

Korana Wind Energy Facility and associated infrastructure, Northern Cape Province

Motivation for amendment of Environmental Authorisation

DEA Ref.: 14/12/16/3/3/2/682

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savannah
environmental

t +27 (0)11 656 3237

f +27 (0)86 684 0547

e info@savannahsa.com

w www.savannahsa.com

Prepared for:

South Africa Mainstream Renewable Power Development (Pty) Ltd
4th Floor Mariendahl House, Newlands on Main,
Cnr Main and Campground Road,
Claremont,
Cape Town,
7708



PROJECT DETAILS

Title	:	Korana Wind Energy Facility and associated infrastructure, Northern Cape Province: Motivation for Amendment to the Environmental Authorisation
Authors	:	Savannah Environmental (Pty) Ltd Jo-Anne Thomas Gideon Raath Hermien Slabbert
Specialist Consultants	:	Chris van Rooyen Chris van Rooyen Consulting Stephanie Dippenaar of Stephanie Dippenaar Consulting Morné de Jager of Enviro Acoustic Research Lourens du Plessis of LOGIS
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TABLE OF CONTENTS

	PAGE
PROJECT DETAILS	i
TABLE OF CONTENTS	ii
APPENDICES	iii
PURPOSE OF THE REPORT	iv
1. OVERVIEW OF THE PROJECT	1
1.1. Location	1
1.2. Potential Environmental Impacts as determined through the EIA Process	1
1.3. Amendments of the Environmental Authorisation	4
2. DETAILS OF THE AMENDMENTS APPLIED FOR	6
2.1. Amendment to Hub height and rotor diameter	6
2.2. Amendment to Wind Turbine Capacity:	6
3. MOTIVATION FOR THE PROPOSED AMENDMENTS	8
3.1. Technical Motivation for Amendment of Turbine Specifications	8
4. Considerations in terms of the requirements of the EIA Regulations	9
5. POTENTIAL FOR CHANGE IN THE SIGNIFICANCE OF IMPACTS AS ASSESSED IN THE EIA AS A RESULT OF THE PROPOSED AMENDMENTS	10
5.1. Impacts on avifauna	10
5.1.1. Comparative Assessment	13
5.1.2. Mitigation measures as a result of the amendment	15
5.1.3. Conclusion	16
5.2. Impacts on bats	17
5.2.1. Comparative Assessment:	18
5.2.2. Conclusion	21
5.3. Visual Impact	22
5.3.1. Comparative Assessment	24
5.3.2. Conclusion	24
5.4. Noise impact	24
5.4.1. Comparative Assessment	26
5.4.2. Conclusion	26
6. ADVANTAGES AND DISADVANTAGES OF THE PROPOSED AMENDMENTS	27
7. REQUIREMENTS FOR ADDITIONAL MITIGATION AS A RESULT OF THE PROPOSED AMENDMENTS	28
8. PUBLIC PARTICIPATION	29
9. CONCLUSION	30

APPENDICES

- Appendix A:** Avifauna Specialist Addendum Report
- Appendix B:** Bat Specialist Addendum Report
- Appendix C:** Visual Specialist Addendum Report
- Appendix D:** Noise specialist Comment Letter
- Appendix E:** Public Participation Documentation
 - Appendix E1: I&AP Database
 - Appendix E2: Consultation with I&APs
 - Appendix E3: Consultation with Organs of State
 - Appendix E4: Advertisements and Site Notices
 - Appendix E5: Comments and Responses Report
 - Appendix E6: Comments Received
- Appendix F:** EMPr
 - Appendix F1: Plant Rescue and Protection, and Rehabilitation Plan
 - Appendix F2: Alien Invasive Management Plan
 - Appendix F3: Erosion Management Plan
 - Appendix F4: Construction Waste Guidelines
 - Appendix F5: Grievance Mechanism for Public Complaints and Issues
 - Appendix F6: Traffic Management Plan
 - Appendix F7: Stormwater Management Plan
 - Appendix F8: Operational Bird Monitoring Programme
 - Appendix F9: Open Space Management Plan
- Appendix G:** A3 Maps
- Appendix H:** Environmental Team CVs

PURPOSE OF THE REPORT

An Environmental Authorisation (EA) for the Korana Wind Energy Facility and associated infrastructure, in the Northern Cape Province (DEA ref: 14/12/16/3/3/2/682) was obtained by South Africa Mainstream Renewable Power Development (Pty) Ltd, issued on 28 May 2015 (as subsequently amended on 06 June 2018). The project comprises a wind farm of up to 140MW and is intended to be bid into future rounds of the Department of Energy's (DoE) Renewable Energy Independent Power Producers Procurement (REIPPP) Programme. There have been advancements to wind turbine technology since the issuing of the EA, and the turbine model authorised in the EA is therefore no longer considered to be the most suitable for the site in terms of production and economic considerations.

In this regard, South Africa Mainstream Renewable Power Development (Pty) Ltd (Mainstream) is considering an alternative turbine model for the project and is proposing the following amendments to the project description considered in the EIA process:

1. An increase in rotor diameter for each turbine from **150m** to **up to 200m**;
2. An increase in hub height from **140m** to **up to 200m**; and
3. An increase in the individual generating capacity of each turbine from **1,5MW - 4MW** to **2MW - 7MW** and
4. A reduction in the number of turbines from **70 turbines** to a **maximum of 42 turbines**.

The increase in the rotor diameter, hub height and wind turbine generation capacity will result in the optimisation of the facility. These amendments to the project are proposed in order to increase the efficiency of the facility and consequently the economic competitiveness thereof. The overall capacity will remain 140 MW and there will be no change to the layout as considered in the EIA process. 70 turbines were approved during the EIA phase, however, with the proposed larger turbine model associated with the amendment, fewer turbines will be constructed to reach the overall export capacity limit of 140 MW (the number of turbines could vary depending on the final turbine model and size selected).

The proposed amendments in themselves are not listed activities, and do not trigger any new listed activity as the proposed amendments are within the original authorised development footprint, and do not change the scope of the EA.

In terms of Condition 5 of the Environmental Authorisation and Chapter 5 of the EIA Regulations of December 2014 (as amended on 07 April 2017 and 13 July 2018), it is possible for an applicant to apply, in writing, to the competent authority for a change or deviation from the project description to be approved.

Savannah Environmental has prepared this Motivation Report in support of the amendment application on behalf of Mainstream. This report aims to provide detail pertaining to the impacts and significance of the proposed change to the turbine specifications in order for interested and affected parties to be informed of the proposed amendments and provide comment, and for the competent authority to be able to reach a decision in this regard. This report is supported by specialist studies in order to inform the final conclusion regarding the proposed amendments (refer to **Appendix A to D** of this report). This main report must be read together with these specialist studies in order to obtain a complete understanding of the proposed amendments and the implications thereof.

This amendment motivation report has been made available to registered interested and affected parties for a 30-day period from **1 October 2019 to 31 October 2019**. The availability of the report was advertised in the Volksblad newspaper on **1 October 2019** (refer to **Appendix E4**).

This document is available for download at www.savannahsa.com. CD copies are available on request. To obtain CD copies, further information, register on the project database, or submit written comment, please contact:

Nicolene Venter of Savannah Environmental
Post: PO Box 148, Sunninghill, 2157 Johannesburg
Tel: 011 656 3237
Fax: 086 684 0547
Email: publicprocess@savannahsa.com
www.savannahsa.com

All comments received during the review period will be included within a Comments and Responses report to be submitted to the DEFF with the final amendment motivation report and application.

1. OVERVIEW OF THE PROJECT

1.1. Location

The authorised Korana Wind Farm is located 22 km south-west of Pofadder in the Northern Cape Province. The site falls within the Khai-Ma Local Municipality within the Namakwa District Municipality.

The wind energy facility is to be constructed within the project site which comprises the following farm portions:

- » Portion 1 of the farm Namies Suid 212;
- » Portion 2 of the farm Namies Suid 212; and
- » Portion 1 of the Farm Poortje 209.

The following infrastructure was authorised following the EIA process:

- » A maximum of 70 wind turbines, with individual turbine capacity ranging between 1.5 – 4MW. The capacity of the facility will be up to 140MW.
- » Foundations to support the turbine towers.
- » Internal access roads (up to 8m in width).
- » Workshop area/office for control, maintenance and storage.
- » On-site substation (500m x 500m).

1.2. Potential Environmental Impacts as determined through the EIA Process

From the specialist investigations undertaken within the EIA process for the wind energy facility (Savannah Environmental, 2015), the following environmental impacts relevant to the amendment application were identified:

- » Impacts on birds;
- » Impacts on bats;
- » Impacts on areas of visual impact; and
- » Noise impact.

Key conclusions and recommendations of the original EIA pertinent to this application:

From the specialist investigations undertaken as part of the EIA for the wind energy facility, it was concluded that the majority of impacts are of low to medium significance with the implementation of appropriate mitigation measures. No environmental fatal flaws were identified on the site. However, areas of very high sensitivity were identified and avoided through micro siting of the wind turbines. Areas of sensitivity identified during the EIA process include:

» **Avifauna:**

A total of 83 species were recorded at the study area (i.e. the turbine area, control areas and immediate surroundings) from all data sources (drive transects, walk transects, VP watches, focal point counts and

incidental sightings), of which 11 are priority species. Based on the avifaunal monitoring, it was determined that the Ludwig's Bustard was the species with the highest potential collision risk score and the Southern Pale Chanting Goshawk emerged as the species with the second highest collision risk with a risk. Raptors nest found near the site such as the Martial Eagle could potentially be displaced as a breeding species, but they would most likely continue to use the site for foraging. The EIA concluded that the Korana Wind Energy Facility will have a moderate impact on avifauna which could be reduced to low through appropriate mitigation. The impacts relating to the potential mortality due to collisions with the wind turbines and the potential displacement due to the habitat transformation associated with the wind turbines and associated infrastructure were rated as medium and was reduced to low with appropriate mitigation. The priority species that could potentially be most affected by displacement due to habitat change and loss is the Ludwig's Bustard, Karoo Korhaan and to a lesser extent the Red Lark. However, due to the small footprint, displacement linked directly to habitat loss is not likely to be a major impact.

» **Bats:**

There are no known bat roosts on site and bats could roost in cavities in these trees, among foliage on the trees or in farm buildings. The development has low mountains to the north, several koppies bordering to the east and encroaching across its boundary and low inselbergs in some areas. These geological features have rocky crevices which could be used as roosts by some bats. Based on over 12 months of pre-construction monitoring, bat activity is moderate and that activity varied across the proposed development with higher activity near the tubular met mast, considered likely to be because of proximity to potential roost sites. Activity is highest in summer at all the monitoring locations and very little activity was recorded in autumn, winter and spring, except for at the met mast where activity persisted throughout the monitoring period. The key findings of the bats impact assessment and bat monitoring concluded that bat species composition and activity was dominated by four species: *Eptesicus hottentotus* (Long-tailed serotine), *Miniopterus natalensis* (Natal long-fingered bat), *Neoromicia capensis* (Cape Serotine) and *Tadarida aegyptiaca* (Egyptian free-tailed bat). These species have the potential to be at risk from WEFs because they display foraging behaviour that may bring them within the rotor-swept zone. The Long-tailed serotine and Cape serotine forage at a range of heights including near to the ground, on the edge of vegetation and in open air several meters above the ground. This may bring these species into the range of the lower sweep of the turbine blades. The Egyptian free-tailed bat was the most abundant species across all monitoring systems during the bat monitoring study. The Egyptian free-tailed bat is a high-flying species which forages in open areas and is therefore at risk of encountering wind turbine blades across most of the rotor-swept zone. Natal long-fingered bats were also recorded at the site but in low numbers. This species also forages across a range of heights and habitats which may bring them into the range of the rotor-swept zone. Lower bat activity was detected over the winter months with a steady increase from November 2013 to March 2014, peaking in January 2014 (Arcus Consultancy Services, 2014).

» **Visual:**

The EIA phase determined that potential sensitive visual receptors included observers residing at homesteads (farm residences and dwellings) within the study area, and observers travelling along the secondary roads traversing within a 5km radius of the proposed development site.

The key findings of the visual impact assessment undertaken as part of the EIA process can be summarised as follows:

- » The visibility of the facility from, and potential visual impact on observers travelling along main roads (i.e. the N14 and TR8401) and secondary roads in close proximity to the proposed facility and within the region.
- » The visibility of the facility from, and potential visual impact on residents of homesteads and settlements in close proximity to the proposed facility and within the region.
- » The potential visual impact of ancillary infrastructure (i.e. the substations, power lines, internal access roads, workshop and office) on observers in close proximity to the proposed facility.
- » Potential visual impacts associated with the construction phase on observers in close proximity to the proposed facility.
- » The potential visual impact of operational, safety and security lighting of the facility at night on observers in close proximity to the facility.
- » The potential visual impact of the proposed facility on tourist access routes (i.e. the N14 and TR8401) within the region.
- » The potential visual impact of the proposed facility on the visual quality of the landscape and sense of place region.
- » The potential cumulative visual impact of the proposed facility in relation to the other three proposed components of the Mainstream Renewable Energy facility, other approved renewable energy facilities and other infrastructure and built forms within the region.
- » Potential residual visual impacts after the decommissioning of the proposed facility.
- » The potential to mitigate visual impacts and inform the design process.

The proposed facility will have a large core area of potential visual exposure on the project site itself, and within a 5km radius thereof. The low mountains to the north and north west of the site offer some visual screening to the areas beyond. Potential sensitive visual receptors within this visually exposed zone include residents of homesteads. Potential visual exposure remains high in the medium distance (i.e. between 5 and 10km), with visually screened areas in the north west (beyond the low mountains). Sensitive visual receptors comprise users of secondary roads to the west, north-west and south-west of the site as well as residents of homesteads and settlements. In the longer distance (i.e. beyond the 10km offset), the extent of potential visual exposure is slightly reduced, especially in the north west of the study area, and to a lesser extent in the north east and south west. Visually exposed areas tend to be concentrated in the south and south east and to the far west and north east. Sensitive visual receptors include users of stretches of the N14 in the north west, and of the TR8401 in the east. In addition, users of secondary roads within the study area and residents of homesteads and settlements, particularly in the south, may be visually exposed. The town of Pofadder lies more than 20km from the proposed site, and is thus not likely to be visually exposed to the proposed facility. Other receptor sites at this distance, despite lying within the viewshed, are also not likely to visually perceive the facility.

» **Noise:**

The Noise Impact Assessment undertaken during the EIA process used the noise emission characteristics of the Vestas V117 3.3 MW wind turbine. It was determined that there were no residential areas (suburban) within 2 000m from the proposed facility with only two potential noise-sensitive receptors within 2 000m from the closest wind turbines of the proposed wind energy facility. With the input data as used, the assessment indicated that there exists a low risk of a noise impact developing during the operational phase of the development. A worst-case scenario with ambient sound levels being quieter than measured onsite, there exists a likely risk that the sound created by the wind turbines will be audible to these two potential noise-sensitive receptors at a level that may be annoying. However, considering the ambient sound levels as

measured onsite, it is unlikely that the wind turbines will create a noise loud enough to be audible above the wind-induced noise levels. The noise impact assessment concluded that the potential noise impact would be of a low significance during both the construction and operational phases.

» **Summary of EIA Findings:**

As part of the planning mitigation strategy, the applicant considered all the above-mentioned findings and sensitivities, and duly made the necessary amendments to the layout considered in the EIA in order to reduce impacts to an acceptable level. The mitigated layout assessed during the EIA process is presented in **Figure 1.1**.

No environmental fatal flaws were identified to be associated with the proposed Korana Wind Energy Facility. However, a number of impacts of medium significance were identified which require mitigation (such that the majority of the impacts can be reduced to medium – low significance). Where impacts cannot be avoided, appropriate environmental management measures are required to be implemented to mitigate the impact. Environmental specifications for the management of potential impacts are detailed within the Environmental Management Programme (EMPr) submitted as part of the EIA Report.

1.3. Amendments of the Environmental Authorisation

Following the issuing of the EA in May 2015, one amendment was made to the Environmental Authorisation:

» Amendment issued on 06 June 2018, the EA was extended by another **3 years**: *"The activity must commence within a period of three (3) years from the date of expiry of the EA issued on **28 May 2015 (i.e. the EA lapses on 28 May 2021)**. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made, provided that the activity is still listed."*

» In addition to this the contact person of the EA was changed; contact details were amended from:

Mr. Michael Mangnall
South African Mainstream Renewable Power Developments
PO Box 45063
CLAREMONT
7735

To
Mr. Eugene Marais
South African Mainstream Renewable Power Developments
PO Box 45063
CLAREMONT
7735

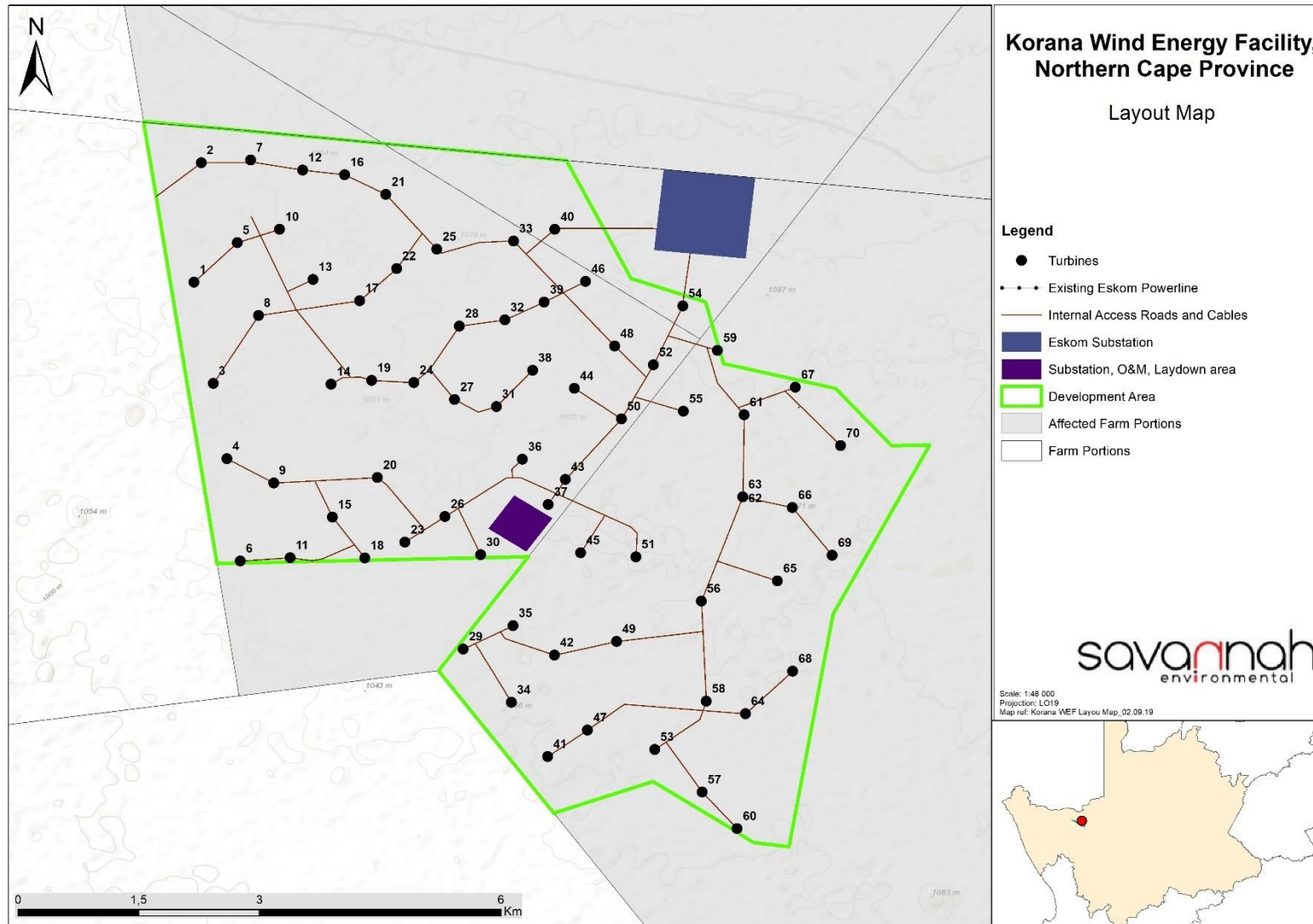


Figure 1.1: Layout assessed during the EIA process undertaken for the project in 2014/2015 (A3 Map included in **Appendix F**).

2. DETAILS OF THE AMENDMENTS APPLIED FOR

The amendments being applied for relate to the authorised wind turbine specifications as detailed in the EA dated 08 May 2015, as amended. This requested amendment will result in an optimisation of the facility assessed within the EIA and an increase in efficiency thereof.

This section of the report details the amendments considered within this report and by the specialist investigations (refer to **Appendix A – D**). Each amendment request is detailed below.

2.1. Amendment to Hub height and rotor diameter

The turbine specifications (as specified on page 5 of the Environmental Authorisation issued on 28 May 2015) are to be amended. It is requested that the turbine specifications be amended from:

- Hub height: 140m
- Rotor Diameter: 150m

To:

- **Hub height: up to 200m**
- **Rotor Diameter: up to 200m**

It is requested that the amended turbine specifications be added into the project description of the EA.

2.2. Amendment to Wind Turbine Capacity:

Individual turbine capacity (as specified on page 5 of the Environmental Authorisation issued on 28 May 2015) are to be amended. It is requested that the turbine specifications be amended from:

- Individual turbine capacity from: 1,5MW - 4MW

To:

- **Individual turbine capacity: 2MW - 7MW**

It is requested that the amended turbine specifications be added into the project description of the EA (on page 5 of the EA).

2.3. Amendment to the number of Wind Turbines:

It is requested that the number of turbines be reduced from the authorised 70 turbines to a **maximum of 42 turbines** (as specified on page 5 of the Environmental Authorisation issued on 28 May 2015).

The table below provides a detailed comparison of the project description included in the EA as authorised on 28 May 2015 with the proposed project components which are requested to be amended (shown in **bold** text).

Component	Authorised specification	Amended specifications
Rotor diameter	Up to 150	Up to 200m
Hub height	Up to 140	Up to 200m

Component	Authorised specification	Amended specifications
Wind Turbine Generation Capacity	1,5MW - 4MW	2MW - 7MW
Number of turbines	70	42

The changes in turbine specifications will not have an impact in the contracted export capacity of the project (i.e. 140MW), will fall within the originally authorised development area of the facility and do not trigger any new listed activities.

3. MOTIVATION FOR THE PROPOSED AMENDMENTS

3.1. Technical Motivation for Amendment of Turbine Specifications

Wind turbine generators are constantly under development to increase the potential energy output capacity per wind turbine. Following the issuing of the EA for the project, there have been advancements to wind turbine technology with newer turbines becoming larger and more powerful. The turbines authorised in the EA are therefore no longer considered to be the most suitable in terms of production and economic considerations. In this regard, The Korana Wind Energy Facility is considering an alternative turbine model for the project and wishes to amend the EA to cater for larger turbine specifications, to enable the use of the latest, most efficient turbines available on the market. The increase in the rotor diameter, hub height and wind turbine generation capacity will result in the optimisation of the facility which was assessed within the EIA for the project and will result in fewer turbines required. These amendments to the project are proposed in order to increase the efficiency of the facility and consequently the economic competitiveness thereof. It is also noted that the proposed amendments will improve the efficiency of the wind farm which may reduce the electricity tariff charged by the project, which would be to the benefit of all electricity consumers in South Africa.

Although there is an increase in the rated power of the turbines being applied for, the overall output capacity of the wind energy facility will remain within the authorised export capacity of 140MW.

4. CONSIDERATIONS IN TERMS OF THE REQUIREMENTS OF THE EIA REGULATIONS

In terms of Regulation 31 of the EIA Regulations 2014 (as amended on 07 April 2017 and 13 July 2018), as amended, an environmental authorisation may be amended by following the process in this Part (i.e. a Part 2 amendment) if it is expected that the amendment may result in an increased level or change in the nature of impact where such level or change in nature of impact was not:

- a) Assessed and included in the initial application for environmental authorisation; or
- b) Taken into consideration in the initial authorisation.

In this instance, the amended turbine specifications were not considered in the initial authorisation. The change does not however, on its own, constitute a listed or specified activity. Therefore, the application is made in terms of Regulation 31(a).

5. POTENTIAL FOR CHANGE IN THE SIGNIFICANCE OF IMPACTS AS ASSESSED IN THE EIA AS A RESULT OF THE PROPOSED AMENDMENTS

An application for the requested amendments has been submitted to the DEFF. The DEFF has advised (as per the acknowledgement of receipt of the application notification letter, dated 10 September 2019) that this application is considered to be a Part 2 amendment as contemplated in terms of Regulation 32 of the EIA Regulations (2014, as amended on 07 April 2017 and 13 July 2018), as amended. In terms of Regulation 32(1)(a)(i), the following section provides an assessment of the impacts related to the proposed change. Understanding the nature of the proposed amendments and the impacts associated with the project (as assessed within the EIA), the following has been considered:

- » Impacts on birds;
- » Impacts on bats;
- » Visual impacts; and
- » Noise impacts.

The change in rotor diameter and turbine hub height, and increase in individual wind turbine capacity are expected to have **no effect** on the findings of the Social, Ecological and Heritage Assessments undertaken as part of the EIA process. Therefore, no Social, Ecological and Heritage Specialist Report have been included as part of the current amendment application.

The potential for change in the significance and/or nature of impacts based on the proposed amendments as described within this motivation report is discussed below, and detailed in the specialists' assessment addendum letters and reports (as applicable) contained in **Appendix A-D**¹. Additional mitigation measures recommended as a result of the proposed amendments, or due to new legislative requirements have been underlined for ease of reference, where applicable. This section of the main report must be read together with the specialist reports contained in **Appendix A-D** in order for the reader to obtain a complete understanding of the proposed amendments and the implications thereof.

5.1. Impacts on avifauna

The avifaunal assessment (**Appendix A**) undertaken for the proposed amendments included the review and assessment of original reports and data, as well as the update of any previously assessed impacts and updated mitigation measures where required.

The original Bird Specialist Study (Van Rooyen et al. 2014) recorded a total of 83 species in the study area (i.e. the turbine area, control areas and immediate surroundings) from all data sources (drive transects, walk transects, VP watches, focal point counts and incidental sightings), of which 11 are priority species. During the EIA phase, a Martial Eagle nest was identified on Tower 147 of the Aries – Aggeney's 400kV 1 transmission line. A buffer of 1,5km was implemented around this nest.

¹ It must be noted that the original specialists who undertook the EIA studies have been used for these assessments as far as possible. However, where the original specialists were not available for whatever reason, suitably qualified and experienced specialists have been used to provide an assessment of the proposed amendments.

The authorised rotor diameter of 150m for the Korana WEF translates into a rotor swept area of approximately 17 671m² per turbine. An increase of the rotor diameter to 200m will result in a rotor swept area of approximately 31 415m² (utilising the same number of turbines as approved). This amounts to an increase of 77.7% in the rotor swept area per turbine should the number of turbines not be reduced simultaneously.

With the proposed larger turbine model associated with the amendment, a smaller number of turbines would be required (assuming the largest turbines size is chosen but the number of turbines could vary depending on the final turbine model chosen) to be constructed to reach the overall facility limit of 140MW. The 77% rotor swept area per turbine is reduced significantly when the number of turbines is reduced.

Two known Martial Eagle nests were identified during the EIA phase. The Verreaux's Eagle nests are indicated relative to the Korana Wind Farm in Figure 5.1.1. The previous 1.5km turbine-free buffer zone around the Martial Eagle nest on Tower 147 of the Aries – Aggeneys 400kV 1 transmission line was converted to a 4.5km turbine-free zone. This was done to bring the WEF closer in line with recent guidelines. This is indicated in Figure 5.1.1 below.

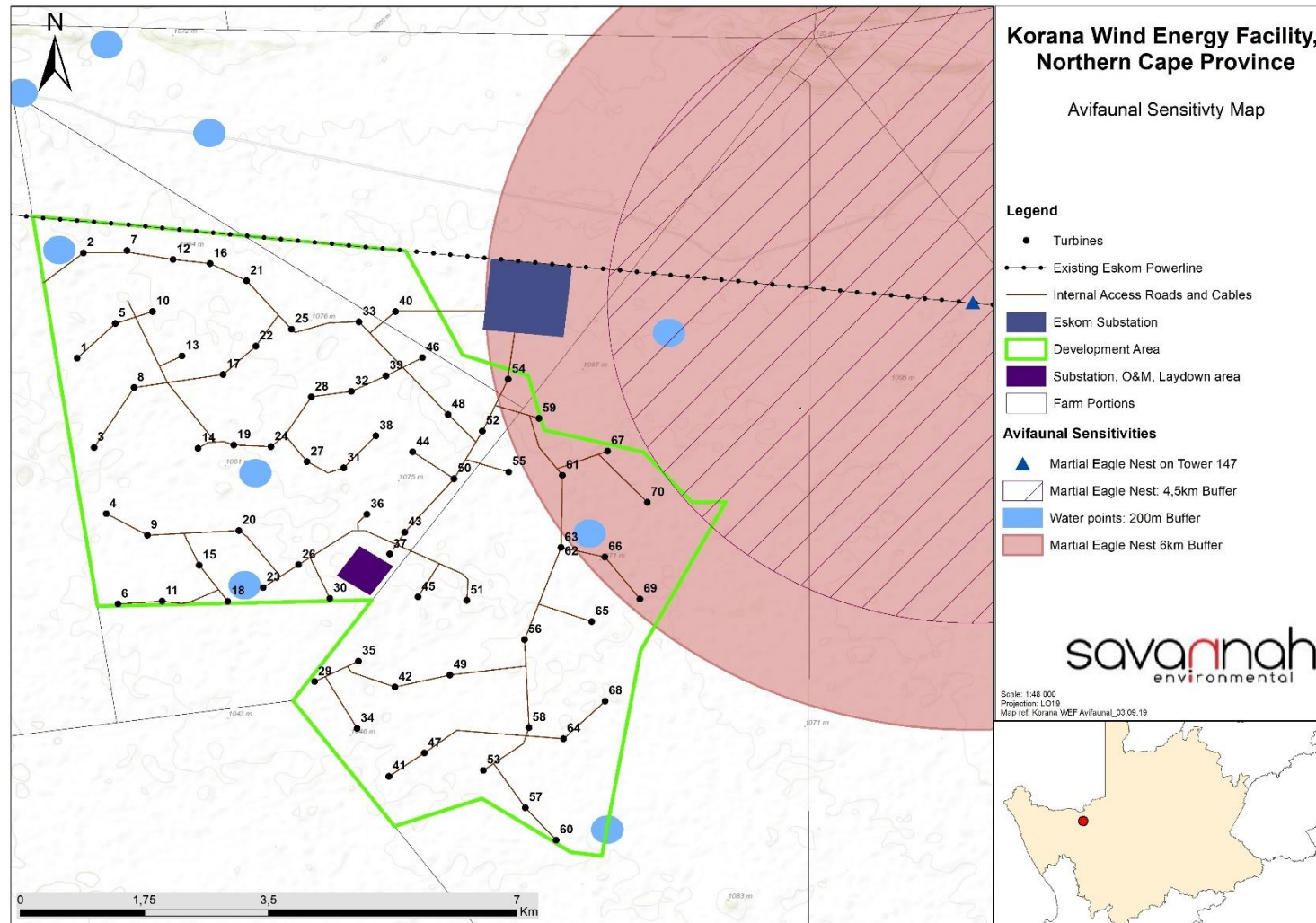


Figure 5.1: The position of known a **Martial Eagle** nest and a 4.5km buffer around the nest, relative to the proposed site. **(A3 Map included in Appendix F).**

5.1.1. Comparative Assessment

The increased rotor diameter will result in an increased avifaunal collision risk and overall collision risk. The rotor swept area will increase by 77.7% in rotor swept area per turbine and is significant, **unless the number of turbines is reduced**, it will result in a significant increase in the overall collision risk. **However, should the number of turbines reduce significantly (i.e. to a maximum of 42), it will result in the collision rating remaining unchanged, depending on the extent of the reduction in the number of turbines** (see impact rating table below).

The following impact identified during the EIA phase is applicable in the amendment process:

- Priority species mortality due to collision with the turbines.

A significance rating of 36 (medium negative) was assigned prior to mitigation measures and a significance rating of 20 (medium negative) was assigned after mitigation.

The impacts relating to disturbance of birds during construction and mortality of birds during operation has increased slightly as a result of the proposed amendment. Where the significance has changed this is indicated in **bold** in the table below.

Priority species mortality due to collision with the turbines

Given the significant proposed increase in rotor swept area, it is concluded that the original pre-mitigation impact significance rating of -36 (medium) for potential collision mortality will not be valid anymore, should the proposed change in the turbine dimensions be applied to the current layout of 70 turbines. In that case, the collision risk rating would increase to -56 (medium) which is marginally below a high rating (>60) (see **Error! Reference source not found.**below). Additional mitigation measures recommended as a result of the proposed amendment have been underlined in the table below, where applicable.

Nature of impact:				
Bird collisions of priority avifauna with the wind turbines.				
	Authorised		Proposed amendment	
	Without mitigation	With mitigation	Without mitigation	With mitigation
Extent	Low (2)	Low (2)	Low (2)	Low (2)
Duration	Long-term (4)	Long-term (4)	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (4)	High (8)	Low (4)
Probability	Probable (3)	Improbable (2)	Highly probable (4)	Improbable (2)
Significance	36 (Medium)	20 (Low)	56 (Medium)	20 (Low)
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	Low	High	Low	High
Irreplaceable loss of resources?	No	No	No	No
Can impacts be mitigated?	Yes		Yes	
Mitigation measures as per the original EIA				
<ul style="list-style-type: none"> » A 200m no-go buffer is proposed around water points as they serve as focal points for raptor activity. » Formal monitoring should be resumed once the turbines have been constructed, as per the most recent edition of the best practice guidelines (Jenkins <i>et al.</i> 2011). The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of adaptive 				

management. The purpose of this would be (a) to establish if and to what extent displacement of priority species has occurred through the altering of flight patterns post-construction, and (b) to search for carcasses at turbines.

- » As an absolute minimum, post-construction monitoring should be undertaken for the first two (preferably three) years of operation, and then repeated again in year 5, and again every five years thereafter. The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of adaptive management.
- » The environmental management plan should provide for the on-going inputs of a suitable experienced ornithological consultant to oversee the post-construction monitoring and assist with the on-going management of bird impacts that may emerge as the post-construction monitoring programme progresses.
- » Depending on the results of the carcass searches, a range of mitigation measures will have to be considered if mortality levels turn out to be significant, including selective curtailment of problem turbines during high risk periods.
- » If turbines are to be lit at night, lighting should be kept to a minimum and should preferably not be white light. Flashing strobe-like lights should be used where possible (provided this complies with Civil Aviation Authority regulations).
- » Lighting of the wind farm (for example security lights) should be kept to a minimum. Lights should be directed downwards (provided this complies with Civil Aviation Authority regulations).

Mitigation measures due to the proposed amendment:

- » The number of turbines should be reduced to a maximum of 42 turbines (i.e. 60% of the original authorised 70).
- » The 1.5km turbine-free buffer zone around the Martial Eagle nest on the Aries – Aggeney's 400kV 1 transmission line should be converted to a 4.5km turbine-free zone, and the number of turbines beyond the 4.5km turbine-free zone, up to a radius of 6km from the nest, should be restricted to no more than 13.
- » As an absolute minimum, post-construction monitoring should be undertaken for the first three years of operation, and then repeated again in year 5, and again every five years thereafter. The exact scope and nature of the post-construction monitoring must be informed on an ongoing basis by the result of the monitoring through a process of adaptive management.

Cumulative impacts:

Site specific for the Korana WEF

There is currently a total of up to 140 turbines planned for a land parcel area of approximately 175km², namely up to 70 turbines for Korana WEF and up to 70 turbines for Kai-Ma WEF, although this number is likely to be considerably less given the proposed use of newer, larger turbines. In the current instance, not all the above criteria can be met in assessing the cumulative impact of potential mortality due to collisions with the proposed turbines at a study area level. The main reason is that no other studies have been done within this area with regard to avifaunal mortality levels, therefore there are no existing studies to review as far as existing impacts on the avifauna is concerned.

In the absence of any scientifically verified data, general knowledge and experience will have to suffice. Given the extensive farming practices which are currently used in the study area, it can be surmised that the existing anthropogenic impacts on avifauna in the study area is relatively low. Although it cannot be confirmed, interviews with the landowners indicate that active persecution of large raptors for alleged stock killing is not commonly practised. Hunting of priority species is also not a major impact, although the hunting of some species has been confirmed by landowners. Overall, the very low human population in the study area is definitely advantageous to avifauna in general.

All of these assertions should ideally be tested empirically in order to make comparisons possible, but a study of that proportion falls outside the scope of this project. The one impact that has been empirically confirmed is the

mortality of Ludwig's Bustard due to collisions with the existing Aries - Aggeneys 400kV transmission line. The extent of this mortality factor in the study area is unknown, but it can be assumed that it is a regular occurrence (Shaw 2013), and it was confirmed by a landowner. The key question therefore is to what extent turbine collisions will contribute to this existing and potentially significant mortality factor.

All in all, it is envisaged that collisions of Ludwig's Bustard with the turbines will not be a major impact, based on mortality figures at operational wind farms to date (BLSA 2018). **Provided the recommendations in this report are implemented, it is envisaged that the cumulative impact of mortality of priority species in the study area due to collisions with the turbines is likely to be low.**

Regional

There are currently four applications for wind energy facilities within a 100km radius around Pofadder. It is difficult to estimate at this stage how severe the cumulative collision impact of all these proposed wind developments will be on priority species on a regional basis, firstly because for many species no or inaccurate baseline population and mortality data exists, and secondly because the extent of actual impacts will only become known if the wind farms are actually developed and post-construction monitoring is implemented.

It is therefore imperative that post-construction monitoring is implemented at all the proposed sites, in accordance with best practice. This will provide the data necessary to improve the assessment of the cumulative impact of wind development on priority species, especially for future developments in the region. Within the context of the previous statement and without detracting from it in any way, it could be speculated that because the priority species that occur (or are likely to occur) at the proposed site all have large distribution ranges (possible exceptions are Red Lark and Sclater's Lark which are more range restricted but are not likely to be significantly impacted by turbine collisions), the potential cumulative impact of turbine collisions on priority species on a regional scale should be relatively minor.

It should be borne in mind that power lines kill many bustards in the Karoo (Shaw 2013), therefore any additional mortality even on a small scale, may well have a more significant cumulative impact than what is evident at first glance. However, it is envisaged that collisions of Ludwig's Bustard with the turbines will not be a major impact. Provided the recommendations in this report and presumably similar ones at all the other developments are implemented, it is envisaged that the **cumulative impact of mortality of priority species due to collisions with the turbines is likely to be low, even on a regional level.**

Residual Risks:

It is envisaged that mitigation will reduce but not entirely eliminate collision mortality.

5.1.2. Mitigation measures as a result of the amendment

The mitigation measures originally proposed for the Korana WEF by Van Rooyen *et al.* (2014) need to be revisited in light of two (2) factors:

- » The proposed increase in the rotor diameter will result in an increased risk of collisions for priority species (see Section 5 above).
- » The "Best Practice Guidelines for Avian Monitoring and Impact Mitigation at Proposed Wind Energy Development Sites in Southern Africa", (Jenkins *et al.* 2011) revised in 2015, requires that either all, or part of the pre-construction monitoring is repeated if there is a time period of three (3) years or more

between the data collection and the construction of the wind farm. This re-assessment is necessary in order to take cognisance of any changes in the environment which may affect the risk to avifauna, and to incorporate the latest available knowledge into the assessment of the risks. In order to give effect to this requirement, nest searches were repeated in July 2019 to ensure current information on the breeding status of priority species at the proposed Korana WEF is recorded.

Since the original Bird Specialist Study was completed in 2014, the local knowledge with regard to the impacts of wind turbines on avifauna has increased significantly with the experience gained from operational wind farms, see for example (Ralston-Patton *et al.* 2017). This has also resulted in the publication of two (2) new sets of guidelines, one (1) for Cape Vultures (Pfeiffer *et al.* 2018) and one (1) for Verreaux's Eagles (Ralston-Patton 2017), while work is almost finished for Black Harriers. Guidelines for a range of other sensitive species are also planned, including Martial Eagles, as they have proven to be highly vulnerable to wind turbine collisions.

The nest searches conducted in July 2019 confirmed the presence of a Martial Eagle nest on Tower 147 of the Aries – Aggeneys 400kV 1 transmission line, which runs north of the project area. The average territory size of a large eagle represents an important area which can contribute to conservation planning and should be considered the absolute minimum area for conservation (Ralston-Patton 2017). Global Positioning System (GPS) tracking of Martial Eagles in the Kruger National Park indicates average territory sizes of 110km² (Percy Fitzpatrick Institute 2015), which equates to a 6km circular zone around the nest. Given the proven vulnerability of the species to wind turbine collisions which is now firmly established, 5-6km should ideally be taken as the desired turbine-free buffer zone around a Martial Eagle nest².

The following revised and additional mitigation measures are proposed to ensure that the post-mitigation significance remains at a “**low**” level:

- » The number of turbines should be reduced to a maximum of 42 turbines (i.e. 60% of the original authorised 70).
- » The 1.5km turbine-free buffer zone around the Martial Eagle nest on the Aries – Aggeneys 400kV 1 transmission line should be converted to a 4.5km turbine-free zone, and the number of turbines beyond the 4.5km turbine-free zone, up to a radius of 6km from the nest, should be restricted to no more than 13.
- » As an absolute minimum, post-construction monitoring should be undertaken for the first three years of operation, and then repeated again in year 5, and again every five years thereafter. The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of adaptive management.

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

5.1.3. Conclusion

Given the potential changes to the turbine specifications, a re-assessment of the potential turbine collision impact was carried out in light of the proposed amendment, in order to establish if the original pre-mitigation

² It should be recognised that Martial Eagle territories in an arid environment like Bushmanland are likely to be much larger than in the mesic Lowveld of the Kruger National Park, therefore a 5-6km turbine free buffer should be seen as an absolute minimum.

assessment by Van Rooyen *et al.* (2014) should be revised and if the original mitigation measures need to be revised.

Given the significant proposed increase in rotor swept area, it is concluded that the original pre-mitigation impact significance rating of -36 (medium) for potential collision mortality will increase to -56 (medium) should the turbine dimensions be applied to the current layout of 70 turbines. However, should the number of turbines reduce significantly (i.e. to a maximum of 42), it will result in the collision rating remaining unchanged, depending on the extent of the reduction in the number of turbines.

The proposed amendment would be advantageous from a bird impact perspective if the number of turbines is reduced as a result of the amendment, and a revised buffer is implemented around the Martial Eagle nest on Tower 147 of the Aries – Aggeneys 400kV 1 transmission line. Should the turbine dimensions increase as proposed, and the number of turbines remain unchanged at 70, it would increase the risk of collisions and it would then be a disadvantage from the bird impact perspective.

In view of new knowledge gained since the original studies were completed, and the increased risk brought about by the proposed changes in the turbine dimensions, the original mitigation measures as formulated by Van Rooyen *et al.* (2014) need to be revised to retain a post-mitigation impact significance of "low". This entails additionally implementing that the 1.5km turbine-free buffer zone around the Martial Eagle nest on Tower 147 of the Aries – Aggeneys 400kV 1 transmission line should be converted to a 4.5km turbine-free zone, and the number of turbines beyond the 4.5km turbine-free zone, up to a radius of 6km from the nest, should be restricted to no more than 13. In addition, the number of turbines should be restricted to a maximum of 42. As an absolute minimum, post-construction monitoring should be undertaken for the first three years of operation, and then repeated again in year 5, and again every five years thereafter. The exact scope and nature of the post-construction monitoring should be informed on an ongoing basis by the result of the monitoring through a process of adaptive management.

These revised mitigation measures are subject to a walk-through survey by the avifaunal specialist prior to the construction commencing, to confirm the location and status of all priority species nests within the area of influence of the wind farm. With the implementation of the new mitigation measure, the avifaunal specialist concluded that the proposed amendment is considered to be acceptable from an avifaunal perspective.

5.2. Impacts on bats

The 12 month bat monitoring involved acoustic monitoring on six short masts at 12 m height, and one meteorological (met) mast at 12 m and 65 m height. This was conducted from 22 November 2013 – 25 November 2014. The study was conducted in compliance with the Third Edition of the South African Good Practice Guidelines for Surveying Bats at Wind Energy Facilities of 2014. Since there have been no significant changes to the environment since the study was completed, and it satisfied the requirements of the guidelines of its time, the study is still considered valid according to the current guidelines (Edition 4.1) that permit a six year validity period.

The height at which monitoring took place is an important consideration for the proposed amendment to assess the relevance of the trends in species richness and activity levels detected at 65 m height, relative to the proposed amended turbine specifications, where the lower tip height is proposed at 100 m. The height at which monitoring took place is 35 m below the lowest reach of the proposed amendment turbine sweep

area. Even in optimal conditions this could be lower than the recording range of the systems used during monitoring.

The mean number of bat passes per night detected by the 12 m microphone on the met mast was greater than recorded at 65 m height; however, the mean and median bat passes per night at 65 m height was higher than recorded by POF1, POF3, POF4, POF5 and POF6 systems (12 m masts). Species richness was the same for both recording heights with a total of four species detected on site, *Eptesicus hottentotus* (Long-tailed serotine), *Miniopterus natalensis* (Natal long-fingered bat), *Neoromicia capensis* (Cape Serotine) and *Tadarida aegyptiaca* (Egyptian free-tailed bat). *Tadarida aegyptiaca* (Egyptian free-tailed bat) was the most abundant species across all monitoring systems and at the 65 m monitoring height. This is a high-flying species with a high risk of collision with turbine blades (Sowler et al., 2017). Lower bat activity was detected over the winter months with a steady increase from November 2013 to March 2014, peaking in January 2014. Bat activity was typically higher in the first portion of the night immediately after sunset, with a secondary peak in activity between 02:00 – 04:00am (Arcus Consultancy Services, 2014).

5.2.1. Comparative Assessment:

The proposed increased turbine dimensions would result in a larger rotor swept area and greater overall height per turbine. The wind turbines currently authorised results in the rotor swept area for each turbine of 0.123697 km³ and the proposed amendment would result in an increase to 0.167547 km³. This represents a 35.5 % increase in rotor swept area. The Bat Impact Assessment during the EIA process (Arcus Consultancy Services, 2014) identified various impacts but only two impacts would change as a result of the proposed amendment. The impacts relevant to this amendment is the change in risk of barotrauma during commuting and/or foraging, and direct collision of bats in flight and bat mortality with moving turbine blades during migration. From the final EIA report, the impacts during commuting/foraging were identified as negative medium (score of 56) without mitigation, and reduced to a score of 33, but still rated as negative medium impact with mitigation implementation. From the final EIA report, the impact during migration was identified as negative medium (score of 42) without mitigation and reduced to negative low (score of 20) with mitigation. The recommended mitigation measures from the final EIA report were:

- » Adhere to the bat sensitivity map (avoid development in the demarcated sensitivity areas and their buffers).
- » Implement an operational bat monitoring study immediately after construction of turbines and apply mitigation measures outlined by the Bat Specialist during the operational monitoring study. Mitigations that could be implemented (based on recommendations from the results of the operational monitoring study) include ultrasonic deterrents, raising the cut-in speeds of turbines, turbine blade feathering and targeted curtailment during specific periods for specific turbines.

Considering the increased airspace that would be occupied by the larger turbines evaluated in this amendment, the higher mortality risk to the dominant species detected on site (*Tadarida aegyptiaca*) and the lack of data within the sweep of the amended turbine blades, the following mitigation measures should be added to the above mitigation to avoid an increase in the negative impact rating of the amendment turbine specifications:

- » All turbines must be feathered below cut in speed and not allow for freewheeling during construction and from the start of operation. Bat activity is markedly higher over low wind speed periods. Preventing freewheeling should not affect energy production significantly but will be a substantial bat conservation mitigation measure.

- » A maximum of 42 turbines, with a hub height of 200 m and a rotor diameter of 200 m, is recommended within the provided total output of 140 MW. If more than 42 turbines with these specifications are installed, a curtailment programme will have to be drawn up by a bat specialist and will have to be implemented at the onset of operation of the wind farm. In the case of installation of smaller turbines, more turbines may be installed, subject to agreement of a Bat Specialist.
- » An operational bat monitoring study should already be in place at the onset of wind farm operation and should be implemented immediately after construction of turbines. Mitigation measures outlined by the Bat Specialist during the operational monitoring study should be applied with due diligence.
- » To refine mitigation measures and to account for the lack of data within the sweep of this amendment turbine specifications, the appropriate turbines, as indicated by the post-construction bat specialist, should be installed with bat monitoring equipment at height and bat monitoring should start at the onset of turbine operation.

The bat monitoring report identified potential roosts on site and designated buffers of 300 m and 500 m around them (Arcus Consultancy Services, 2014). Siting of turbines, and other construction activities, in these buffers should be avoided. For this amendment, all components, including the turbine blade tips, must be excluded from entering the buffer areas. The turbine layout should be approved by a bat specialist upon finalisation of turbine specifications. Refer to figure 5.2.1 below for the bat sensitivity areas.

Considering the greater turbine dimensions proposed in the amendment application, the impact would remain the same as assessed in the final EIA report, on condition of implementation of the above listed mitigation measures, as well as the mitigations from the final EIA report. The proposed amendment is considered to be acceptable from a bat perspective and can be supported.

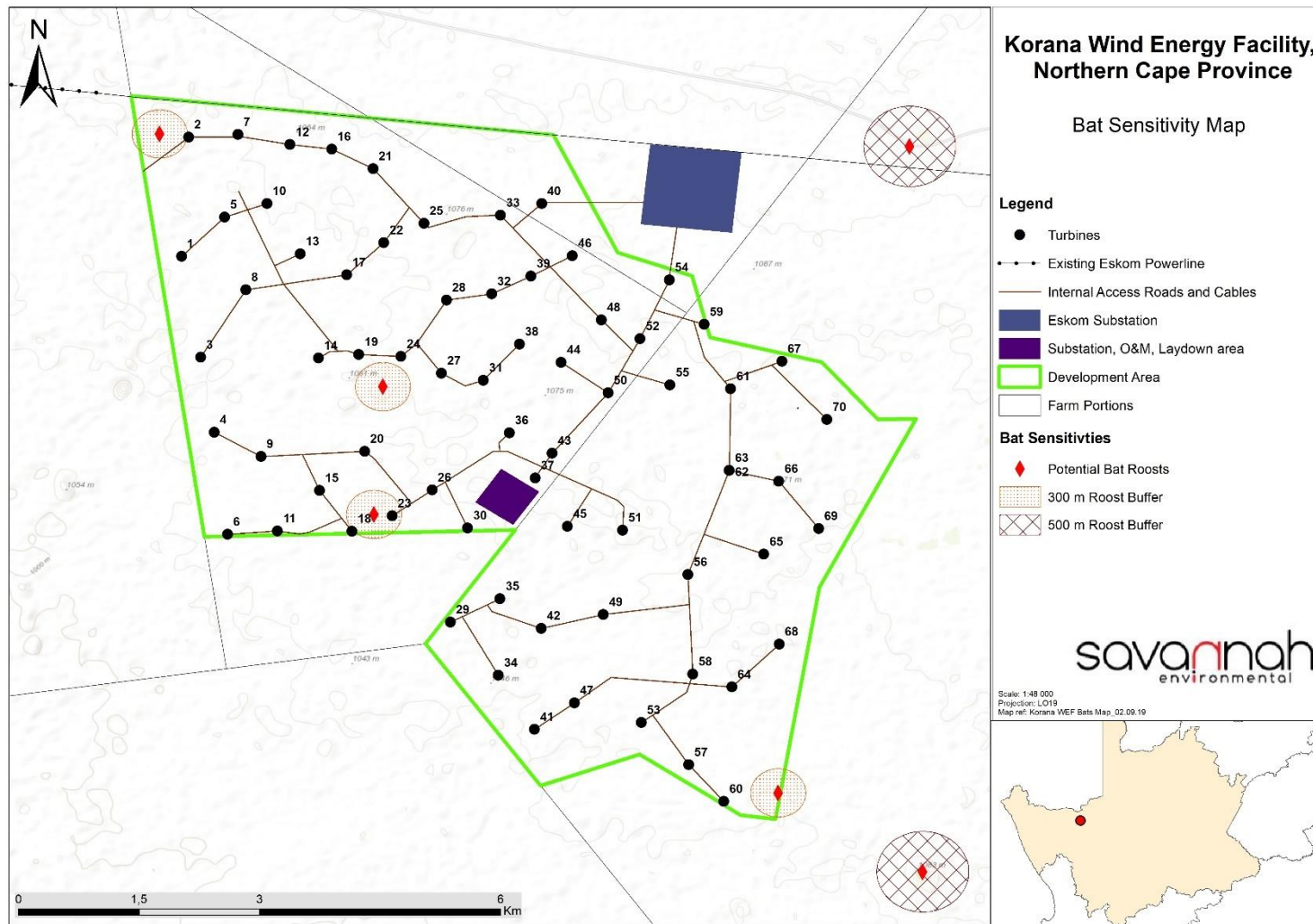


Figure 5.2: Potential roosts on the Korana WEF and designated buffers of 300 m and 500 m around these roost sites. **(A3 Map included in Appendix F).**³

³ The layout shown above consists of 70 turbines and a few turbines are currently located within the roost buffers. These turbines will however be excluded from the layout when the layout is finalised at a later stage (prior to commencement of the activity).

Cumulative impacts:

The pertinent threat to bats, from the cumulative impact of several wind energy facilities operating within a single general area, is mortality from turbine blade collision and barotrauma. There is potential for significant loss of locally active bats and migratory bats that will essentially reduce the effective population size and may cause population crashes.

According to the DEFF's Renewable Energy EIA Application Database for SA (First quarter 2019), there are currently three authorised wind farms within 20 km of the Korana WEF, namely:

- » Khai-Ma WEF (Applicant - Mainstream Renewables)
- » Poortjies WEF (Applicant - Mainstream Renewables)
- » Proposed wind energy facility and associated infrastructure on Namies wind farm Pty Ltd (Applicant - Mainstream Renewables)

Additionally, there are several solar energy facilities authorised in the greater area:

- » 75MW Enamandla PV5 projects and associated infrastructure on the farm Hartbeest Vlein No 86 (Applicant – BioTherm Energy)
- » Bloemhoek 75MW Solar Energy Facility near aggeneys (Applicant – Solar Capital)
- » 70MW Orlight SA Photovoltaic Solar Power Plant on Portion 1 of the Farm Aroams 57 RD (Applicant – BioTherm Energy)
- » Sato Energy Holdings Photovoltaic Project (Applicant – Sato Energy Holdings)
- » Boesmanland solar farm portion 6 (A portion of portion 2) Farm 62 Zuurwater (Applicant – Boesmanland Solar)
- » Sol Invictus 4 PV solar facility and its associated infrastructure (Applicant – Cyralex)

Although solar power installations do not typically contribute directly to bat mortalities, they do result in habitat destruction that may interrupt foraging behaviours.

Currently, there are no guidelines or recommendations of how to mitigate for the cumulative impact of wind farms within a greater area. Cumulative impacts on bats are difficult to accurately assess without baseline data on bat population size and demographics. These data are lacking for many South African bat species. Further research into the populations and behaviour of South African bats is required to inform future assessments of the cumulative effects of wind farms on bats.

This amendment assessment assumes all neighbouring facilities will implement appropriate mitigation measures informed by their preconstruction EIA studies, and that the mitigation measures proposed in this report are adhered to. Thus, there are no additional mitigations required for the proposed amendment with regards to the cumulative impact assessment and there is no change to assessment of the final EIA report.

5.2.2. Conclusion

The mortality risk to bats may be decreased with the amended turbine specifications for the lower flying species detected on site as the lower blade tip height increases with larger turbine dimensions (specifically the increased hub height). However, there is a higher risk of mortality for high flying species (that is also the most abundant species on site) as the rotor swept area and blade tip height are increased with larger turbine dimensions. To account for this higher risk, mitigation measures outlined in section 5.2.1 of this report

must be implemented upon construction. The turbine layout must adhere to the sensitivity areas and buffers. All components, including the turbine blade tips, must be excluded from entering the buffer areas and these distances must be revised and calculated with the amended turbine sizes. The impact assessment ratings will remain as in the EIA report on condition of implementation of the above-mentioned mitigations.

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

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

5.3. Visual Impact

A visibility analysis was undertaken from each of the wind turbine positions (70 in total⁴) at an offset of 210m (maximum blade tip height) above ground level. The result of this analysis represents the potential total visual exposure of the original turbine dimensions (indicated in green). The viewshed analysis was repeated at an offset of 300m to indicate the visual exposure (shown in red) of the increased turbine dimensions. The results of the visibility analyses are displayed on Figure 5.3.

From this analysis it is clear that the approximately 30% increase in turbine dimensions, would have a relatively small influence on the overall visual exposure, due to the already tall turbine structures previously approved and the low visual absorption capacity of the landscape. The surface area (within the study area) of the original turbine exposure is 448km², compared to the 457km² of the increased dimensions of the wind turbine exposure. This is an increase of 9km², or alternatively, an increase of only 2% in potential visual exposure.

There are no additional sensitive visual receptors located within the area of increased visual exposure.

Potential sensitive visual receptors within an approximately 5km radius (identified during the EIA phase) include:

- » Onder Namies
- » Poortjie 1 and 2
- » Samoep
- » De Rust
- » Neelsvlei

Observers travelling along the secondary roads traversing within a 5km radius of the turbine structures.

Note:

- *Where homesteads are derelict or deserted, the visual impact will be non-existent, until such time as it is inhabited again.*

⁴ It should be noted that visual assessment included 70 turbines (as assessed in the EIA process) but the number of turbines would be reduced significantly (the final number of turbines will be determined by the exact turbine specifications chosen).

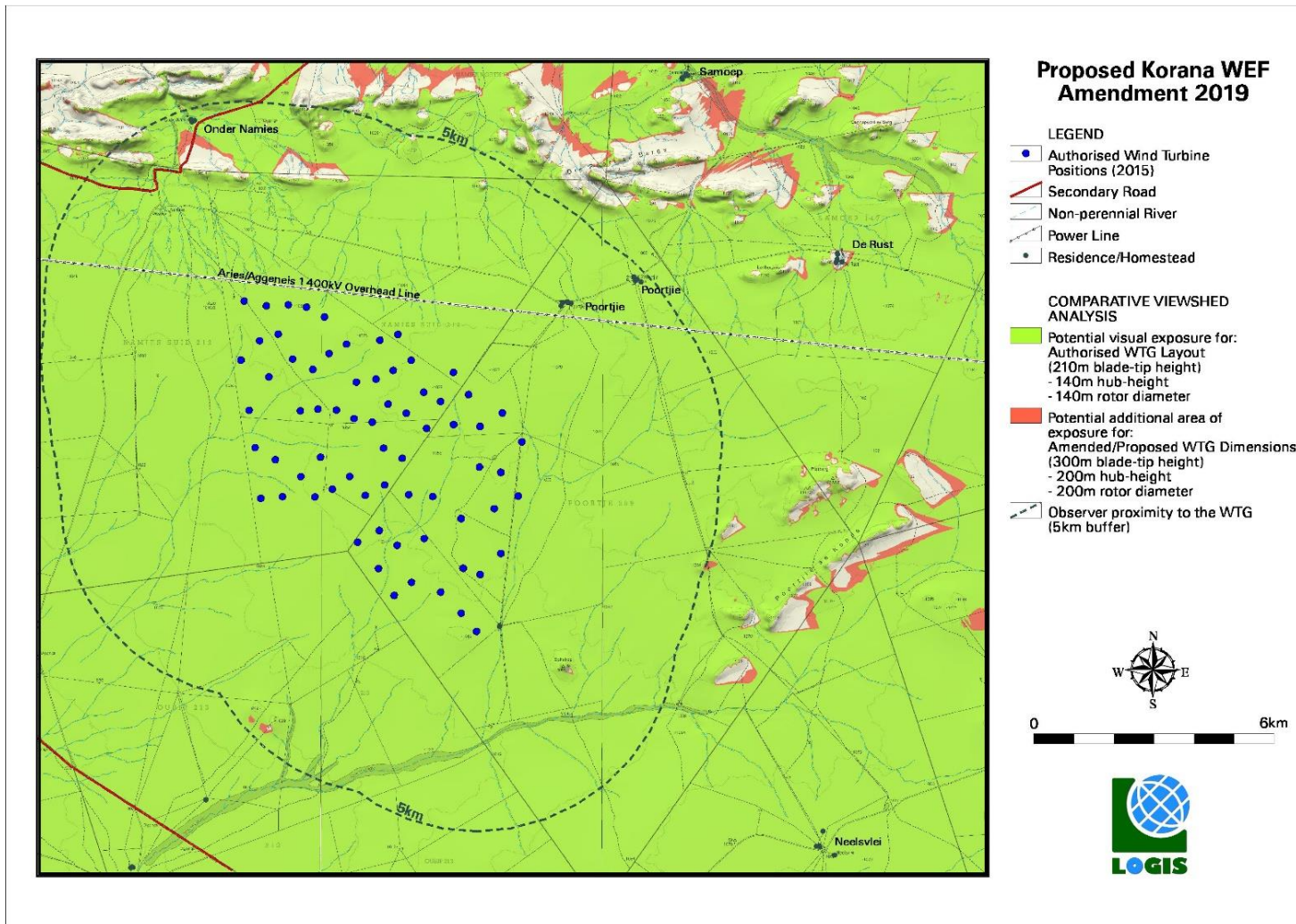


Figure 5.3: Viewshed analysis represents the potential total visual exposure of the original turbine dimensions (illustrated in green) compared to the proposed new turbine dimensions (illustrated in red).⁵

⁵ It should be noted that visual assessment included 70 turbines (as assessed in the EIA process) but the number of turbines would be reduced significantly (the final number of turbines will be determined by the exact turbine specifications chosen).

The increased area of visual exposure does not include a significant portion of additional exposure to the secondary roads within the study area.

It is expected that the wind turbine structures, both the original dimensions and the proposed increased dimensions would be equally visible and noticeable from both the roads and homesteads identified above, therefore signifying a negligible change to the potential visual impact.

5.3.1. Comparative Assessment

In consideration of the proposed amendments, there is no (zero) change to the significance rating compared with the original EIA visual impact assessment report (and therefore no comparative impact table is included).

5.3.2. Conclusion

The proposed increase in the dimensions of the wind turbine structures is not expected to significantly alter the influence of the WEF on areas of higher viewer incidence (observers traveling along the secondary roads within the region) or potential sensitive visual receptors (residents of homesteads in close proximity to the WEF).

The proposed increase in dimensions are consequently not expected to significantly influence the anticipated visual impact, as stated in the original VIA report (i.e. the visual impact is expected to occur regardless of the amendment). This statement relates specifically to the assessment of the visual impact within a 5km radius of the wind turbine structures (potentially high significance), but also generally apply to potentially moderate to low visual impacts at distances of up to 20km from the structures.

From a visual perspective, the proposed changes will therefore require no (zero) changes to the significance rating within the original visual impact assessment report that was used to inform the approved EIA. In addition to this, no new mitigation measures are required.

It is suggested that the proposed amendment to the turbine dimensions be supported, subject to the conditions and recommendations as stipulated in the original Environmental Authorisation, and according to the Environmental Management Programme and suggested mitigation measures, as provided in the original Visual Impact Assessment report.

5.4. Noise impact

The noise amendment comment letter (**Appendix D**) addresses the potential changes in noise impact significance in terms of the proposed amendments by comparison with the original assessment undertaken in 2014 as part of the EIA process. The 2014 Noise Impact Assessment indicated that the proposed wind farm will have a noise impact of a low significance on all Noise Sensitive Developments (NSDs) in the area during both the construction and operational phases using the Vestas V117 3.3MW wind turbine for all wind speeds. This wind turbine has a maximum sound power generation level of 107.0 dBA. The projected maximum noise levels would be less than 35 dBA at the closest NSD. These NSDs are shown in Figure **5.4** below.

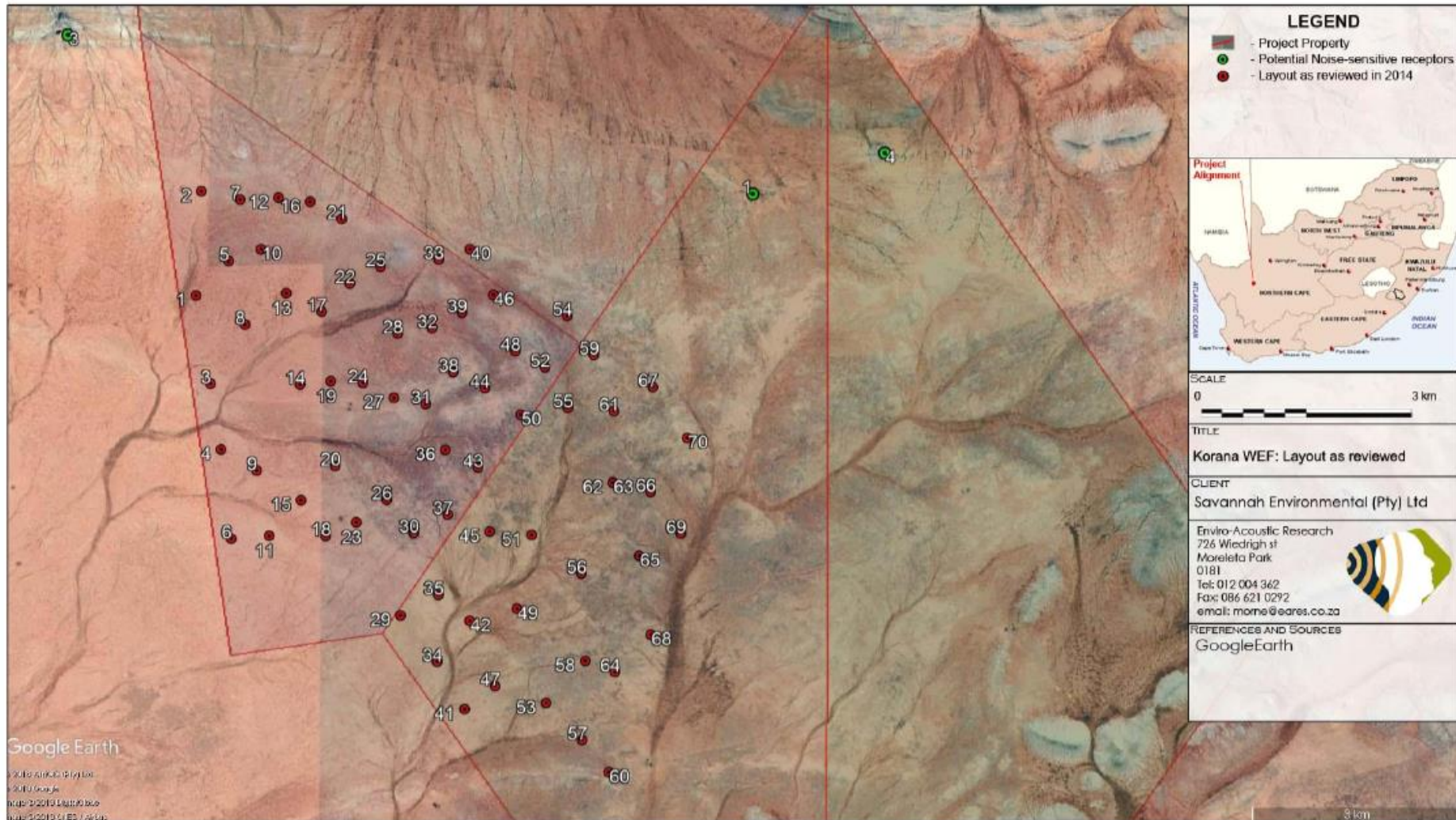


Figure 5.4: NSD in relation to the wind turbines of the Korana WEF (refer to **Appendix F** for A3 Map).⁶

⁶ It should be noted that noise assessment included 70 turbines (as assessed in the EIA process) but the number of turbines would be reduced significantly (the final number of turbines will be determined by the exact turbine specifications chosen).

5.4.1. Comparative Assessment

The proposed wind turbines are located more than 2000m away from any potential noise-sensitive receptors. With the higher potential sound power emission level (worst-case of 109 dBA is assumed), the maximum projected noise level will be less than 35 dBA at the closest NSD. The amendments proposed will have a negligible effect on the significance of impacts as predicted in the EIA and therefore no comparative impact tables were required to be included.

5.4.2. Conclusion

Considering the fact that proposed wind turbines are more than 2000m away from any potential noise-sensitive receptors and taking into account the potential noise impact, the specialist concluded that the change will not alter (i.e. increase or decrease) the significance of the noise impact and the impacts will remain of a low significance. The amendment is acceptable from a noise perspective and no additional mitigation measures are required.

6. ADVANTAGES AND DISADVANTAGES OF THE PROPOSED AMENDMENTS

In terms of Regulation 32(1)(a)(ii), this section provides details of the advantages and disadvantages of the proposed amendment.

Advantages of the amendment	Disadvantages of the amendment
General	
<p>The increase in rotor diameter will increase the efficiency of the facility and consequently the economic viability thereof. Increased efficiency of a facility is considered to be beneficial to the environment as this will reduce the need for additional facilities to generate additional electricity.</p> <p>It is also beneficial from a macro-economic perspective as it results in the lower cost per unit of energy (i.e. lower tariff), ultimately benefiting the South African public.</p>	None
Avifauna	
<p>As a result of this amendment, the Korana WEF is now more in line with latest guidelines and a revised buffer is implemented around the Martial Eagle nest. This will be considered within the final design and micro-siting.</p>	<p>The new proposed turbine model will present an increase in the overall facility collision risk window (the increase in the collision risk window will vary depending on the final turbine specifications chosen). This disadvantage can be offset by restricting the number of turbines to a maximum of 42.</p>
Bats	
<p>The increased rotor swept area could possibly be offset in part by a reduced number of turbines since fewer turbines will be used to reach the overall export capacity of 140MW.</p>	<p>The proposed amendment to the turbines at the wind farm would result in a greater per turbine rotor swept area and of 35%.</p>
Visual	
<p>The proposed amendment will not change the significance rating and the visual impacts will remain the same.</p>	None
Noise	
<p>The proposed wind turbines are more than 2000m away from any potential noise-sensitive receptors and the proposed amendment will not the significance of the noise impact and the impacts will remain of a low significance.</p>	None

Based on the above, it can be concluded that the advantages of the proposed change outweigh the disadvantages from an environmental and technical perspective provided that the recommended mitigation measures for birds and bats are implemented.

7. REQUIREMENTS FOR ADDITIONAL MITIGATION AS A RESULT OF THE PROPOSED AMENDMENTS

As required in terms of Regulation 32(1)(a)(iii), consideration was given to the requirement for additional measures to ensure avoidance, management and mitigation of impacts associated with the proposed change. From the specialist inputs provided into this amendment motivation, it is concluded that the mitigation measures proposed within the EIA would be sufficient to manage potential impacts within acceptable levels. Updated mitigation measures are however provided by the Avifaunal specialists, these are outlined as the following:

- » The number of turbines should be reduced to a maximum of 42 turbines (i.e. 60% of the original authorised 70).
- » The 1.5km turbine-free buffer zone around the Martial Eagle nest on the Aries – Aggeney's 400kV 1 transmission line should be converted to a 4.5km turbine-free zone, and the number of turbines beyond the 4.5km turbine-free zone, up to a radius of 6km from the nest, should be restricted to no more than 13.
- » As an absolute minimum, post-construction monitoring should be undertaken for the first three years of operation, and then repeated again in year 5, and again every five years thereafter. The exact scope and nature of the post-construction monitoring will be informed on an ongoing basis by the result of the monitoring through a process of adaptive management.
- » All turbines must be feathered below cut in speed and not allow for freewheeling during construction and from the start of operation. Bat activity is markedly higher over low wind speed periods. Preventing freewheeling should not affect energy production significantly but will be a substantial bat conservation mitigation measure.
- » A maximum amount of 42 turbines, with a hub height of 200 m and a rotor diameter of 200 m, is proposed within the provided total output of 140 MW. If more than 42 turbines with these specifications are installed, a curtailment programme will have to be drawn up by a bat specialist and will have to be implemented at the onset of operation of the wind farm. In the case of installation of smaller turbines, more turbines may be installed, subject to agreement of a Bat Specialist.
- » An operational bat monitoring study should already be in place at the onset of wind farm operation and should be implemented immediately after construction of turbines. Mitigation measures outlined by the Bat Specialist during the operational monitoring study should be applied with due diligence.
- » To refine mitigation measures and to account for the lack of data within the sweep of this amendment turbine specifications, the appropriate turbines, as indicated by the post-construction bat specialist, should be installed with bat monitoring equipment at height and bat monitoring should start at the onset of turbine operation.

No other novel mitigation measures are introduced from the other specialists. Some of these additional mitigation measures are not directly related to the proposed amendments, but rather due to additional information now available (since the initial EA issuance) as a result of new guidelines that have been published and experience gained at operational facilities. **These updated mitigation measures should be included within the project EMP when the updated layout is finalised and submitted for final approval to the DEFF as required in terms of Conditions 15 – 18 of the Environmental Authorisation.**

8. PUBLIC PARTICIPATION

A public participation process is being conducted in support of a part two application for amendment of the Environmental Authorisation for the Korana Wind Energy Facility and associated infrastructure, Northern Cape Province. This public participation includes:

- » Site notices were placed at the site on 11 **September 2019** (refer to **Appendix E4**).
- » The draft motivation report being made available for a public review period on www.savannahsa.com from **1 October 2019 to 31 October 2019**.
- » Written notification to registered I&APs regarding the availability of the amendment motivation report was distributed on **27 September 2019** (refer to **Appendix E2**).
- » Advertisements were placed in the Volksblad newspaper on **1 October 2019** (refer to **Appendix E4**).

Comments received during the public review period will be included in the final submission to the DEFF for consideration in the decision-making process. Comments will be included and responded to in the Comments and Responses Report (to be included as **Appendix E5**). Proof of attempts made to obtain comments from relevant Organs of State and key stakeholders will also be included in **Appendix E3**.

9. CONCLUSION

Based on the specialist findings, it is concluded that the proposed amendments to the turbine specifications are not expected to result in an increase to the significance ratings (i.e. low, medium or high) for the identified potential impacts within the EIA. Only one impact, with regards avifauna, has increased slightly with the proposed amendment. Two impacts relating to impacts on bats have increased slightly with the proposed amendment, but the rating will remain the same after mitigation. No other new impacts have been identified under the current amendment and all other impact ratings remain the same.

In terms of Avifaunal Impacts, new guidelines have become available subsequent to the original assessment and has made a difference to the buffer implemented around a Martial Eagle nest. A 4.5km buffer was implemented around this nest, this is considered to be a no-go area for turbines. One impact has increased in significance due to the proposed amendment, however, the impact rating after the implementation of new mitigation measures will remain the same. The avifaunal specialist recommended post-construction monitoring for the first three years of operation, and then repeated again in year 5, and again every five years thereafter. The exact scope and nature of the post-construction monitoring must be informed on an ongoing basis by the result of the monitoring through a process of adaptive management. The avifaunal specialist recommended that the number of turbines be reduced from the approved 70 turbines to 42 turbines, and that no more than 13 turbines be placed between 4.5km and 6km of the Martial Eagle nest.

The Bats specialist concluded that two impacts would increase with the proposed amendment but with the implementation of new mitigation measures the impact rating after mitigation will remain the same. The bats specialist recommended adhering to buffers of 300 m and 500 m around potential roost sites (in accordance with the bat monitoring previously conducted) and that the turbine layout should be approved by a bat specialist upon finalisation of turbine specifications. The bats specialist also recommended a reduction in turbines to a maximum of 42 turbines.

In terms of aspects relating to visual and noise, the proposed changes to the EA will not increase the significance of impacts originally identified in the EIA report or lead to any additional impacts.

The amendment in itself does not constitute a listed activity. The mitigation measures described in the original EIA document are adequate to manage the expected impacts for the project. **Additional mitigation measures have been recommended by the avifauna and bat specialists and, as a result of this proposed amendment, must be included within the project EMPr when the updated layout and EMPr is finalised and submitted to DEFF for final approval in terms of the requirements of Conditions 15-18 of the Environmental Authorisation.**

Given the above, the following amendments to its EA is being requested for the Korana WEF:

1. An increase in rotor diameter for each turbine from **150m** to **up to 200m**;
2. An increase in hub height from **140m** to **up to 200m**; and
3. An increase in the individual generating capacity of each turbine from **1,5MW - 4MW** to **2MW - 7MW**.
4. Reduction in the number of turbines from 70 to a maximum of 42.

Taking into consideration the conclusions of the studies undertaken for the proposed amendments associated, with the revised turbine specifications (as detailed in **Appendix A – D**), **it is concluded that these amendments are considered acceptable from an environmental perspective, provided that the original and additional mitigation measures stipulated herein are implemented.**

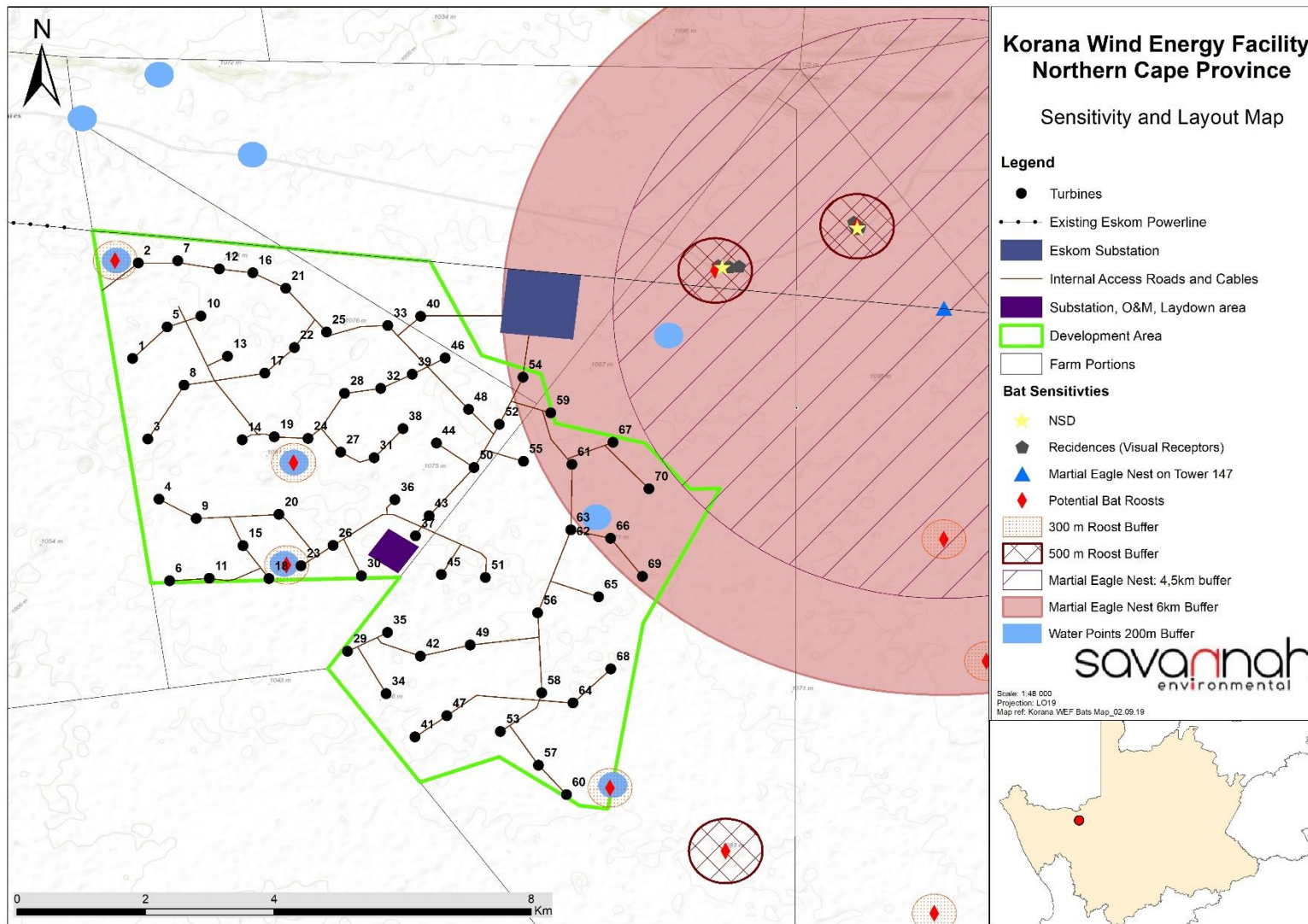


Figure 9.1: Wind farm layout with updated specialist environmental sensitivities (A3 Map included in **Appendix F**)

