warrant a sealed surface. The cost of the upgrade/s is not justified based on the expected ADT during the operational phase of the project. The expected increase in traffic volumes as a result of the completed Springbok WEF will be insignificant.

Table 24: Traffic Impacts: Assessment of traffic impacts associated with the amended alternative for the construction and operation of the project (Source: ITS Engineers (Pty) Ltd, 2017)

<u>Nature of impact</u>	<u>Extent of impact</u>	<u>Duration of impact</u>	<u>Intensity</u>	<u>Probability of occurrence</u>	<u>Status of the impact</u>	<u>Degree of confidence</u>	<u>Level of significance</u>	<u>Mitigation measure</u>	<u>Significance after mitigation</u>
CONSTRUCTION PHASE									
Heavy truck traffic will damage the road surface of the gravel roads	Region	Short-term	High	Highly probable	Negative	High	Medium	The gravel roads should be maintained on a regular basis. Grading once a month with repairs where/when necessary.	Low
Network and intersection operations	Region	Short-term	Medium	Highly probable	Neutral	High	Low	None	Low
Abnormal load trucks will have an impact on the regional road network	Region	Short-term	Medium	Probable	Neutral	High	Low	Rehabilitation/Road repairs when and where required	Low
OPERATIONAL PHASE									
Additional vehicular trips as a result of the day to day operations will impact on the existing road network and intersection operations	Site & immediate surroundings	Long-term	Low	Probable	Neutral	High	Low	None	Low

Cumulative Impact

No changes to or additional cumulative impacts were identified.

b) Mitigation

As indicated above, whilst the October 2010 Traffic Impact Assessment compiled by ITS Engineers recommended that the gravel roads should be upgraded with a permanent sealed surface, this mitigation measure has been updated in light of the proposed amendments. ITS Engineers have now indicated that the average daily traffic (ADT) along these roads are low and does not warrant a sealed surface. It is therefore recommended that the gravel roads should rather be maintained on a regular basis. The roads should be graded and sprayed with water regularly to improve the road surface and restrict dust pollution and gravel loss. If possible, grey water should be sourced to spray the road (ITS Engineers, 2017).

c) Conclusion

No significant impacts are expected in terms of road safety and operations on the surrounding road network for both the Approved Project and the Proposed Amended Alternative. Based on the discussions above, both the Approved Project and Proposed Amended Option will have a Low (Negative) significance in terms of the transport impact before and after mitigation. Whilst the significance of the potential traffic impacts would be the same for both the Approved Project and the Proposed Amended Option, with the reduction in the number of turbines in the Proposed Amended Option, motor vehicle and truck trips generated during the peak hours in the construction phase trips will reduce and the associated transport impact will be less than that of the Authorised Project. Furthermore, the proposed Amended Option would result in a reduction of over 20 percent in the total truck traffic associated with the WEF layout and configuration, which is considered advantageous.

3.2 AMENDMENT TO PROJECT TITLE OF THE EA

No negative or positive environmental impacts will occur if the project title in the EA, as outlined in Section 2, is amended. The amendment of the title of the EA (to remove the reference to “Farm O’Nabapeep”) would however provide an improved description of the project and location, given that the project is located over a number of properties, as described in the amended EA dated 27 June 2014 (as amended, 18 May 2016).

3.3 UPDATE TO THE CONTACT DETAILS OF THE HOLDER OF THE EA

No negative or positive environmental impacts will occur if the contact details of the holder of the EA, as outlined in Section 2, are amended. The EA would however contain the correct (updated) details for the holder of the EA.

3.4 SUMMARY OF IMPACTS ASSOCIATED WITH THE PROPOSED CHANGES TO THE PROJECT DESCRIPTION AND LAYOUT

A summary of the potential impacts for the construction and operational phases associated with the proposed Springbok WEF (i.e. the Authorised Project (Alternative A1) versus the Proposed Amended Option (i.e. the proposed amendments outlined in Section 2)) is provided in Table 25 below. The last column provides an indication of whether or not a change in significance of impacts is apparent between the authorised WEF and the proposed amended WEF.

High negative	Red
Medium negative	Orange
Low-Medium negative	Light Orange
Low negative	Blue
Very Low negative	Green
Positive impact	Yellow
Negligible	Grey

Table 25: Summary of impacts associated with proposed amendments to the project description

Impact	Authorised Project (Alternative A1)		Proposed Amended Option (Proposed amended Alternative A1)		Changes to impact significance rating
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation	
Construction Phase					
Botanical	Medium (-)	Medium (-)	Medium (-)	Medium - Low (-)	Yes (reduced)
Avifauna	Low (-)	Low (-)	Low (-)	Low (-)	None
Bats	Medium - High (-)	Low (-)	Medium - High (-)	Low (-)	None
Noise	Low (-)	Low (-)	Low (-)	Low (-)	None*
Visual	High (-)	Medium-High (-)	High (-)	Medium-High (-)	None*
Archaeology	High (burials) & Low (-)	Low (-)	High (burials) & Low (-)	Low (-)	None
Palaeontology	Low (-)	Low (-)	Low (-)	Low (-)	None
Heritage	Low (-)	Low (-)	Low (-)	Low (-)	None*
Reptiles	Low (-)	Low (-)	Low (-)	Low (-)	None*
Socio-Economic	Low (-) to Medium (+)	Low (-) to Medium (+)	Low (-) to Medium (+)	Low (-) to Medium (+)	None
Traffic	Medium - Low (-)	Low (-)	Medium - Low (-)	Low (-)	None*
Operational Phase					
Botanical	Low (-)	Low (-)	Low (-)	Low (-)	None
Avifauna	Medium (-)	Low (-)	Medium-High (-)	Medium (-)	Yes (increased)
Bats	Very High (-) to Medium (-)	Low (-)	Very High (-) to Medium (-)	Low (-)	None*
Noise	Low-Medium (-)	Low (-)	Low (-)	Low (-)	Yes (reduced)
Visual	High (-)	Medium-High (-)	High (-)	Medium-High (-)	None*
Archaeology	High (burials) & Low (-)	Low (-)	High (burials) & Low (-)	Low (-)	None
Palaeontology	Low (-)	Low (-)	Low (-)	Low (-)	None
Heritage	Low - Medium (-)	Low (-)	Low - Medium (-)	Low (-)	None*
Reptiles	Low (-)	Low (-)	Low (-)	Low (-)	None*

Socio-Economic	High (-) to High (+)	High (-) to High (+)	High (-) to High (+)	High (-) to High (+)	None
Traffic	Low (-)	Low (-)	Low (-)	Low (-)	None*

From the tables above it is evident that the proposed amendments may result in changes to the significance ratings and/or level of impact for some of the potential environmental impacts associated with the project, specifically botanical, avifauna, and noise impacts. In some instances, the proposed amendment would result in a reduced impact, whilst others, potentially an increased level of impact. A brief summary is provided below outlining the nature of the potential changes in the impact significance ratings associated with the botanical, avifauna and noise impacts.

- **Botanical:** The overall development disturbance footprint for the Proposed Amended Option is likely to be about 20 – 30% smaller than for the Authorised Project, and will thus have a slightly lower (reduced) botanical impact. The overall botanical impact, although clearly slightly lower than for the Authorised Project, is still best described as Medium (Negative) at a regional scale, before mitigation (Helme, 2017). If a suitable biodiversity offset is implemented then the overall botanical impact of the Proposed Amended Option after mitigation could be reduced to Low (Negative), and this is therefore strongly recommended by the botanical specialist (Helme, 2017).
- **Avifauna:** According to Simmons & Martins (2017), the effects of the proposed amendments to the authorised project are both positive (reduced number of turbines and, thus, disturbance or displacements of birds), and negative (increased probability of fatalities) for a suite of collision-prone birds (some red listed). Collision with the turbine blades of the WEF, and associated power line network, are however the biggest potential risk with turbines placed on the upland ridges or near foraging areas. Whilst the significance of the potential construction phase impacts on avifauna would remain Low (Negative), the proposed amendments would result in an increased significance for operational phase impacts on birds, i.e. the Proposed Amended Option would increase the significance of potential avifauna impacts during the operational phase, before mitigation, from Medium (Negative) to Medium – High (Negative). The impact significance, after mitigation, would increase from Low (Negative) to Medium (Negative). This is largely due to the increase in hub heights and blade length associated with the proposed amendments, as, according to Simmons & Martins (2017), the proposed amendments (i.e. 25 turbines with hub heights of 140m) is likely to incur more fatalities than the authorised 37 turbines of 80m height. However, with suitable mitigations, i.e. either (i) the four most “risky” turbines (i.e. turbine numbers 4, 8 15 & 16) have their hub heights reduced to 105m and blade length reduced; and (ii) all turbines killing one or more Red Data birds per year will need to be fitted with automated deterrent or shut-down on demand, then the Applicant can reduce their environmental/ avian footprint to acceptable levels. Simmons & Martins (2017) recommends a minimum of 12 months’ post-construction monitoring to determine the effects of the wind farm on the Red Data species identified as at risk. With these mitigations, the avian specialist can recommend that the Springbok wind farm, as amended, can be allowed to proceed (Simmons & Martins, 2017). (Note: The Applicant has reduced the hub height to 105m for the four

“risky” turbines (turbine numbers 4, 8 15 & 16), as recommended by Simmons & Martins (2017) and indicated in the proposed amendments outlined in Section 2).

- **Noise:** The significance rating of the potential noise impacts during the operational phase of the WEF would be reduced to Low (Negative) for the Proposed Amended Option (in comparison to the Authorised Project which was rated as Low – Medium (Negative)), due to the reduction of the turbine number and their positioning to locations further away from residential areas (Dracoulides, 2017).

In some instances (annotated with a “” in the last column of Table 25 above), the significance of the impact remained the same for the Proposed Amended Project as for the Authorised Project, albeit that the specialist noted a potential change in the level of impact in their specialist Addendum reports. This was the case for the bat and visual impacts (increased level of impact) and heritage, reptiles and traffic impacts (reduced level of impact), as summarised below:

- **Bats:** Whilst the significance rating for operational phase impacts on bats would remain Very High – Medium (Negative) before mitigation, and Low (Negative), after mitigation, the level of impact on bats during the operational phase is expected to be higher (albeit that the significance rating has remained the same). A change to the rotor diameter and hub height of the authorised turbines can increase the risk of impact on bats during the operational phase of the WEF, as an increased blade size increases the airspace in which bat mortality may occur during wind turbine operation. The proposed amendments would however not increase the potential impacts on bats during the construction or decommissioning phases. Whilst the proposed amendments to the turbine dimensions would result in a lowered impact on low flying species that are active near vegetation clutter, such as *Neoromicia capensis* the amended turbine size may have an increased impact on high flying bat species, such as *Tadarida aegyptiaca*, based on increased airspace in which mortality is a risk. According to Animalia, the increase in turbine dimensions is significant and thus it triggered an increased negative (level of impact) in terms of potential bat mortalities due to direct blade impact or barotrauma during foraging activities, which has resulted in the need for strict application of mitigation measures as described in Appendix C3, in order for the proposed amendments to be acceptable from a bat sensitivity and impact perspective.
- **Visual:** The Proposed Amended Option, if 25 turbines would be constructed, offers 30% fewer turbines, 77% greater in scale, along with similar infrastructure elements as before. If 12 turbines would be constructed, the layout would offer 66% fewer turbines, 77% greater in scale. Whilst the significance rating for the Authorised and Proposed Amended Options remain the same during the operational phase (i.e. High (Negative) (which is a combination of intensity, extent and duration ratings), the degree of that high rating would be somewhat greater than for the Authorised project due to the increased height and rotor length. The visual specialist concluded that the Proposed Amendment Option with 25 turbines is acceptable from a visual standpoint (Hansen, 2017).
- **Heritage:** Whilst the significance of the potential operational phase heritage impacts for the Proposed Amended Option, before and after mitigation, are the same as for the

Authorised project (i.e. Low (Negative)), the heritage specialist noted that the Proposed Amended Option is an improvement in heritage terms and impacts (i.e. the intensity of the potential operational phase heritage impacts) are subsequently lower (Martin, 2017).

- **Traffic:** Whilst the significance of the potential traffic impacts would be the same for both the Approved Project and the Proposed Amended Option, with the reduction in the number of turbines in the Proposed Amended Option, motor vehicle and truck trips generated during the peak hours in the construction phase trips will reduce and the associated transport impact will be less than that of the Authorised Project. Furthermore, the proposed Amended Option would result in a reduction of over 20 percent in the total truck traffic associated with the WEF layout and configuration, which is considered advantageous.
- **Reptiles:** Although the impact ratings for the Proposed Amended Option will be the same as for the Authorised Project, the reptile specialist indicated that the lower numbers of WTGs and the associated decrease in road area coverage of the proposed amended option must be considered as advantages as far as the impact of habitat loss, road kills, and the barrier effects of roads on reptiles are concerned. The disadvantage of the larger temporary construction pad per WTG in the proposed amended option would be offset by the lower number of WTGs (Mouton, 2017).

3.5 CHANGES TO THE EMPR

This report does not contain a dedicated Environmental Management Programme report (EMPr) given that the “Life Cycle EMPr” (dated 2010) included in the Final Environmental Impact Assessment Report (2010) for the project (refer to Annexure E of the Final EIA Report included as Appendix F hereto) has not been submitted to DEA as yet for approval. The EMPr will be finalised and submitted to DEA for approval, together with the Final Layout, as required in terms of Conditions of Authorisation 3.1 and 6.4 of the EA, in due course.

The proposed amendments to the project description have not required changes to the recommended mitigation measures for the noise, visual, palaeontology, reptile and socio-economic studies. Updates to the mitigation measures for the botanical, avifauna, bats, archaeology, heritage and traffic studies are however outlined in Section 3.1 of this report and are included in Appendix C, and must be addressed in the final EMPr, where relevant.

Where the proposed amendments of the project description have resulted in updates to the mitigation measures put forward by the specialists (as outlined above), the EMPr would be amended accordingly in due course, when it is submitted to DEA for approval, together with the Final Layout Plan, as required in terms of Conditions of Authorisation 3.1 and 6.4 of the EA.

4 PUBLIC PARTICIPATION PROCESS

A public participation process is being undertaken to ensure that potential and registered I&APs were given an opportunity to comment on the proposed amendments to the EA for the proposed WEF. The public participation process included the following:

- Notification of all previously registered I&APs for the proposed project of the Application for Amendment of the EA:
 - A letter of notification has been distributed to all affected landowners, to notify them of the Application for Amendment of the EA. Refer to Appendix 3 of the Application for Amendment of the EA (included in Appendix B) for proof of notification.
 - A letter of notification has been distributed to all registered¹¹ I&APs, notifying registered I&APs of the Application for Amendment of the EA and opportunity to comment (30 day comment period) on the Application for Amendment of the EA and associated report. Refer to Appendix E4.
- Notification of all potential I&APs
 - Placement of a site notice, notifying potential (and registered) I&APs of the Application for Amendment of the EA. The notice provides a brief description of the proposed amendment of the EA, and invites members of the public to register as I&APs and submit any comments on the proposed EA Amendment Application (Refer to Appendix E2 for a copy of the Site Notice).
 - Placement of an advertisement in the local *Plattelander* and regional *Die Burger* and *Volksblad* newspapers providing notification of the proposed amendment of the EA, and inviting members of the public to register as I&APs and raise any issues or concerns, as part of the 30 day comment period. (Refer to Appendix E3 for a copy of the advertisements).
- The relevant State Departments will be provided with copies of the Amendment Application and associated Environmental Assessment Report and will be given 30 days to consider the proposed amendments and submit any comments that they may have. The relevant State Departments include:
 - Department of Agriculture, Forestry and Fisheries: Directorate: Land Use and Soil Management
 - Department of Water and Sanitation
 - Department of Agriculture (Northern Cape)
 - Department of Energy (Northern Cape)
 - Northern Cape Department of Environment and Nature Conservation
 - Northern Cape Department of Transport, Safety and Liaison
 - Northern Cape Department of Roads and Public Works
 - Heritage Northern Cape
 - South African Heritage Resources Agency
 - DEA: Protected Areas Expansion Unit
 - Department of Science and Technology
 - SKA
 - South African Civil Aviation Authority

¹¹ Previously registered I&APs for the original EIA and amendment of the EA application processes.

- All potential and registered I&APs (including relevant State Departments) will be given an opportunity to review and comment on the Application for Amendment of the EA and associated report for a **30 day comment period i.e. from 30 January 2018 – 1 March 2018**. A hard copy of the report was lodged at the Springbok Public Library, and was made available for download on the Holland & Associated Environmental Consultants website (www.hollandandassociates.net) during the comment period.
- All comments submitted by I&APs will be collated, summarised and responded to in a Comments and Response Report (CRR) which will be submitted to DEA for decision making, together with the final Environmental Assessment Report for the Application for Amendment of the EA.
- Registered I&APs will be notified, in writing, of DEA's decision.

5 CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of the re-assessment of potential environmental impacts associated with the Application for Amendment of the Environmental Authorisation, it is evident that the proposed amendments may result in changes to the significance ratings and/or level of impact for some of the potential environmental impacts associated with the project, specifically botanical, avifauna, and noise impacts. In some instances, the proposed amendment would result in a reduced impact (i.e. for potential botanical and noise impacts), which would be advantageous, whilst others, potentially an increased level of impact (i.e. for impacts on avifauna), which would be disadvantageous in terms of the proposed amendments. A brief summary is provided below outlining the nature of the potential changes in the impact significance ratings associated with the botanical, avifauna and noise impacts.

- **Botanical:** The overall development disturbance footprint for the Proposed Amended Option is likely to be about 20 – 30% smaller than for the Authorised Project, and will thus have a slightly lower (reduced) botanical impact. The overall botanical impact, although clearly slightly lower than for the Authorised Project, is still best described as Medium (Negative) at a regional scale, before mitigation (Helme, 2017). If a suitable biodiversity offset is implemented then the overall botanical impact of the Proposed Amended Option after mitigation could be reduced to Low (Negative), and this is therefore strongly recommended by the botanical specialist (Helme, 2017).
- **Avifauna:** According to Simmons & Martins (2017), the effects of the proposed amendments to the authorised project are both positive (reduced number of turbines and, thus, disturbance or displacements of birds), and negative (increased probability of fatalities) for a suite of collision-prone birds (some red listed). Collision with the turbine blades of the WEF, and associated power line network, are however the biggest potential risk with turbines placed on the upland ridges or near foraging areas. Whilst the significance of the potential construction phase impacts on avifauna would remain Low (Negative), the proposed amendments would result in an increased significance for operational phase impacts on birds, i.e. the Proposed Amended Option would increase the significance of potential avifauna impacts during the operational phase, before mitigation, from Medium (Negative) to Medium – High (Negative). The impact significance, after mitigation, would increase from Low (Negative) to Medium (Negative). This is largely due to the increase in hub heights and blade length associated with the proposed amendments, as, according to Simmons & Martins (2017), the proposed amendments (i.e. 25 turbines with hub heights of 140m) is likely to incur more fatalities than the authorised 37 turbines of 80m height. However, with suitable mitigations, i.e. either (i) the four most “risky” turbines (i.e. turbine numbers 4, 8, 15 and 16) have their hub heights reduced to 105m and blade length reduced; and (ii) all turbines killing one or more Red Data birds per year will need to be fitted with automated deterrent or shut-down on demand, then the Applicant can reduce their environmental/ avian footprint to acceptable levels. Simmons & Martins (2017) recommends a minimum of 12 months’ post-construction monitoring to determine the effects of the wind farm on the Red Data species identified as at risk. With these mitigations, the avian specialist can recommend that the Springbok WEF, as amended,

can be allowed to proceed (Simmons & Martins, 2017). (Note: The Applicant has reduced the hub height to 105m for the four “risky” turbines (turbine numbers 4, 8 15 & 16), as recommended by Simmons & Martins (2017) and indicated in the proposed amendments outlined in Section 2).

- **Noise:** The significance rating of the potential noise impacts during the operational phase of the WEF would be reduced to Low (Negative) for the Proposed Amended Option (in comparison to the Authorised Project which was rated as Low – Medium (Negative)), due to the reduction of the turbine number and their positioning to locations further away from residential areas (Dracoulides, 2017).

Whilst in some instances the significance of the potential environmental impacts remained the same for the Proposed Amended Project as for the Authorised Project, the specialists noted a potential change in the level of impact in their specialist Addendum reports. This was the case for the bat and visual impacts (which indicated an increased level of impact, which may therefore be considered to be disadvantageous in terms of the proposed amendments), as well as heritage, reptiles and traffic impacts (which indicated a reduced level of impact, which would therefore be advantageous for the Proposed Amended Option), as summarised below:

- **Bats:** Whilst the significance rating for operational phase impacts on bats would remain Very High (in terms of potential bat mortalities due to direct blade impact or barotrauma during foraging) to Medium (Negative) (relating to artificial lighting) before mitigation, and Low (Negative), after mitigation, the level of impact on bats during the operational phase is expected to be higher (albeit that the significance rating has remained the same). A change to the rotor diameter and hub height of the authorised turbines can increase the risk of impact on bats during the operational phase of the WEF, as an increased blade size increases the airspace in which bat mortality may occur during wind turbine operation. The proposed amendments would however not increase the potential impacts on bats during the construction or decommissioning phases. Whilst the proposed amendments to the turbine dimensions would result in a lowered impact on low flying species that are active near vegetation clutter, such as *Neoromicia capensis* the amended turbine size may have an increased impact on high flying bat species, such as *Tadarida aegyptiaca*, based on increased airspace in which mortality is a risk. According to Animalia, the increase in turbine dimensions is significant and thus it triggered an increased negative (level of impact) in terms of potential bat mortalities due to direct blade impact or barotrauma during foraging activities, which has resulted in the need for strict application of mitigation measures as described in Section 3 and Appendix C3, in order for the proposed amendments to be acceptable from a bat sensitivity and impact perspective.
- **Visual:** The Proposed Amended Option, if 25 turbines would be constructed, offers 30% fewer turbines, 77% greater in scale, along with similar infrastructure elements as before. If 12 turbines would be constructed, the layout would offer 66% fewer turbines, 77% greater in scale. Whilst the significance rating for the Authorised and Proposed Amended Options remain the same during the operational phase (i.e. High (Negative) (which is a combination of intensity, extent and duration ratings), the degree of that high rating would be somewhat greater than for the Authorised project due to the increased height and rotor length. The visual specialist concluded that the Proposed Amendment Option with 25 turbines is acceptable from a visual standpoint (Hansen, 2017).

- Heritage: Whilst the significance of the potential operational phase heritage impacts for the Proposed Amended Option, before and after mitigation, are the same as for the Authorised project (i.e. Low (Negative)), the heritage specialist noted that the Proposed Amended Option is an improvement in heritage terms and impacts (i.e. the intensity of the potential operational phase heritage impacts) are subsequently lower (Martin, 2017).
- Traffic: Whilst the significance of the potential traffic impacts would be the same for both the Approved Project and the Proposed Amended Option, with the reduction in the number of turbines in the Proposed Amended Option, motor vehicle and truck trips generated during the peak hours in the construction phase trips will reduce and the associated transport impact will be less than that of the Authorised Project. Furthermore, the proposed Amended Option would result in a reduction of over 20 percent in the total truck traffic associated with the WEF layout and configuration, which is considered advantageous.
- Reptiles: Although the impact ratings for the Proposed Amended Option will be the same as for the Authorised Project, the reptile specialist indicated that the lower numbers of WTGs and the associated decrease in road area coverage of the proposed amended option must be considered as advantages as far as the impact of habitat loss, road kills, and the barrier effects of roads on reptiles are concerned. The disadvantage of the larger temporary construction pad per WTG in the proposed amended option would be offset by the lower number of WTGs (Mouton, 2017).

In light of the above, the proposed amendments to the project description (including layout), are considered acceptable to the EAP and specialists, provided that the recommended mitigation measures outlined in Section 3 (and in the specialist Addendum Reports (refer to Appendix C)) are implemented.

The proposed amendments to the project title of the EA and contact details of the holder of the EA are non-substantive amendments (and therefore would not result in any negative or positive environmental impacts). It is therefore recommended that the aforementioned amendments be authorised.

Any additional mitigation measures included in the Application for Amendment of the EA Environmental Assessment Report (i.e. this report) as a result of the proposed amendments to the project (as outlined in Section 3 and included in the Specialist Addendum Reports – refer to Appendix C), as well as the pre-construction bird and bat monitoring studies, must be included in the final EMPr before submission to DEA for final approval, as required in terms of Condition 3.1 of the EA.

**Appendix A:
Amended layout showing turbine positions, access
roads and distribution network**

Appendix B: Application for Amendment of the EA Form

Appendix C: Specialist Studies

Appendix C1: Impacts on vegetation

Appendix C1a: Addendum Report: Impacts on vegetation

Appendix C1b: Specialist Comment: Impacts on vegetation

Appendix C1c: Specialist Declaration

Appendix C1d: Specialist CV

Appendix C2: Impacts on avifauna (birds)

Appendix C2a: Addendum Report: Impacts on avifauna (birds)

Appendix C2b: Specialist Declaration

Appendix C2c: Specialist CV

Appendix C3: Impacts on bats

Appendix C3a: Addendum Report: Impacts on bats

Appendix C3b: Specialist Comment: Impacts on bats

Appendix C3c: Specialist Declaration

Appendix C3d: Specialist CV

Appendix 3e

Endorsement by Prof Jacobs

Appendix C4: Noise Impacts

Appendix C4a: Addendum Report: Noise Impacts

Appendix C4b: Specialist Comment: Noise Impacts

Appendix C4c: Specialist Declaration

Appendix C4d: Specialist CV

Appendix C5: Visual Impacts

Appendix C5a: Addendum Report: Visual Impacts

Appendix C5b: Specialist Comment: Visual Impacts

Appendix C5c: Specialist Declaration

Appendix C5d: Specialist CV

Appendix C6: Archaeological Impacts

Appendix C6a: Addendum Report: Archaeological Impacts

Appendix C6b: Specialist Comment: Archaeological Impacts

Appendix C6c: Specialist Declaration

Appendix C6d: Specialist CV

Appendix C7: Palaeontological Impacts

Appendix C7a: Addendum Report: Palaeontological Impacts

Appendix C7b: Specialist Comment: Palaeontological Impacts

Appendix C7c: Specialist Declaration

Appendix C7d: Specialist CV

Appendix C8: Heritage Impacts

Appendix C8a: Addendum Report: Heritage Impacts

Appendix C8b: Specialist Comment: Heritage Impacts

Appendix C8c: Specialist Declaration

Appendix C8d: Specialist CV

Appendix C9: Impacts on Reptiles

Appendix C9a: Addendum Report: Impacts on Reptiles

Appendix C9b: Specialist Comment: Impacts on Reptiles

Appendix C9c: Specialist Declaration

Appendix C9d: Specialist CV

Appendix C10: Socio-Economic Impacts

Appendix C10a: Addendum Report: Socio-Economic Impacts

Appendix C10b: Specialist Comment: Socio-Economic Impacts

Appendix C10c: Specialist Declaration

Appendix C10d: Specialist CV

Appendix C11: Traffic Impacts

Appendix C11a: Addendum Report: Traffic Impacts

Appendix C11b: Specialist Comment: Traffic Impacts

Appendix C11c: Specialist Declaration

Appendix C11d: Specialist CV

Appendix D: Details of EAP and Declaration of Interest

Appendix E: Public Participation Process

Appendix E1: List of Interested and Affected Parties

Appendix E2: Site Notices

Appendix E3: Advertisements

Appendix E4: Letters of Notification to I&APs

Appendix F:
**Electronic copy of original EIA Report (2010) and
associated specialist studies**

