Castle Wind Energy Facility and associated infrastructure, Northern Cape Province

Motivation for amendment of Environmental Authorisation

DEA Ref.: 14/12/16/3/3/2/278

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PROJECT DETAILS

Title	:	Castle Wind Energy Facility and associated infrastructure, Northern Cape Province: Motivation for Amendment to the Environmental Authorisation
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Client	:	Castle Wind Farm (Pty) Ltd
Report Status	:	Report for Public and Authority Review and Comment

When used as a reference this report should be cited as: Savannah Environmental (2019) Motivation Report for the Amendment to the Environmental Authorisation for the Castle Wind Energy Facility, Northern Cape Province.

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PURPOSE OF THE REPORT

An Environmental Authorisation (EA) for the Castle Wind Energy Facility and associated infrastructure, in the Northern Cape Province (DEA ref: 14/12/16/3/3/2/278) was obtained by Castle Wind Farm (Pty) Ltd on 8 May 2015. The project comprises a wind farm of up to 118MW 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 in terms of production and economic considerations.

In this regard, Castle Wind Farm (Pty) Ltd is considering an alternative turbine model for the project and is proposing the following amendments to the project description considered in the EIA process, as follows:

1. An increase in rotor diameter for each turbine from **up to 150** to **between 110 to 200m;**
2. An increase in hub height from **up to 130** m to **between 90 to 150m; and**
3. An increase in the individual generating capacity of each turbine from **up to 4.5 MW** to **up to 7.9 MW.**

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 118 MW and there will be no change to the layout as considered in the EIA process. The number of turbines will not increase from 31. With the proposed larger turbine model associated with the amendment, less turbines will be constructed to reach the overall facility limit of 118 MW (the number of turbines could vary depending on the final turbine model and size chosen).

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 Castle Wind Farm (Pty) Ltd. This report aims to provide detail pertaining to the significance and impacts 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 will be made available to registered interested and affected parties for a 30-day period from **3 July 2019 to 2 August 2019.** The availability of the report was advertised in the Volksblad newspaper on 3 July (refer to **Appendix G4**).

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:

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

1. OVERVIEW OF THE PROJECT

1.1. Location

The authorised Castle Wind Farm is located near De Aar in the Northern Cape Province. The proposed site is located within the Emthanjeni Renosterberg Local Municipality within the Pixley ka Seme District Municipality. The project site is located ~28 km north-east of De Aar and ~22 km south-west of Philipstown.

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

- Portion 12 of Farm 165 (Vendussie Kuil);
- Portion 13 of Farm 165 (Vendussie Kuil); and
- The Remaining Extent of Portion 0 of Farm 8 (Knapdaar).

The following infrastructure was authorised following the EIA process:

- 31 Wind Turbines
- Turbine foundations
- 31 Crane hardstand areas
- Underground cabling between turbines aolong the road verge
- Temporary laydown areas
- On-site 132kv substation
- Internal access roads (approxiametely 7km wide)linking turbines and other infrastructure on the site.

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.

<u>Key conclusions and recommendations of the original EIA pertinent to this application:</u>
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:**

An approximate total of 209 bird species could occur in the study area, based on what has been recorded in the relevant six quarter degree squares by the first bird atlas project (Harrison *et al* 1997), and the second atlas project (www.sabap2.adu.org.za). This is a relatively good diversity of species, reflecting the diversity of habitats, including both mountains and low lying flats. In total 16 of these species could be considered threatened. This site falls within the SA037 Platberg-Karoo Conservancy Important Bird Area.

During the pre-construction bird monitoring undertaken in 2014, small terrestrial species were recorded on a total of approximately 12 km of walked transects (repeated 4 times). Large terrestrial species and raptors were recorded on an approximate 47 km of driven transects (repeated 4 times). Eleven focal sites (ten of which are dams) were monitored in each season. Approximately 85 incidental records of target species and an additional five species considered relevant to record despite not being target species (i.e. African Harrier Hawk, Booted Eagle, Rufous-chested Sparrowhawk, Spur-winged Goose and Steppe Buzzard) were collected.

The key findings of the avifaunal impact assessment and pre-construction monitoring undertaken can be summarised as follows:

- A total of 26 target bird species were identified as potentially important at the outset of the programme. Fifteen (15) of these were subsequently recorded on site, out of a total of 124 bird species recorded during the year.
- Walked transects on site recorded a total of 68 small bird species during the year, with a slight peak in species richness in autumn and winter (although abundance of individual birds was lower in winter). None of the species recorded were Red Listed small passerines.
- Driven transects on site recorded 15 bird species in total, with a slightly lower species richness in autumn and winter. Only two species were recorded in all four seasons, the Northern Black Korhaan, and Southern Pale Chanting Goshawk.
- None of the dams on or near the site held any water during the monitoring period, and as a result, no significant bird species were recorded. A Verreaux's Eagle nest was found approximately 2.2 km off site on the escarpment edge. Considering this distance of 2.2 km in combination with relatively infrequent records of this species flying on the site, no additional buffer was considered necessary.
- Most incidental sightings of target species were in the south-east of the site, in the flatter areas and no turbines will be located in the assessed layout.
- The species recorded flying most frequently on site were the Northern Black Korhaan, and Southern Pale Chanting Goshawk. The Lesser Kestrel and Amur Falcon were recorded infrequently on site, which may be as a result of low food occurrence during the monitoring programme. It can however be anticipated that these flocking species will occur in high numbers on the site at some point during the lifespan of this project when food is more abundant.
- Due to the overall low flight activity recorded on site, the collision risk index that was developed highlighted very little in the way of spatial patterns in flight activity. No turbine re-positioning was recommended as a result of the collision risk index.
- Based on a formal risk assessment, two species emerged as being of 'medium' risk of impact by the proposed wind farm, the Northern Black Korhaan and the Southern Pale Chanting Goshawk.
- The significance of impacts on avifauna as a result of habitat destruction, disturbance of birds, and displacement of birds was rated as medium significance. Collision of birds with turbines was rated as low significance.

» Site sensitivity mapping identified buffers around dams, within which no turbines should be built. There are no turbines located within the buffer areas.

» **Bats:**

Three bat species were recorded in the vicinity of the site that occur commonly in the area. These species were expected to occur on site based on their widespread distribution. These species are of importance due to their likelihood of being impacted by the proposed wind energy facility, which is a combination of abundance and behaviour. The relevant species include:

» *Miniopterus natalensis;*
» *Neoromicia capensis; and*
» *Tadarida aegyptiaca.*

The key findings of the bats impact assessment and pre-construction monitoring undertaken can be summarised as follows:

» The *Neoromicia capensis* and *Tadarida aegyptiaca* were very common across the site, with *Miniopterus natalensis* occurring in significantly lower numbers. The common bat species, found in high numbers, are considered to be ecologically important, since they are mostly responsible for the ecosystem services provided by insectivorous bats.
» The *Tadarida aegyptiaca* species showed declined activity levels over the winter months with a general increase over the spring season. The *Neoromicia capensis* species also displayed lower activity over the cold winter months with a steady increase into spring. The *Miniopterus natalensis* species was detected in low numbers over most of the year, with highest detections over the autumn months of February to May.
» Potential roosting sites were present along several drainage lines and rocky elevations found throughout the proposed study site. These areas often have favourable weather conditions which cause increases in insect abundance and thus possible increases in bat activity.

» **Visual:**

The topography in the Castle Wind Farm is mostly flat toward the south of the project site. The viewshed analyses conducted during the EIA process found that the facility would have a large area of potential visual exposure within the central to southern sections of the study area. This is attributed to the sizable wind turbine structures, the location of the structures on top of the plateau and the generally flat topography to the south. The visual exposure to the north is effectively interrupted by the northern escarpment due to the relative setback distance of the wind turbines from this escarpment. The visually exposed terrain, for the most part, falls within vacant natural land, although some sensitive visual receptors may be encountered at farm residences and along major roads.

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

» Within **a 5km radius from** the proposed facility, the wind turbines would likely be exposed to a number of farm residences and sections of secondary roads traversing near or over the development site. Affected farmsteads, excluding the ones located within the development site, may include: *Kranskop, Klipfontein, Vendusiekraal, Disselskuil* and *Slingershoek.* Receptors within this zone may experience a high visual impact of the proposed infrastructure.

- Visibility within the **5-10km** radius from the development site becomes scattered due to the shielding effect of the escarpment surrounding the site. This is quite evident to the north, where the wind turbines are not expected to be visible at all, and some sections to the south. Sections of secondary roads may experience views of the facility where it traverses within this zone. Affected homesteads, from where the turbine structures may be visible, includes: *Tweefontein, Enkeldebult, Garrenboom, Groenpan, Die Dam* and *Matjiesfontein*. Receptors within this zone may experience a moderate visual impact of the proposed infrastructure.
- The intensity of visual exposure is expected to subside beyond a **10km** radius. This zone contains large tracts of natural land, limited sections of the R389 and other secondary roads, and a number of farm residences. These include: *Leeuwkuil, Trekpoort, Plessisvlakte, Rooidam, Skietkuil, Sipreshof, Bloemhof, Rusoord* and *Jakkalsfontein*. Receptors within this zone may experience a moderate visual impact of the proposed infrastructure.

It was concluded that the wind turbines and structures (where visible from shorter distances) may constitute a high visual prominence, potentially resulting in a high visual impact. It must however be noted that a large section of the potential viewshed area of the Castle Wind Energy Facility turbines, especially within a 10km radius of the facility, fall within farms earmarked for construction of the Longyuan Mulilo De Aar 2 South Wind Energy Facility and operating Longyuan Mulilo De Aar 2 North Wind Energy 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. With the input data as used, the assessment indicated that the potential noise impact would be of a low significance on all Noise Sensitive Developments (NSDs) during both the construction and operational phases. The assessment indicated that the potential cumulative noise impact would also be insignificant during the operational phases for the three evaluated facilities (including the Plateau East North and Plateau East South WEFs). This Vestas V117 wind turbine has a maximum sound power generation level of 107.0 dBA. The projected maximum noise levels would be less than 36 dBA at the closest NSD.

- **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 layout assessed during the EIA process is presented in **Figure 1.1**.

No environmental fatal flaws were identified to be associated with the proposed Castle Wind Energy Facility. A number of issues requiring mitigation were however highlighted. 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, two amendments were made to the Environmental Authorisation, including the following:

- Amendment 1 issued on 30 June 2015: The following listed activity that was included in the EIA but omitted from the EA was added to the EA:
  Activity 10 of GN R 544: The construction of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity or more than 33 kilovolts but less than 275 kilovolts.
- Amendment 2 issued on 04 April 2017: The wind turbine specification was amended from:
  "31 wind turbines with a generation capacity of up to 3.5MW each, with a hub height of up to 120m and a rotor diameter of up to 132m."
  To
  "Up to 31 wind turbines with a generation capacity of up to 4.5MW each, with a hub height of up to 130m and a rotor diameter of up to 150m and an overall wind farm generation capacity of 118MW."
- Amendment 3 issued on 15 March 2018, the EA was extended by another **5 years**: "The activity must commence within a period of 5 years from the date of expiry of the EA issued on **08 May 2015 (i.e. commence by 8 May 2023)**. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmnetal authorisation must be made in order for the activity to be undertaken."
  In addition to this the contact details were amended from:
  Charlotte Smith
  Castle Wind Farm Pty Ltd
  22nd Floor Metropolitan Centre
  7 Walter Sisulu Ave
  Foreshore
  Cape Town
  8001
  Tel: 021 821 6134
  Cell: 082 875 7348
  Email: charlotte.smith@juwi.co.za

  To:
  Corné van der Westhuizen
  Castle Wind Farm Pty Ltd
  22nd Floor Metropolitan Centre
  7 Walter Sisulu Ave
  Foreshore
  Cape Town
  8001
  Tel: 021-831-6129
  Cell: 083-611-7073
  E-mail: corne.vanderwesthuizen@juwi.co.za

There was no change in the layout assessed within the EIA process (as presented in Figure 1.1).

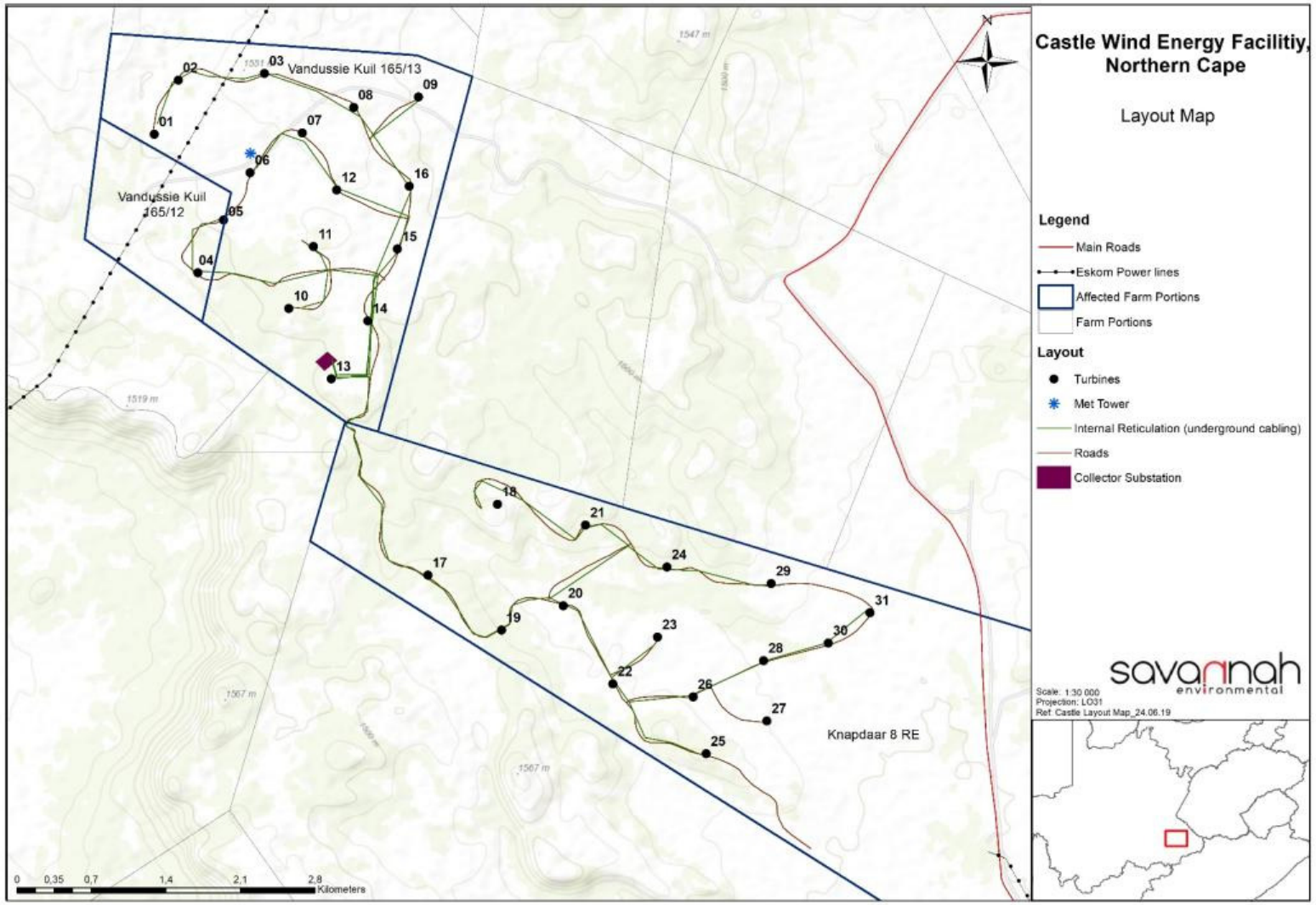

Figure 1.1: Layout assessed during the EIA process undertaken for the project in 2015 (A3 Map included in **Appendix F**).

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.

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 6 of the Environmental Authorisation issued on 8 May 2015) are to be amended.

It is requested that the turbine specifications be amended from:
» Hub height: up to 130
» Rotor Diameter: up to 150

To:
» Hub height: between 90 - 150m
» Rotor Diameter: between 110 - 200m

2.2. Amendment to Wind Turbine Capacity:

Individual turbine capacity (as specified on page 6 of the EA) are to be amended.

It is requested that the turbine specifications be amended from:
» Individual turbine capacity from: up to 4.5 MW

To:
» Individual turbine capacity: up to 7.9 MW

It is requested that the amended turbine specifications be added into the project description of the EA so that the EA reads as follows:

"Up to 31 wind turbines with a generating capacity of up to 7.9MW each, with a hub height of between 90 to 150m and a rotor diameter of between 110 to 200m and an overall wind farm generation capacity of 118MW."

2.3. Change in contact details of person stated in the EA:

Change in contact details from:

Corné van der Westhuizen

Tel: 021-831-6129
Cell: 083-611-7073

E-mail: corne.vanderwesthuizen@juwi.co.za

To:
Steyn de Vos
Tel: 021-831-6147
Cell: 082-388-4738
E-mail: steyn.devos@juwi.co.za

The table below provides a detailed comparison of the project description included in the amended EA as authorised on 08 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	**Between 110 - 200m**
Hub height	Up to 130	**Between 90 - 150m**
Wind Turbine Generation Capacity	up to 4.5 MW	**Up to 7.9 MW**

The changes in turbine specifications will not have an impact in the contracted capacity of the project (i.e. 118MW), 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 not considered to be the most suitable in terms of production and economic considerations. In this regard, Castle Wind Farm (Pty) Ltd 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, wind turbine generation capacity will result in the optimisation of the facility which was assessed within the EIA for the project. 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 capacity of 118MW.

3.2. Change in contact person

The contact person has changed and this needs to be reflected in the EA.

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

In terms of Regulation 31 of the EIA Regulations 2014, 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 DEA. The DEA has advised (as per the acknowledgement of receipt of the application notification letter, dated 18 June 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. 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 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.

During the avifaunal pre-construction monitoring, WildSkies (2014) recorded 15 priority bird species flying on site, mostly at very low frequency. A summary of the findings is provided in Table 5.1. For the purposes of the current amendment assessment, the largest turbine model was assumed. This would result in a rotor swept area from 50m to 250m above ground (previously from 55 to 205m). Table 5.1 indicates that for most species recorded on site, the increased rotor swept area would not make a difference to collision risk. The pre-construction monitoring indicated that only species for which there could be an increased risk is Booted Eagle, which was recorded flying only twice in 192 hours of observation.

[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.

Table 5.1: Summary of findings from the EIA process and Implications for the proposed amendment

Species	EIA finding – Smallie, 2014 Passage rate	EIA finding – Smallie, 2014 Flight height	Implications of proposed amendment (rotor zone from 50 – 250m above ground)
Verreaux's Eagle *Aquila verreauxii* (Vulnerable)	7 records in 192 hours or 0.04birds/hr	4 of 7 records above 186m (rotor zone) Mean 189.3m	No change
Northern Black Korhaan *Afrotis afraoides*	35 records or 0.18 birds/hr	100% of records below 54m	No change 100% of records below 55m
Karoo Korhaan *Eupodotis vigorsii* (Near-threatened)	3 records or 0.02birds/hr	10m, 20m, 80m – mean 36.7m	No change
Ludwig's Bustard *Neotis ludwigii* (Endangered)	2 records or 0.01birds/hr	80m & 50m, mean 65m	No change
Pale Chanting Goshawk *Melierax canorus*	12 records or 0.06birds/hr	100% below 54m, mean 10.5m	No change 100% below 55m
Jackal Buzzard *Buteo rufofuscus*	2 records or 0.01birds/hr	40m, 100m	No change
Booted Eagle *Hieraaetus pennatus*	2 records or 0.01 birds/hr	All flights below 54m, mean 26.6m	Slight increase in risk as 1 flight would now fall in rotor zone
Black-chested Snake Eagle *Circaetus pectoralis*	1 record or 0.01birds/hr	30m	No change
Secretarybird *Sagittarius serpentarius* (Vulnerable)	1 record or 0.01birds/hr	3m	No change
Yellow-billed Kite *Milvus migrans*	1 record or 0.01birds/hr	100m	No change
Lanner Falcon *Falco biarmicus* (Vulnerable)	1 record or 0.01birds/hr	20m	No change
South African Shelduck *Tadorna cana*	8 records or 0.04birds/hr	15m, 10m, 40m, 80m Mean of 36.3m	No change
Egyptian Goose *Alopochen aegyptiaca*	8 records or 0.04birds/hr	10m to 80m, mean 36.3m	No change
Black-headed Heron *Ardea melanocephala*	1 record or 0.01birds/hr	15m	No change
Spur-winged Goose *Plectropterus gambensis*	1 record or 0.01birds/hr	30m	No change

Although the lower tip of the proposed rotor diameter will slightly change, most of the change in collision risk window will take place at the upper blade tip, which is above the height at which most bird flights were recorded. The change in height above ground of the rotor zone under the new proposed turbine model will not significantly alter the collision risk.

The proposed increase in rotor diameter means that the aggregate collision risk window will be larger. The authorised turbine model with a rotor diameter of 150m had a collision risk window of 17 671.46m² per turbine. The proposed amendment of up to 200m rotor diameter (the worst-case scenario is assumed for the purpose of this assessment) will be associated with a collision risk window of 31 415.93m² per turbine. If all 31 turbines originally authorised are constructed, this will lead to a 78% increase in the collision risk window. With the proposed larger turbine model associated with the amendment, only 20 turbines (assuming the largest turbines size is chosen but the number of turbines could vary depending on the final turbine model chosen) will be constructed to reach the overall facility limit of 118 MW and this will lead to

a collision risk window increase of only 15% (31 x 17 671.46m² = 547 815.26m², c.f. 20 x 31 415.93m² = 628 318.60m²). This is considered to be a slight increase and is considered to be acceptable.

In 2017 BirdLife South Africa published best practice guidelines for the Verreaux's Eagles. These guidelines will be discussed in the section below.

a) *Best practice guidelines for birds and wind energy*
The pre-construction monitoring undertaken for the Castle Wind Energy Facility concluded in 2014. Although the monitoring has exceeded three years, the specialist advised that there is no need for further monitoring provided that the Applicant adhere to additional recommendations included in Section 5.1.1.

b) *Verreaux's Eagle best practice guidelines*
Subsequent to the original studies at Castle WEF (Wind Energy Facility), BirdLife South Africa has published species specific best practice guidelines for the Verreaux's Eagle (BirdLife South Africa, 2017). Verreaux's Eagle best practice guidelines noted the following important recommendation relating to this amendment:

"A buffer of 3km is recommended around all nests (including alternate nests). This is intended to reduce the risk of collisions and disturbance. This is a precautionary buffer and may be reduced (or increased) based on the results of rigorous avifaunal surveys, but nest buffers should never be less than 1.5km."

Verreaux's Eagles have been recorded at the Castle WEF project site and three known Verreaux's Eagle nests were identified during the pre-construction monitoring. The Verreaux's Eagle nests are indicated relative to the Castle Wind Farm in Figure 5.1.1. The closest of these nests is relevant since it is approximately 2.2km from the nearest turbine. In order to adhere to the 3km no-go buffer, the removal/relocation of Turbines 1, 4 and 5 during final design and micro-siting is recommended by the specialist. Should this buffer be adhered to there will be no need for further avifaunal survey work on site. If infrastructure is constructed within this 3km buffer area, it would necessitate further survey work on site. The avifaunal specialist would need to return to site to update their knowledge and understanding of the location of Verreaux's Eagle nests in the area before making a final finding. It will also require data from the adjacent operational Longyuan Mulilo De Aar 2 North Wind Energy Facility to get a better understanding of the Verreaux's Eagle population dynamics in the area.

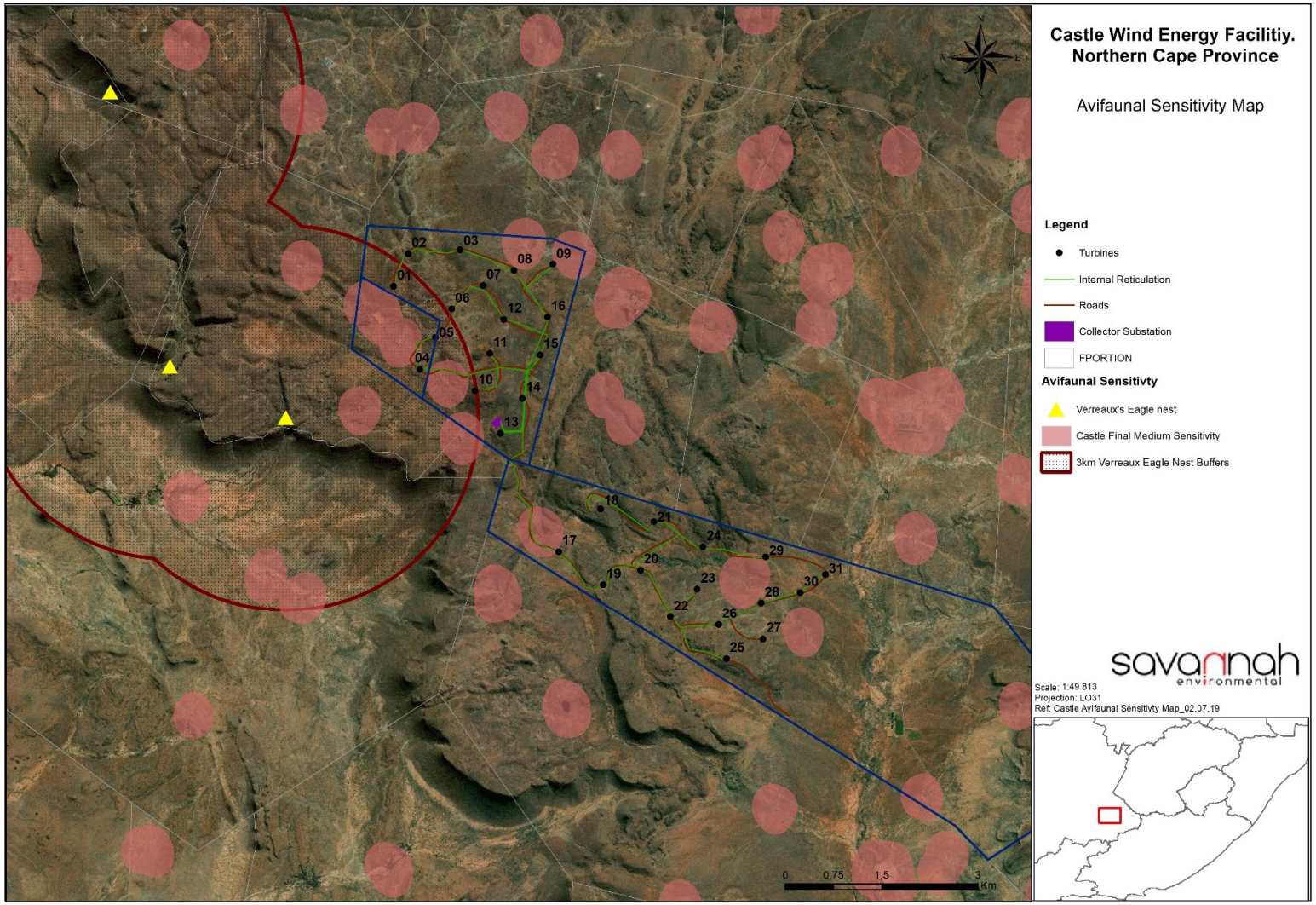

Figure 5.1.1: The position of known Verreaux's Eagle nests & 3km buffers relative to the proposed site. **(A3 Map included in Appendix F).**[2]

» [2] Turbines 1, 4 and 5 will need to be relocated/removed during final design and micro-siting in order to adhere to the 3km buffer.

5.1.1. Comparative Assessment

The increased rotor diameter will result in an increased avifaunal collision risk and overall risk window. Considering that the overall capacity of the facility will not increase, this risk is expected to increase by 15%, and the avifaunal specialist concluded that the collision risk to the relevant bird species flying on the site would be of medium significance. The original avifaunal impact assessment study (WildSkies, 2014) made the following findings with respect to impact significance:

- Habitat destruction rated as MEDIUM significance;
- Disturbance of birds as MEDIUM significance;
- Displacement of birds rated as MEDIUM significance; and
- Collision of birds with turbines was rated as LOW significance.

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 tables below.

Disturbance of birds during construction (Construction phase)

The disturbance of birds during the construction phase will slightly increase in significance without mitigation as compared to the original assessment. However, the significance of the impact with the implementation of mitigation remains unchanged. This is a result of the 3km no-go buffer around the Verreaux's Eagle nest as required by the Best Practice Guidelines. As a result of the 3km no-go buffer, turbines 1, 4 and 5 will need to be relocated/removed during final design and micro-siting. Additional mitigation measures as a result of this amendment are underlined.

Nature: **Disturbance of birds during construction activities**				
	Authorised		**Proposed amendment**	
	Without mitigation	**With mitigation**	**Without mitigation**	**With mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Short (1)	Short (1)	Short (1)	Short (1)
Magnitude	Medium (6)	Medium (6)	**High (8)**	Medium (6)
Probability	Highly probable (4)	Highly probable (4)	Highly probable (4)	Highly probable (4)
Significance	32 (Medium)	32 (Medium)	**40 (Medium)**	32 (Medium)
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	High	Medium	High	Medium
Irreplaceable loss of resources?	No	No	No	No
Can impacts be mitigated?	Partially		Partially	

Mitigation:

- » A 3km no-go buffer has been identified around each of the known Verreaux's Eagle nests. No new infrastructure may be constructed within these areas. Turbines 1, 4 and 5 will need to be relocated/removed during final design and micro-siting in order to adhere to the 3km buffer.
- » Any significant impacts detected by post-construction monitoring must be mitigated where judged necessary by the avifaunal specialist. The onus is on the wind farm operator to have planned ahead for such an eventuality, particularly in respect of financial budgeting.
- » The local population of Verreaux's Eagle must be monitored for the full lifespan of the wind farm to ensure that any impacts are measured. This will require 2-3 visits to each of the 3 known nests (and any new ones subsequently found) during the breeding season each year by a suitably qualified independent ornithologist.
- » At other operational wind farms it has been suspected that ground burrowing small mammals, such as Ground Squirrel, found more favourable burrowing conditions along new road and hard stand verges on site after construction, which resulted in an inflated prey base for eagles close to turbines, and consequent higher turbine collision risk. It is essential that the Castle Wind Farm does not create favourable conditions for such mammals in high risk areas. Discussions with civil engineers previously have determined that it is not possible to adequately compact road verges, drains and hard stand edges during construction to eliminate such burrowing. We therefore recommend then that within the first year of operations a full assessment of this aspect be made by the ornithologist contracted for post construction monitoring. If such burrowing is found case specific solutions to exclude these mammals from areas close to turbines will need to be developed.

Cumulative impacts:

High, the Castle WEF is almost surrounded by other wind farms, one of which is operational.

Residual Risks:

None

Impact assessment for collision risk during operational phase.

This impact has increased slightly in significance under the current assessment. Verreaux's Eagle has previously been 'suspected' to potentially be susceptible to turbine collision. It has recently been confirmed that Verreaux's Eagle are susceptible to turbine collision. The collision risk can be mitigated to some extent by applying 3km no-go buffer areas around known nest sites, this will result in turbines 1, 4 and 5 being relocated or removed from the layout during final design and micro-sitting. Additional mitigation measures as a result of this amendment are underlined.

Nature: **Mortality of birds through collision with turbine blades**				
	Authorised		**Proposed amendment**	
	Without mitigation	**With mitigation**	**Without mitigation**	**With mitigation**
Extent	Local (1)	Local (1)	Local (1)	Local (1)
Duration	Long term (4)	Long term (4)	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)	**Moderate (6)**	**Moderate (6)**
Probability	Highly Probable (4)	Probable (3)	Highly Probable (4)	Probable (3)
Significance	27 (Low)	18 (Low)	**44 (Medium)**	**33 (Medium)**
Status (positive or negative)	Negative	Negative	Negative	Negative
Reversibility	Low	Low	Low	Low
Irreplaceable loss of resources?	Yes	Yes	Yes	Yes
Can impacts be mitigated?	Partially		Partially	
Mitigation: » Any significant impacts detected by post-construction monitoring must be mitigated where judged necessary by the avifaunal specialist. The onus is on the wind farm operator to have planned ahead for such an eventuality, particularly in respect of financial budgeting. » The local population of Verreaux's Eagle must be monitored for the full lifespan of the wind farm to ensure that any impacts are measured. This will require 2-3 visits to each of the 3 known nests (and any new ones subsequently found) during the breeding season each year by a suitably qualified independent ornithologist. » At other operational wind farms it has been suspected that ground burrowing small mammals such as Ground Squirrel found more favourable burrowing conditions along new road and hard stand verges on site after construction, which resulted in an inflated prey base for eagles close to turbines, and consequent higher turbine collision risk. It is essential that the Castle Wind Farm does not create favourable conditions for such mammals in high risk areas. Discussions with civil engineers previously have determined that it is not possible to adequately compact road verges, drains and hard stand edges during construction to eliminate such burrowing. We therefore recommend then that within the first year of operations a full assessment of this aspect be made by the ornithologist contracted for post construction monitoring. If such burrowing is found case specific solutions to exclude these mammals from areas close to turbines will need to be developed.				
Cumulative impacts: High, the Castle Wind Farm is almost surrounded by other wind farms, one of which is operational.				
Residual Risks: None				

To summarise, the differences between the original and current impact significance are as follows:

Table 5.1.2. Summary of original and current impact significance ratings.

Impact	Original (WildSkies, 2014) Pre mitigation/Post mitigation	Current (WildSkies 2019) Pre mitigation/Post mitigation	Nature of change
Construction phase			
Habitat destruction	50 Medium/ 50 Medium	50 Medium/ 50 Medium	No change
Disturbance	**32 Medium/ 32 Medium**	**40 Medium/ 32 Medium**	**Change upwards**
Operational phase			
Displacement	30 Medium/ 30 Medium	30 Medium/ 30 Medium	No change
Mortality through collision with turbines	**27 Low/18 Low**	**44 Medium/ 33 Medium**	**Change upwards**

It should be noted that the change in significance ratings is as a result of new guidelines which have become available from BirdLife and not due to the proposed amendments. These guidelines would be applicable regardless of whether the amendment is approved.

5.1.2. Conclusion

The proposed amendment to the turbine model will not significantly increase the collision risk window area of the wind farm as compared to the original turbine model. This is because the proposed changes to the turbine specifications (and consequent fewer turbines) will present only a 15% increase in the overall facility collision risk window and based on actual bird species flight data the changed height of the rotor zone will not change the collision risk.

New guidelines which have become available subsequent to the original assessment has however made a difference to the rating of the mortality of birds and the disturbance of birds. Verreaux's Eagle has previously been 'suspected' to potentially be susceptible to turbine collision. It has recently been confirmed that Verreaux's Eagles are susceptible to turbine collision. The collision risk can be mitigated to some extent by applying 3km no-go buffer areas around known nest sites, which will result in turbines 1, 4 and 5 being relocated or removed during final design and micro-siting.

The Updated Best Practice Guidelines for birds and wind energy released in 2015 (Jenkins et al. 2015) state that: *"If there is a significant gap (i.e. more than three years) between the completion of the initial pre-construction monitoring and impact assessment, and the anticipated commencement of construction, it may be advisable to repeat the pre-construction monitoring (or parts thereof) to assess whether there have been any changes in species abundance, movements and/or habitat use in the interim"*. Castle Wind Energy Facility has exceeded this three year timeframe as the pre-construction monitoring concluded in 2014. The avifaunal specialist has however indicated that there is no reason to expect that any particular avifaunal information on site has changed – and there has been no layout change to the Wind Energy Facility. It was therefore concluded that there is no need for further monitoring at this stage.

Overall, the specialist found there is not any material change to the overall findings of the existing impact assessment. New mitigation measures have been recommended in accordance with current guidelines and knowledge. These new mitigation measures are outlined as follows:

- A 3km no-go buffer has been identified around each of the known Verreaux's Eagle nests. No new infrastructure may be constructed within these areas. There are currently three turbines inside this buffer area and these are to be relocated during micro-siting.

- » Any significant impacts detected by post-construction monitoring must be mitigated where judged necessary by the avifaunal specialist. The onus is on the wind farm operator to have planned ahead for such an eventuality, particularly in respect of financial budgeting.
- » The local population of Verreaux's Eagle must be monitored for the full lifespan of the wind farm to ensure that any impacts are measured. This will require 2-3 visits to each of the 3 known nests (and any new ones subsequently found) during breeding season each year by a suitably qualified independent ornithologist.
- » At other operational wind farms it has been suspected that ground burrowing small mammals such as Ground Squirrel found more favourable burrowing conditions along new road and hard stand verges on site after construction, which resulted in an inflated prey base for eagles close to turbines, and consequent higher turbine collision risk. It is essential that the Castle Wind Farm does not create favourable conditions for such mammals in high risk areas. Discussions with civil engineers previously have determined that it is not possible to adequately compact road verges, drains and hard stand edges during construction to eliminate such burrowing. We therefore recommend then that within the first year of operations a full assessment of this aspect be made by the ornithologist contracted for post construction monitoring. If such burrowing is found case specific solutions to exclude these mammals from areas close to turbines will need to be developed.

These additional recommendations must be added to the project Environmental Management Programme (EMPr) and considered in developing the final layout for the facility. It should be noted that micro-siting of the facility layout can only be undertaken once the project has been selected as a Preferred Bidder and the Applicant has identified the actual turbine model to be used. Once this has been confirmed, the Applicant will ensure that no turbines are placed within areas of medium sensitivity or within 3km from a Verreaux's Eagle nest. The amended EMPr and final layout will be submitted to the DEA for approval in terms of Conditions 12 – 16 of the Environmental Authorisation.

Provided that these recommendations are adhered to, the proposed amendment is acceptable from an avifaunal perspective.

5.2. Impacts on bats

The proposed amendment to the turbines for the Castle Wind Energy Facility would result in a greater per turbine rotor swept area and hence a potentially greater likelihood bats would collide with turbine blades or experience barotrauma. The minimum and maximum tip heights currently approved will be 55 m and 205 m respectively. This will change to a minimum and maximum tip height of 35 m and 145 m respectively (for the 90 m hub height turbine) or minimum and maximum tip height of 50 m and 250 m respectively (for the 150 m hub height turbine). The wind turbines currently authorised results in the rotor swept area for each turbine of 17,671 m^2 (assuming turbines with a hub height of 130 m and blade lengths of 75 m). The proposed amendment would result in either a decrease (to 9,503 m^2 assuming turbines with a hub height of 90 m and blade lengths of 55 m) or increase (to 31,416 m^2 assuming turbines with a hub height of 150 m and blade lengths of 100 m) in the rotor swept area.

5.2.1. Comparative Assessment:

The Bat Impact Assessment during the EIA process (Animalia, 2014) identified various impacts but only one impact would change as a result of the proposed amendment. The mortality of bat species due to collision with turbine blades or due to barotrauma will change due to the greater rotor swept area per turbine and

hence a potentially greater likelihood that bats would collide with turbine blades or experience barotrauma. The significance of all other identified impacts on bats associated with the development will remain the same as per the assessment during the EIA process. In the EIA process the potential collision impact to bats was rated as high before mitigation and low after mitigation. The two primary mitigation measures in this regard was outlined as curtailment and the avoidance of sensitive areas for bats. The results of the operational bat monitoring would determine the level of curtailment needed, if any. The proposed amendment would however not change the significance ratings for the impact, and only result in an updated sensitivity map based on the new turbine dimensions (see Figure 5.2.1 below).

In the pre-construction bat monitoring report (included within the EIA Report) sensitive areas were defined as either high (with a 150 m buffer) or moderate (with a 100 m buffer). The current turbine layout adheres to these buffers, with no turbines located within them. While not explicitly stated in the pre-construction monitoring report, these buffers must be to blade tip. The following formula was recommended by the bat specialist in order to determine the buffer distances required to ensure that no turbine blades enter the bat buffers:

$$b = \sqrt{(bd + bl)^2 - (hh - fh)^2}$$

Where: bd = buffer distance, bl = blade length, hh = hub height and fh = feature height (zero in this instance) (Mitchell-Jones and Carlin 2014).

Using the formula above, the 150 m high sensitivity buffer would need to be either 184 m or 200 m to blade tip. The 100 m moderate sensitivity buffer would need to be either 126 m or 132 m to blade tip. Based on this, some turbines are now located in bat sensitive buffers (Table 5.2.1). The guidelines applicable during the initial Bat Impact Assessment (Animalia, 2014) stipulated a buffer of either 100 m or 150 m (Sowler and Stoffberg, 2012). Subsequent to the initial Bat Impact Assessment revised guidelines have been released (Sowler et al. 2017). These guidelines recommend a minimum buffer of 200 m to blade tip for important bat features. The specialist recommended that based on the bat activity at the site, the moderate sensitivity buffer should be sufficient at 100 m. The increase in the high sensitivity buffer from 150 m to 200 m results in some turbines being located in buffer zones (Table 5.2.1 and Figure 5.2.1). These turbines will need to be relocated from the layout during final design and micro-siting.

Table 5.2.1: Number of turbines within bat buffers for each turbine size being applied for.

Unchanged 100m Moderate Sensitivity Buffer (to blade tip)	**90 m hub height, 55 m blade (126 m to turbine base)**	**150 m hub height, 100 m blade (135 m to turbine base)**
Moderate Sensitivity	1 (T2)	2 (T2, T9)
Previous 150 m High Sensitivity Buffer (to blade tip)	**90 m hub height, 55 m blade (184 m to turbine base)**	**150 m hub height, 100 m blade (200 m to turbine base)**
High Sensitivity	1 (T28)	3 (T1, T24, T28)
Current 200 m High Sensitivity Buffer (to blade tip)	**90 m hub height, 55 m blade (239 m to turbine base)**	**150 m hub height, 100 m blade (260 m to turbine base)**
High Sensitivity	4 (T1, T20, T24, T28)	6 (T1, T6, T18, T20, T24, T28)

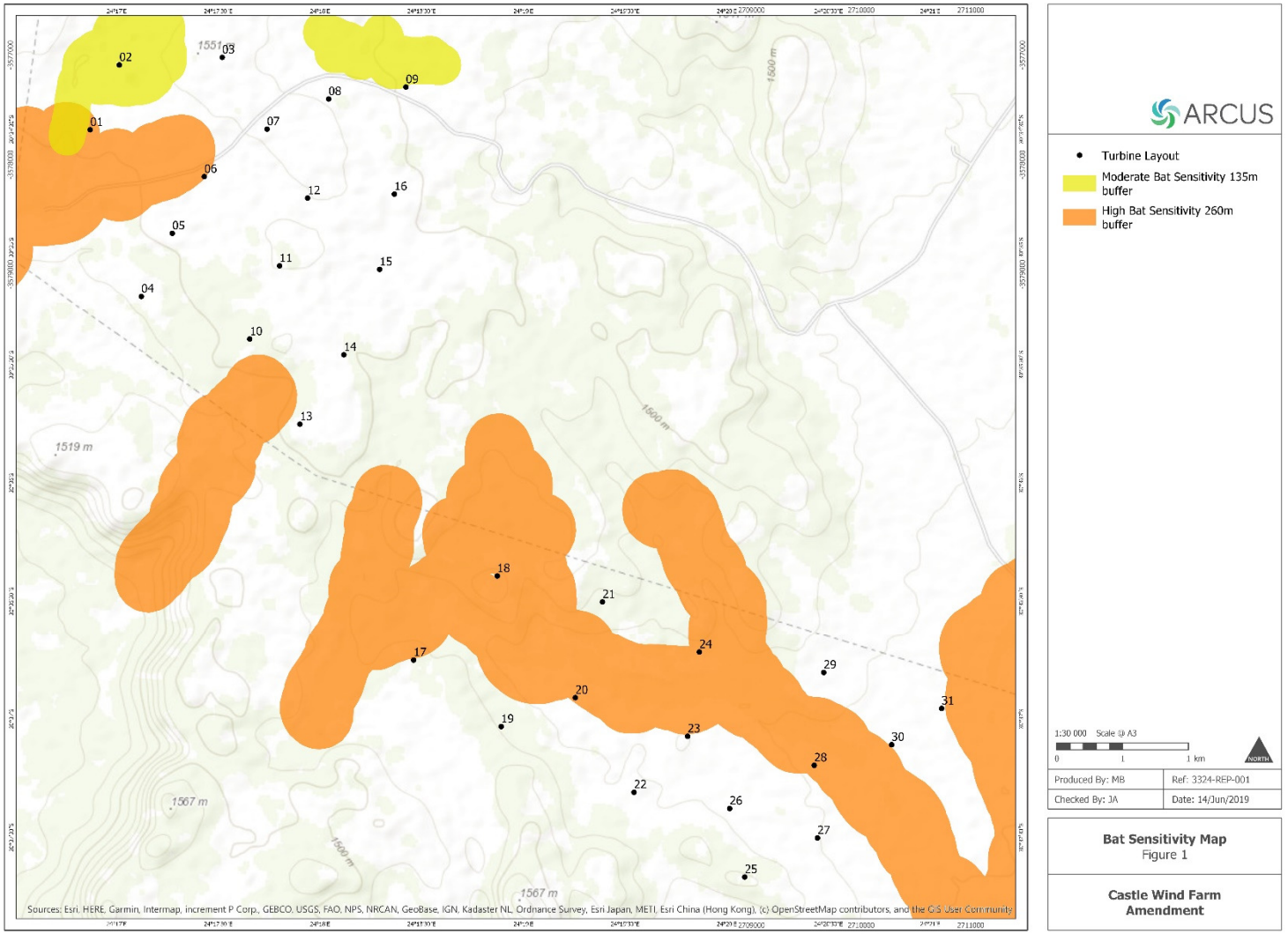

Figure 5.2.1: Due to the updated guidelines, a number of turbines are now located in High Bat Sensitivity areas. These turbines will need to be relocated during micro-siting or removed from the layout **(A3 Map included in Appendix F).**

During the pre-construction monitoring is was determined that bat activity was higher closer to the ground at 10m than it was at 50m. It was therefore recommended that the ground clearance be maximised as much as possible (i.e. the distance between the ground and the blade tip at its highest point). This can be done by using turbines with the shortest possible blades and the highest possible hub height. This would reduce the number of species, and individual bats, potentially impacted upon by turbine blades during the operation phase. It would also be preferential to use shorter blades so that they do not intrude into higher airspaces and in so doing reduces the potential impact to high flying species such as free-tailed bats. Research also shows that bats actively forage around wind turbines (despite generally lower activity at height) and that wind turbines could possibly alter bat activity patterns in the area by either increasing activity at height and/or increasing the diversity of species making use of higher airspaces.

Therefore, even though the rotor swept area of the 150 m hub height turbine is larger and this would usually be considered a higher impact, the blades of these turbines will sweep to 50 m whereas the blades of the 90 m hub height turbine will sweep down to 35 m, making them likely to impact a greater number of bats. It was therefore concluded that wind turbines with a 90 m hub height may have a greater impact to bats. The higher impact did however not change the significance of overall impacts.

5.2.2. Conclusion

The proposed amendment is unlikely to alter (increase or decrease) the impact significance as assessed during the EIA process. These impacts would remain the same assuming the mitigation measures proposed in the pre-construction bat monitoring report and EMPr are adhered to. The mitigation measures included the implementation of operational bat monitoring and assessing the need for curtailment and the avoidance of sensitive areas for bats by adhering to the sensitivity map (Figure 5.2.1). No additional mitigation measures are required.

In order to maximise ground clearance due to bat activity that was recorded lower to the ground, a wind turbine with a 150m hub height is recommended as the preferred option by the specialist. The amendment will not change the findings of the EIA report and the amendment is considered to be acceptable from a bats perspective, provided that during final design and micro-siting all turbines are located outside of the bat sensitivity buffer zones calculated according to the formula in section 5.2.1. The final layout must be submitted to the DEA for approval in terms of Conditions 12 and 13 of the Environmental Authorisation.

5.3. Visual Impact

A visibility analysis was undertaken in order to determine whether there would be an increased visual impact as a result of the proposed amendment. The increased wind turbine specifications could potentially result in total wind turbine height increase from 205m (130m hub-height + 75m blade length) to 250m (150m hub-height + 100m blade length). This could potentially result in a maximum increase of 45m in blade tip height per Wind Turbine Generator (here a worst-case scenario is assumed). If the minimum turbine specifications are selected (90m hub-height and 110m rotor diameter) the turbine blade tip height will be reduced by 60m to 145m above ground level. The visibility analysis used the largest wind turbine specifications in the visibility analysis (the worst-case scenario).

The visibility analysis was undertaken from each of the wind turbine positions (31 in total) at an offset of 205m (maximum blade tip height) was used. This result indicates the total visual exposure from the Visual Impact

Assessment during the EIA process (indicated in green). The 250m maximum blade tip height was used as input and the visual exposure is shown in red. The results of the visibility analyses are displayed on **Figure 5.3** below. The visual expose increased by 18% and the specialist concluded that this would have a relatively small influence on the overall visual exposure. The surface area exposure increased from **325km^2** to **336km^2** with the increased dimensions in the proposed amendment. This constitutes a **3%** increase in potential visual exposure which was also concluded to be of low significance.

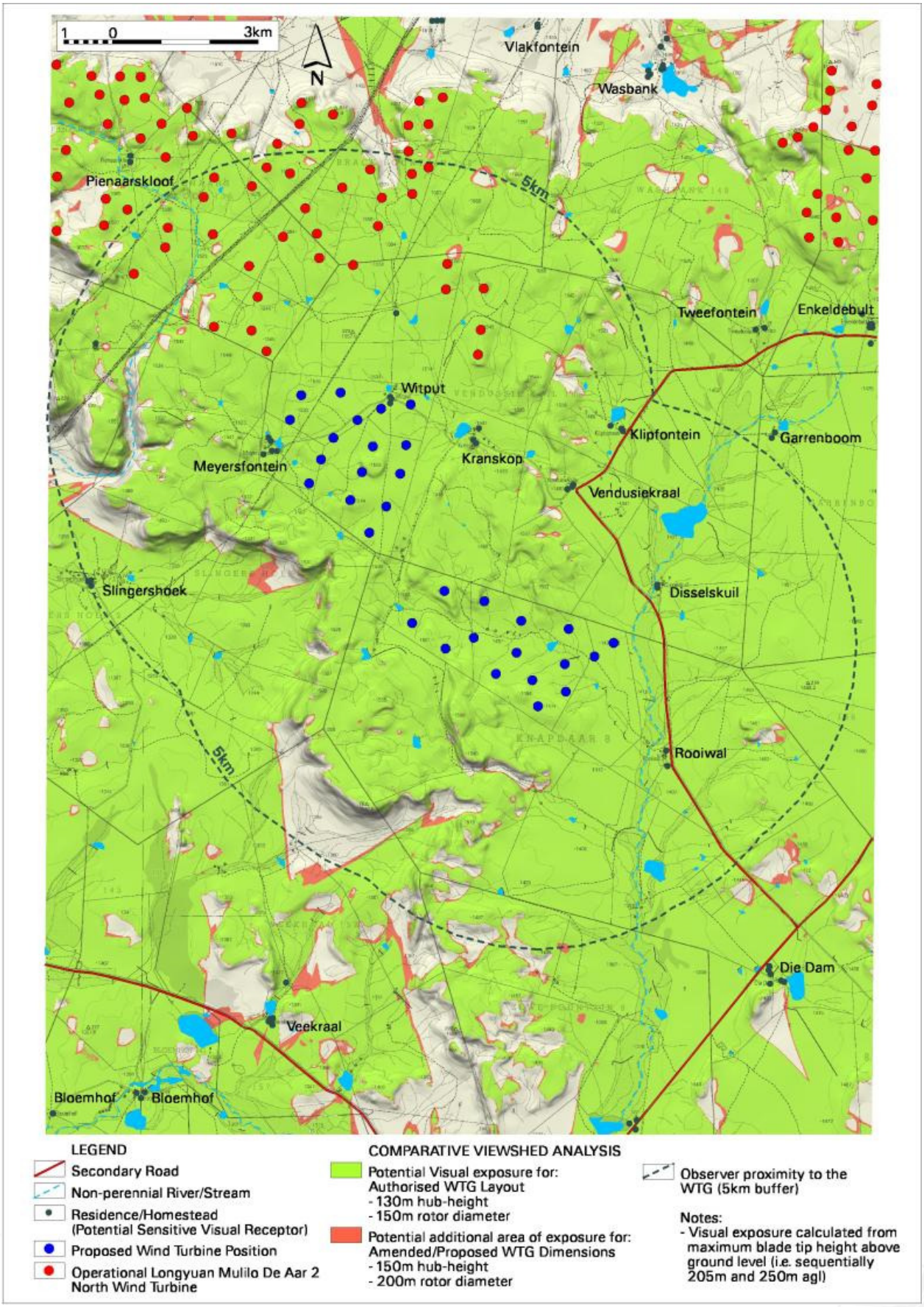

Figure 5.3: Viewshed analysis represents the potential total visual exposure of the original turbine dimensions (illustrated in green) compared to the proposed new turbine dimensions (illustrated in red).

No additional sensitive visual receptors located within the area of increased visual exposure were identified. The increased area of visual exposure does not include a significant portion of additional exposure to the secondary roads within the study area.

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

» Klipfontein
» Disselskuil
» Garrenboom
» Vendusiekraal[1]
» Kranskop[1]
» Rooiwal[2]
» Meyersfontein[2]
» Witput[2]
» Slingershoek[3]
» Pienaarskloof[3]
» Tweefontein[3]
» Enkeldebult[3]
» Die Dam[3]
» Observers travelling along the secondary roads traversing near or over the proposed development site.

Note:

- *The homesteads marked [1] are believed to be derelict or uninhabited.*
- *The homesteads marked [2] are located on the farm earmarked for the Castle WEF development, assuming their approval of the WEF development.*
- *The homesteads marked [3] are located on the farms earmarked for the Longyuan Mulilo De Aar 2 North (operational) and South (approved) WEF developments, assuming their approval of the WEF development.*

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

There will be no change to the significance rating compared with the original EIA visual impact assessment report. The amendments proposed will have negligible effect on the significance of impacts as predicted in the EIA process and therefore no comparative impact tables were required to be 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 **not expected to significantly influence** the anticipated visual impact, as stated in the original Visual Impact Assessment (VIA) report (i.e. the visual impact is expected to occur regardless of the amendment). This statement relates specifically to the assessment of the high visual impact (visual receptors within a 5km radius of the wind turbine structures) but also apply to potentially ***moderate*** to ***low*** visual impacts (visual receptors of up to 20km from the structures).

From a visual perspective, the proposed changes will therefore require no changes to the significance rating within the original VIA report that was used to inform the approved EIA. No new mitigation measures are required, provided that the conditions and recommendations as stipulated in the original Environmental Authorisation, and according to the EMPr as provided in the original Visual Impact Assessment report, are adhered to.

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 2015 as part of the EIA process. The 2015 Noise Impact Assessment indicated that the proposed wind farm will have a noise impact of a low significance on all potential noise-sensitive developments in the area during both the construction and operational phases. The wind turbine used in this assessment was the Vestas V112 3.0MW 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 were projected to be less than 36 dBA at the closest NSD. These NSDs are shown in **Figure 5.4** below.

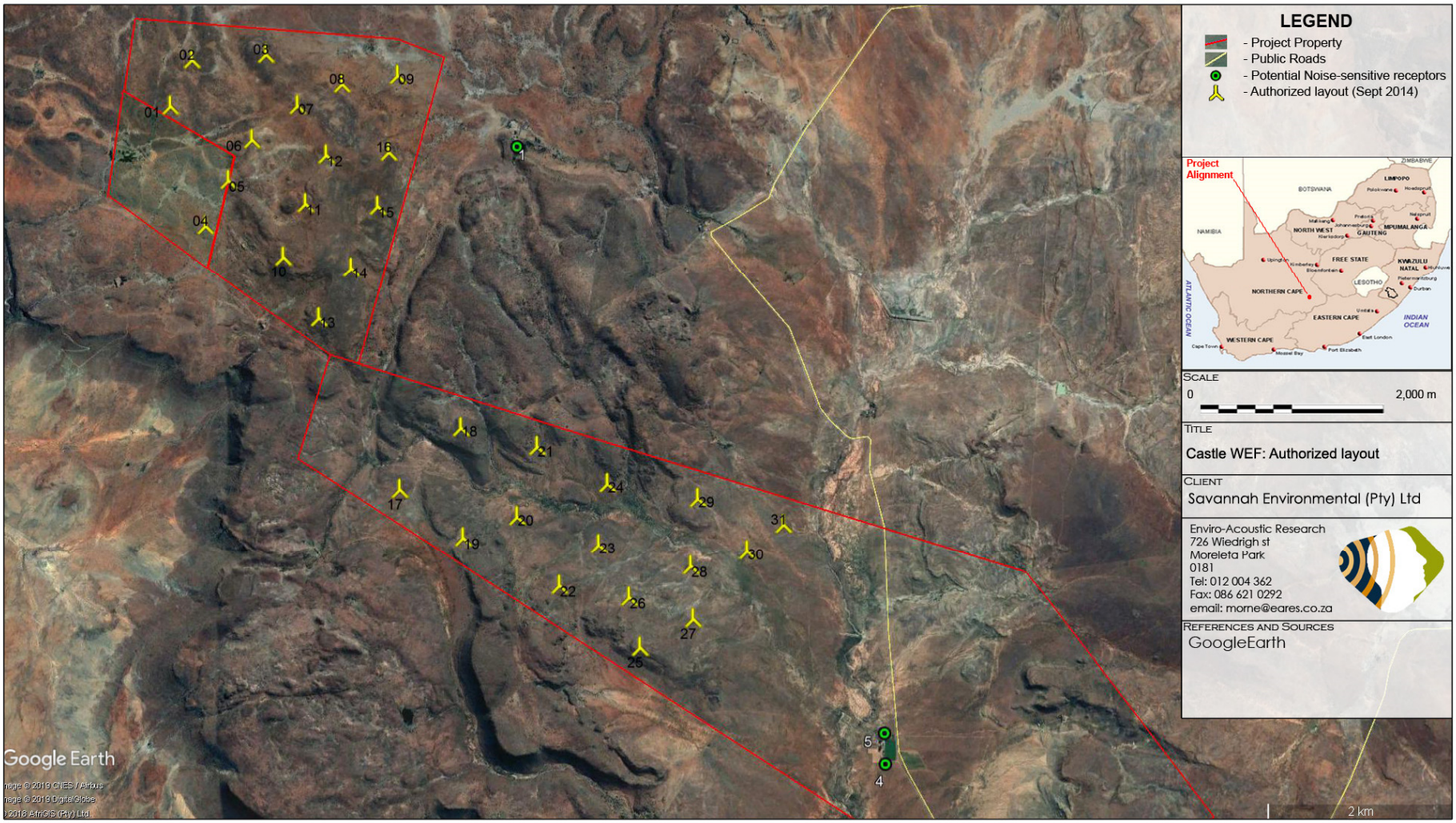

Figure 5.4: NSD in relation to the wind turbines of the Castle WEF (refer to **Appendix F** for A3 Map**)**.

5.4.1. Comparative Assessment

The proposed wind turbines are located more than 1 000m 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 38 dBA at the closest NSD. This is only slightly higher than the 36 dBA measured at the closest NSD during the EIA process. 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 1 000m away from any potential noise-sensitive receptors and taking into account the potential noise impact, the specialist concluded that the change will not change (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	
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. 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.	None
Avifauna	
As a result of this amendment, the Castle WEF is now in line with Updated Verreaux's Eagle best practice guidelines and a new 3km buffer was imposed on the layout. This will be considered within the final design and micro-siting.	The new proposed turbine model will present a 15% increase in the overall facility collision risk window. This increase was however considered to be minor.
Bats	
The increased rotor swept area could possibly be offset in part by a reduced number of turbines since less turbines will be used to reach the overall capacity of 118MW.	The proposed amendment to the turbines at the wind farm would result in a greater per turbine rotor swept area and hence a potentially greater likelihood bats would collide with turbine blades or experience barotrauma. Currently, the rotor swept area for each turbine is 17,671 m^2 but based on the amendment being applied for, this would increase to up to 31,416 m^2. This figure will however be reduced since less turbines will be used to reach the overall capacity of 118MW.
The higher hub height as per the recommendation will result in maximised ground clearance. This would reduce the number of species, and individual bats, potentially impacted upon by turbine blades during the operation phase.	None
Visual	
None.	None
Noise	
All of the proposed wind turbines are located more than 1,000m from any potential noise-sensitive receptors.	None
The maximum projected noise level will be less than 38 dBA at the closest NSD. This is only slightly higher than the 36 dBA at the closest NSD. Considering the fact that proposed wind turbines are more than 1 000m away from any potential noise-sensitive receptors and taking into account the potential noise impact, the specialist	None

Advantages of the amendment	Disadvantages of the amendment
concluded that the change will not change (i.e. increase or decrease) the significance of the noise impact and the impacts will remain of a low significance.	

Based on the above, it can be concluded that the advantages of the proposed change outweigh the disadvantages from an environmental and technical perspective.

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:

- A 3km no-go buffer has been identified around each of the known Verreaux's Eagle nests. No new infrastructure may be constructed within these areas. There are currently three turbines inside this buffer area and these are to be relocated during micro-siting.
- Any significant impacts detected by post-construction monitoring must be mitigated where judged necessary by the avifaunal specialist. The onus is on the wind farm operator to have planned ahead for such an eventuality, particularly in respect of financial budgeting.
- The local population of Verreaux's Eagle must be monitored for the full lifespan of the wind farm to ensure that any impacts are measured. This will require 2-3 visits to each of the 3 known nests (and any new ones subsequently found) during breeding season each year by a suitably qualified independent ornithologist.
- At other operational wind farms it has been suspected that ground burrowing small mammals such as Ground Squirrel found more favourable burrowing conditions along new road and hard stand verges on site after construction, which resulted in an inflated prey base for eagles close to turbines, and consequent higher turbine collision risk. It is essential that the Castle Wind Farm does not create favourable conditions for such mammals in high risk areas. Discussions with civil engineers previously have determined that it is not possible to adequately compact road verges, drains and hard stand edges during construction to eliminate such burrowing. We therefore recommend then that within the first year of operations a full assessment of this aspect be made by the ornithologist contracted for post construction monitoring. If such burrowing is found case specific solutions to exclude these mammals from areas close to turbines will need to be developed.

No other novel mitigation measures are introduced from the other specialists. 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 an operational facilities. **These updated mitigation measures should be included within the project EMPr when the updated layout is finalised and submitted for final approval to the DEA as required in terms of Conditions 12 – 16 of the Environmental Authorisation**.

8. PUBLIC PARTICIPATION

A public participation process is being conducted in support of a Part 2 application for amendment of the Environmental Authorisation for the Castle Wind Energy Facility and associated infrastructure, Northern Cape Province. This public participation includes:

- Site notices were placed at the site on **25 June 2019** (refer to **Appendix E4**).
- The draft motivation report being made available for a public review period on www.savannahsa.com from **3 July 2019 to 2 August 2019.**
- Written notification to registered I&APs regarding the availability of the amendment motivation report was distributed on **3 July 2019** (refer to **Appendix E2**).
- Advertisements were placed in the Volksblad newspaper on **3 July 2019** (refer to **Appendix E4**).

Comments received during the public review period will be included in the final submission to the DEA 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 for the identified potential impacts within the EIA. Only one impact, with regards avifauna, has increased slightly with the proposed amendment. 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 rating of the impact of mortality of birds through collision with turbines. This impact has increased in significance under the current assessment due to the requirements of the guideline. A key species which was previously 'suspected' to potentially be susceptible to turbine collision (Verreaux's Eagle) has subsequently proven to actually be susceptible to turbine collision. The new best practice guidelines for Verreaux's Eagle and Wind Farms require a 3km no-go buffer around nests. Currently three turbines (turbine 1, 4 and 5) are situated inside this area (refer to Figure 5.1.1 and Figure 9.1). These turbines should be relocated/removed during final design and micro-siting.

The Bats specialist concluded that it is unlikely that the amendments to the turbine dimensions proposed for the Castle WEF would change (i.e. increase or decrease) the current rated impacts to bats. This is because they are already high before mitigation and low after mitigation. Due to the proposed change in rotor size, the buffer areas were recalculated. This resulted in some turbines being located in bat sensitive buffers (refer to Figure 5.2.1 and Figure 9.1). These turbines should be relocated/removed during final design and micro-siting.

The specialist also stated that bat activity was lower closer to the ground during the pre-construction monitoring, therefore a 150 m hub height turbine was considered to be the preferred option by the specialist. It was also recommended that the bat sensitivity buffer zones be calculated and adhered to.

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 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 DEA for final approval in terms of the requirements of Conditions 12 – 16 of the Environmental Authorisation.** It must be noted that the layout and EMPr for the project will be finalised and submitted to the DEA for review and approval (in accordance with Condition 28 of the EA) once a turbine supplier has been selected for the project.

Given the above, Castle Wind Farm (Pty) Ltd requests the following amendments to its EA:

1. Rotor Diameter increase from **up to 150** to **between 110 to 200m;**
2. Hub height from **up to 130** m to **between 90 to 150m; and**
3. Individual turbine capacity from **up to 4.5 MW** to **up to 7.9 MW**

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.

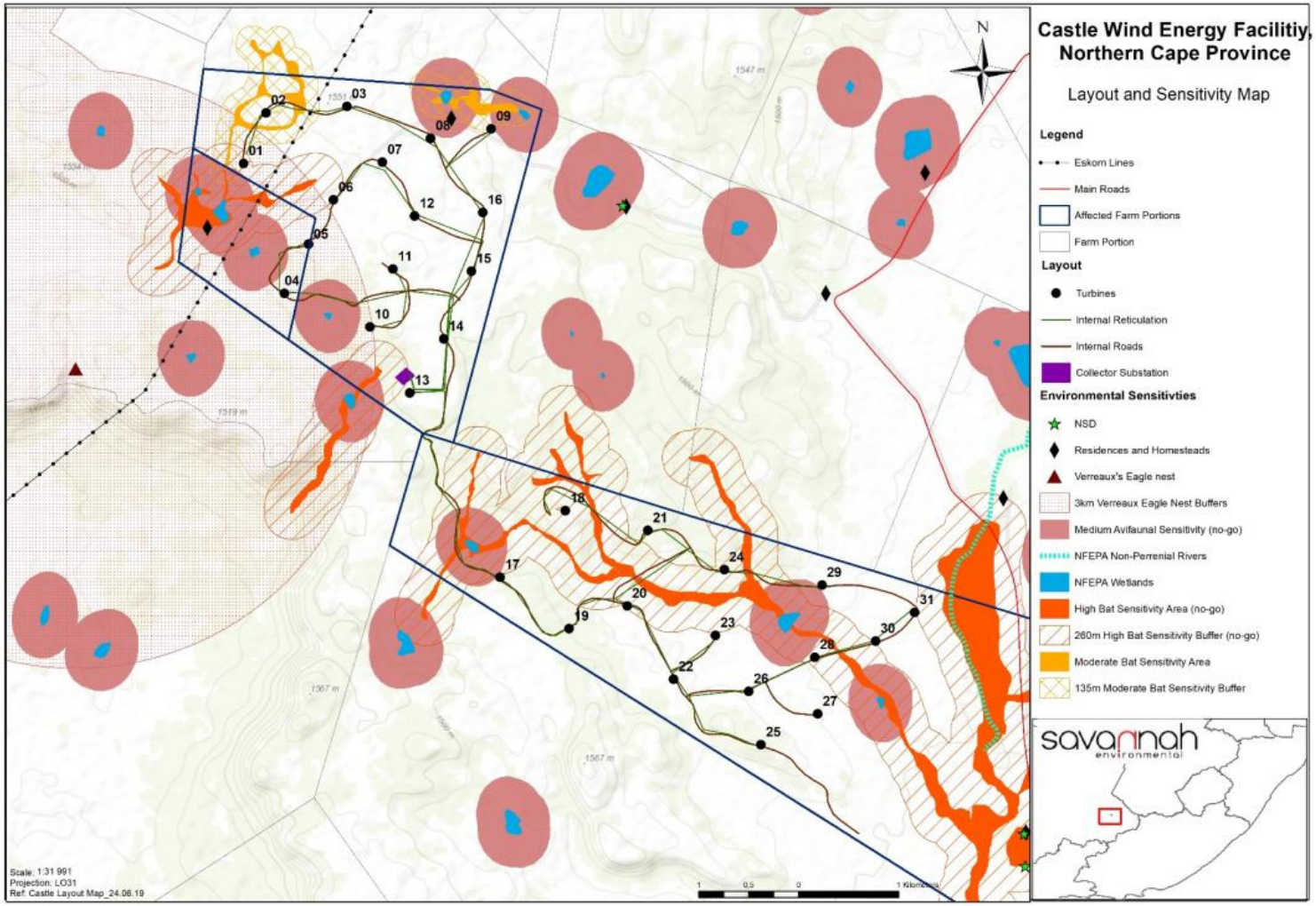

Figure 9.1: Wind farm layout with updated specialist environmental sensitivities (A3 Map included in **Appendix F**)[3]

[3] No Additional sensitivities were identified during the current amendment process. The Verreaux's Eagle buffer was added during the amendment process due to new guidelines that came into effect and the bat sensitivity buffer was increased in order to be in line with current guidelines.