

# The Proposed Karreebosch Wind Farm and associated infrastructure, Northern and Western Cape Provinces

Motivation for amendment of Environmental  
Authorisation

DEA Ref.: 14/12/16/3/3/2/807

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## PROJECT DETAILS

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<b>Title</b>	:	The Proposed Karreebosch Wind Farm and associated infrastructure within the Northern and Western Cape Provinces: Motivation for Amendment to the Environmental Authorisation
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<b>Client</b>	:	G7 Renewable Energies (Pty) Ltd
<b>Report Status</b>	:	Report for Public Review and Comment

**When used as a reference this report should be cited as:** Savannah Environmental (2018) Motivational Report for the Amendment to the Environmental Authorisation for the Karreebosch Wind Farm and associated infrastructure, Northern and Western Cape Provinces.

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## PURPOSE OF THE REPORT

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Karreebosch Wind Farm (Pty) Ltd received an Environmental Authorisation (EA) for the construction of the Karreebosch Wind Energy Facility in the Northern and Western Cape Provinces (DEA ref: 14/12/16/3/3/2/807) on 29 January 2016 (amended on 10 June 2016, 14/12/16/3/3/2/807/AM1). The project is intended to be bid into future rounds of the Department of Energy's (DoE) Renewable Energy Independent Power Producers Procurement (REIPPP) Programme which is expected to be in November 2018. There have been advancements to wind turbine technology since the issuing of the EA, and 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, Karreebosch Wind Farm (Pty) Ltd is considering an updated turbine model for the project. An amendment to the authorised turbine specifications are required as follows:

- » An increase in each wind turbine generation capacity from 2MW to 3.3MW, to **2MW to 5.5MW** for each;
- » an increase of the rotor diameter for each wind turbine from 140m, to up to **160m**; and
- » an increase of the hub height for each wind turbine from 100m, to up to **125m**.

It is also requested that the wind measuring mast height is increased from 100m to **125m**. The height of the wind measuring mast is to be increased in line with the hub height to take accurate wind measurements.

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.

In addition to the above, Karreebosch Wind Farm (Pty) Ltd is requesting a change to the details of the holder of the EA to the current Director of the company.

In terms of Condition 7 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 Karreebosch Wind Farm (Pty) Ltd. This report aims to provide detail pertaining to the significance and impacts of the proposed change to the project description and approved layout 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 **31 July 2018 to 31 August 2018**. The availability of the report was advertised in two (2) newspapers. The first advert was published in *Die Burger* (provincial newspaper) on 1 August 2018. The second advert was published in *Die Noordwester Uitgewers* (local newspaper) on 3 August 2018 (refer to **Appendix E2**). This document is available for download at <http://data.g7energies.com/part2/karreebosch> 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 and application.

# 1. OVERVIEW OF THE PROJECT

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## Location:

The Karreebosch Wind Farm and the associated infrastructure is located on a site ~40km north of Matjiesfontein and ~40km south of Sutherland. The site falls within the Karoo Hoogland Local Municipality (Namakwa District Municipality) in the Northern Cape and the Laingsburg Local Municipality (Central Karoo District Municipality) in the Western Cape. It must be noted that the Karreebosch Wind Farm is located within the Komsberg Renewable Energy Development Zone (REDZ) as determined by the Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa (2015 – CSIR/DEA) and formally gazetted on 16 February 2018 (GN 114). The Karreebosch Wind Farm is to be constructed within the project site which comprises the following farm portions:

- » The Farm Appelsfontein 201;
- » The Remainder of Ekkraal 199;
- » Portion 1 of Ekkraal 199;
- » Portion 2 of Ekkraal 199;
- » The Remainder of Karreebosch 200;
- » Portion 1 of Karreekloof 196;
- » The Remainder of Klipbanksfontein 198;
- » Portion 1 of Klipbanksfontein 198;
- » The Farm Kranskraal 189;
- » The Farm Oude Huis 195;
- » Farm Rietfontein 197;
- » Farm Roode Wal 187;
- » Portion 2 of Standvastigheid 210;
- » Remainder of Wilgebosch Rivier 188;
- » Farm Aprils Kraal 105;
- » Remainder of Bon Espirange 73; and
- » Portion 1 of Bon Espirange 73.

## Potential Impacts:

From the specialist investigations undertaken within the EIA process for the wind energy facility, no environmental fatal flaws were identified. The following environmental sensitivities were identified:

- » Potential impacts on fauna and flora;
- » Potential impacts on birds;
- » Potential impacts on bats;
- » Potential impacts on hydrology;
- » Potential impacts on soils;
- » Potential impacts on heritage (including archaeology and palaeontology);
- » Potential noise impact;
- » Areas of visual impact; and
- » Potential social impacts.

## Key conclusions and recommendations of the 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 potential for mitigation of impacts of major and high significance were identified. Measures recommended for the mitigation/avoidance of the impacts primarily entailed the relocation and removal

of certain turbines and associated infrastructure from areas of concern, as well as measures to be implemented during the construction phase. Key conclusions made during the EIA process include:

- » Ecology (flora, fauna and drainage lines):
  - The ecological walk-through survey and assessment of the initial layout of Karreebosch wind farm revealed that the majority of the turbines were located within physically and ecologically acceptable areas.
  - Broad scale ecological sensitivity indicated that the central ridges are more sensitive than those in the west where there may be some localized areas of higher sensitivity. However, all ridges are acceptable for development if the recommended mitigation measures are implemented. The power line routes are largely located in the lower sensitivity lowlands but also traverse more sensitive hills. However, as their footprint is small, significant impacts on sensitive hills are considered unlikely.
  - Access roads would be the primary source of impact associated with the wind farm development and specific mitigation measures to limit the ecological impact of the roads will be required. The access roads onto the ridges frequently traverse steep areas where the risks of erosion would be high.
  - No highly significant impacts on the terrestrial environment are expected from the power line options, provided standard mitigation and avoidance are implemented. A preconstruction walk-through survey of the power line route would ensure that any species of conservation concern within the footprint can be avoided.
- » Birds:
  - No turbines were to be located nearer than 1.3 km from the established Verreux's Eagles breeding cliff on Beacon Hill<sup>1</sup>.
  - Siting of turbines in the flatter middle part of the ridge would minimise risk of collision.
  - Siting turbines closer than 50 m from the lowest point of upper valley saddles is not encouraged as with increasing ridge height, birds increase their selection of the lowest points that provide exits from the upper reaches of the valleys.
  - All turbines are generally spaced by a minimum of 3 x rotor diameter (i.e. up to 420m apart).
- » Bats:
  - No proposed turbines are located within High bat sensitive areas and their respective buffer zones.
  - Areas of High sensitivity and their buffers are areas that are deemed critical for resident bat populations, capable of elevated levels of bat activity and support greater bat diversity than the rest of the site. These areas are 'no-go' areas and turbines must not be placed in these areas.
  - Turbines within or close to Moderate Bat Sensitivity areas must acquire priority (not excluding all other turbines) during pre/post-construction studies and mitigation measures, if any is needed.
- » Heritage (including Archaeology):
  - Archaeological sites of low heritage significance occur outside the development footprint, therefore no mitigation is required.
- » Palaeontology:

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<sup>1</sup> Although the avifauna specialist recommended a buffer of 1.3km, the EA (Condition **42**) requires a buffer of 1000m. However, no Karreebosch wind farm turbines are closer than 1.4km from the potential nest. Although very low bird activity was recorded in the region, the applicant followed the precautionary principle and proactively implemented a 1.4km buffer.



- No areas or sites of exceptional fossil heritage sensitivity or significance have been identified within the Karreebosch Wind Farm study area. The majority of fossil sites recorded in the study region lie outside the anticipated development footprint therefore no mitigation is required.
- » Noise:
  - Based on the assessed layout, no noise mitigation procedures would need to be implemented (under the Noise Control Regulations) neither at the turbines themselves nor at any of the dwellings located within or the neighbouring properties outside the Karreebosch Wind Farm site boundaries.
- » There are no visual or social recommendations for micro-siting of the wind turbines.

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.

## 2. DETAILS OF THE AMENDMENTS APPLIED FOR

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

### 2.1. Turbine specifications

The request to change the turbine specifications is as follows (shown in **bold font**):

	<b>Authorised turbine specification</b>	<b>Amended turbine specifications</b>
Wind Turbine Generation Capacity	2MW to 3.3MW	<b>2MW to 5.5MW</b>
Rotor Diameter	140m	<b>160m</b>
Hub Height	100m	<b>125m</b>
Blade Length	70m	<b>80m</b>

These changes in turbine specifications, which will not have an impact on the contracted capacity of the project (i.e. 140MW overall output capacity), will fall within the originally authorised development area of the facility, and do not trigger any new listed activities. The approved turbine locations will remain the same as authorised (refer to **Figure 2.1**). An A2 map of the original EIA preferred layout is included as **Appendix F**.

With respect to the above, the following specific amendments within the Environmental Authorisation are requested:

It is requested that the above turbine specifications be amended and added into the project description on **page 9 of the EA**, so that the EA reads (shown in **bold font**):

- Up to 65 wind turbines (**2MW to 5.5MW** in capacity each) with a foundation of 25m in diameter and 4m in depth; and
- The hub height of each turbine will be **125m**, and the rotor diameter **160m**.

In addition to the above, it is requested that the relevant "Technical details of the proposed facility" be amended (shown in **bold font**) for the project description on **page 10 of the EA**, so that the EA reads:

Component	Authorised turbine description / dimensions	Amended turbine description / dimensions
Hub height	100m	<b>125m</b>
Rotor diameter	140m	<b>160m</b>

The approved positions of the proposed wind turbine layout consisting of the proposed 65 wind turbines will remain as is, and has been included in **Appendix F**.

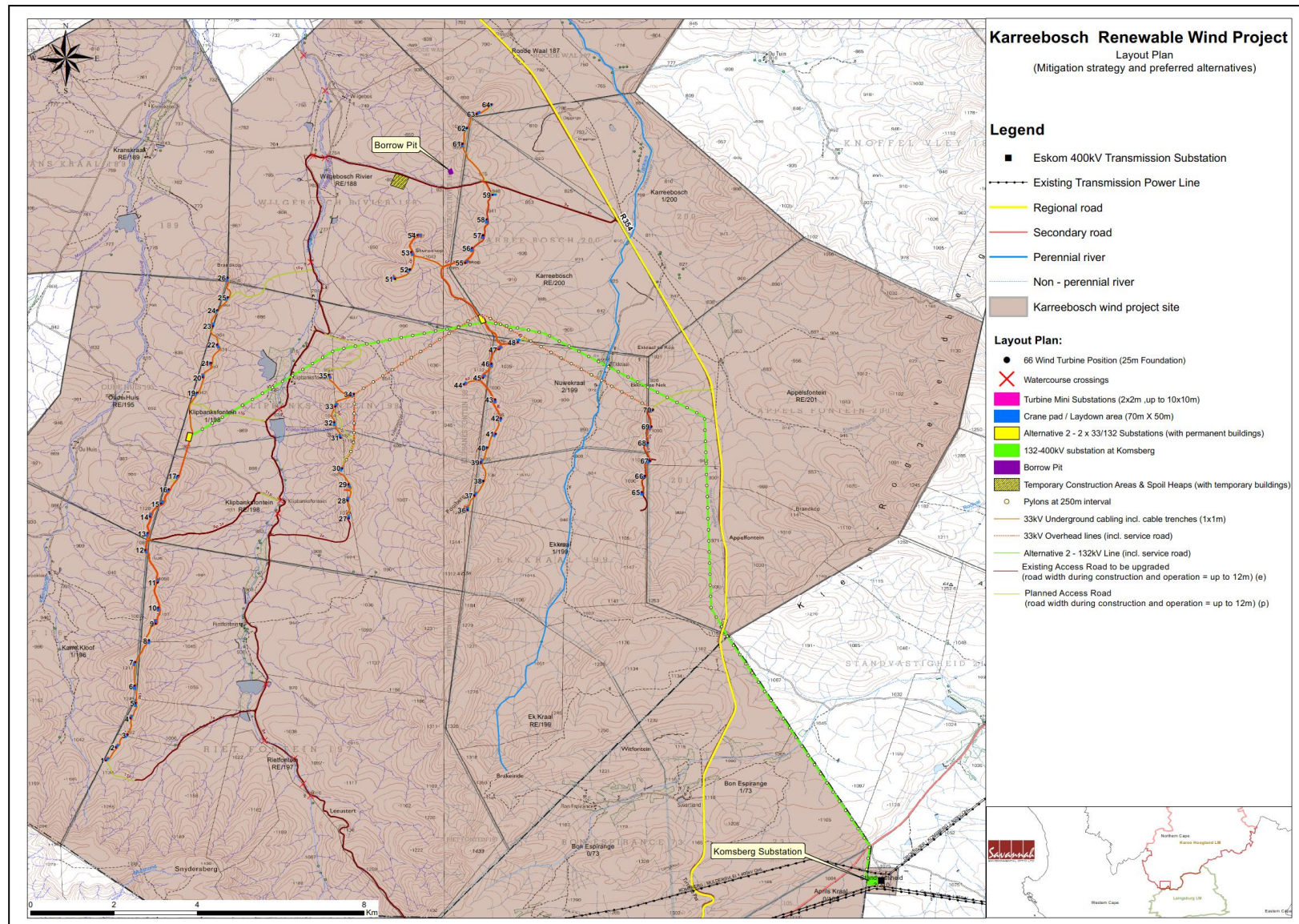
## 2.2. Wind Measuring Mast Height Specifications

The wind measuring mast height is requested to be increased from 100m to **125m**. The height of the wind measuring mast is to be increased in line with the proposed amended hub height to take accurate wind measurements for the proposed development.

## 2.3. Change of Contact details of the Holder of the Environmental Authorisation

The request to change the contact details of the Holder of the EA is as follows (shown in **bold** font):

Authorised Details of the Holder of the Environmental Authorisation	Requested Amended Details of the Holder of the Environmental Authorisation
Mr. Khangelani Methuli Mbanjwa Karreebosch Wind Farm (Pty) Ltd 5th Floor, 125 Buitengracht Street Cape Town 8001  Telephone Number: 021 300 0610 Cellphone Number: 083 697 9241 Fax Number: 086 514 1735 Email Address: methuli@g7energies.com	<b>Mr. Kilian Hagemann</b> Karreebosch Wind Farm (Pty) Ltd 5th Floor, 125 Buitengracht Street Cape Town 8001  Telephone Number: 021 300 0610 Cellphone Number: <b>082 768 9830</b> Fax Number: 086 514 1735 Email Address: <b>karreebosch@g7energies.com</b>



**Figure 2.1:** The preferred original EIA proposed turbine layout (A3 Map included in **Appendix F**).

### **3. MOTIVATION FOR THE PROPOSED AMENDMENTS**

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#### **3.1. Technical Motivation for the Amendment of Turbine Specifications**

Wind turbine generators are constantly under development to increase the potential energy output capacity per wind turbine. The more energy one turbine can produce, the less turbines are required to generate the authorised 140MW. Following developments in technology after the issuing of the original environmental authorisation (EA), the applicant would like to finalise the site development plan on the basis of the wind monitoring results from the site as well as economic efficiency considerations. Therefore, the applicant is proposing to install a turbine technology on the site which is best suited to the conditions on the site. These amendments are proposed in order to increase the efficiency of the facility and consequently the economic competitiveness thereof, in turn reducing the electricity tariffs to be charged by the facility which would benefit electricity consumers at large. By potentially installing wind turbine generators with a bigger rotor diameter, hub height and energy generation capacity, it will increase the energy output per turbine thereby reducing the number of turbines required to generate the required 140MW. The applicant proposes to amend the EA to allow for the use of such larger wind turbines before the site development plan is optimised.

Note that there are no changes to the originally authorised footprint of the facility, with no turbine positions being required to be adjusted. The changes in the turbine specifications do not trigger any new listed activities. Should this amendment request be authorised, the developer would in the near future finalise the site development plan, which will in all likelihood consist of fewer turbines than what is currently authorised. This final layout will be submitted to the DEA separately in the future as required in terms of Condition 16 of the EA (i.e. not part of this amendment).

In addition to the above, the contact person and relevant contact details for Karreebosch Wind Farm (Pty) Ltd has changed. Therefore, the relevant details of the holder of the environmental authorisation needs to be changed accordingly.

#### **3.2. Wind Measuring Mast Height Specifications**

The wind measuring mast height is requested to be increased from 100m to **125m**. The height of the wind measuring mast is to be increased in line with the proposed amended hub height to take accurate wind measurements for the proposed development to inform the immediate planning and future operation efficiency of the proposed wind farm.

#### **3.3. Motivation for the Amendment of Contact Details**

The contact person and associated details of the holder of the EA are required to be changed due to a change in Director at Karreebosch Wind Farm (Pty) Ltd.

#### **3.4. 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 amendment process (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 assessed in the initial authorisation process. These changes do not however, on their own, constitute a listed or specified activity. Therefore, the application is made in terms of Regulation 31(a).

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

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In terms of Regulation 32(1)(a)(i), the following section provides an assessment of the impacts related to the proposed amendments being applied for. 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 bats;
- » Impacts on birds;
- » Visual impacts; and
- » Noise impacts.

The change in rotor diameter, hub height and the increase in generation capacity for each wind turbine is not expected to have an effect on the findings of the Ecology, Agriculture and Soils, Hydrology, Heritage and Palaeontology, and Social Assessment Reports undertaken as part of the EIA process as the footprint remained the same. Therefore, no Ecology, Agriculture and Soils, Hydrology, Heritage (including Archaeology and Palaeontology), and Social Specialist Reports have been included.

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 specialist's assessment addendum Reports contained in **Appendix A-D**. This section of the 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.

### **4.1. Impacts on bats**

Five (5) bat species were recorded at the site during pre-construction monitoring undertaken in 2014 which includes the Egyptian free-tailed bat (*Tadarida aegyptiaca*), Robert's flat-headed bat (*Sauromys petrophilus*), the Natal long-fingered bat (*Miniopterus natalensis*), the Cape serotine (*Neoromicia capensis*) and the Long-tailed serotine bat (*Eptesicus hottentotus*). The pre-construction monitoring revealed that the most common and abundant species included the *N. capensis* and *T. aegyptiaca*, whilst *M. natalensis*, *E. hottentotus* and *S. petrophilus*, and that these were detected in sufficient numbers to suggest healthy populations of the species on site. Bat activity was significantly higher at 10m than at 50m during the pre-construction assessment, therefore the rotor swept height above ground of the wind turbine as assessed in the EIA was considered. The proposed amendments to change the wind turbine specifications were assessed considering the original wind farm layout and the proposed amended turbine specifications

specified herein within the bat amendment study (**Appendix A**). Importantly, it must be stated that there have not been any material changes on site that would change the diversity and / or population of the bats previously recorded in the area. Therefore, the data collected in the original pre-construction monitoring study remains valid and sufficient to inform the current proposed amendment of the wind turbine specifications.

Given that the proposed amendments will increase the rotor swept height above ground level as a result of the increase in blade length and hub height (i.e. raised from 30m to 45m above ground), the likelihood of impacts on bats is decreased. Conversely, there will be an increase in a larger airspace of moving blades (that is, the rotor swept area). However, as the larger rotor swept area is in a lower risk zone (i.e. bat activity higher at 10m than at 50m from ground level), the proposed amendment therefore will not influence the risk levels enough to change the significance in ratings in the impact assessment as assessed during the original EIA process. The larger turbine dimensions are preferable in keeping the likelihood of impacts on bats to a minimum. The mitigation and management measures specified in the EIA are sufficient and will remain unchanged.

#### **4.1.1. Comparative Assessment**

In consideration of the proposed amendments, there is **no (zero) change to the significance rating** compared with the original pre-construction bat monitoring and impact assessment report.

#### **4.1.2. Conclusion**

**No additional impacts as a result of the proposed amendments to the turbine specifications are anticipated on bats. From a bat perspective, the proposed changes will result in no (zero) changes to the significance rating within the original bat impact assessment report that was used to inform the approved EIA. In addition to this, no new mitigation measures are required. The proposed amendments can therefore be supported provided that the recommended mitigation measures as per the original bat pre-construction monitoring report (dated 2014) are adhered to.**

#### **4.2. Impacts on avifauna**

The pre-construction monitoring programme (dated October 2014), undertaken over an eighteen (18) month period between 2013 and 2014, was conducted to determine the bird occurrence within the proposed study area of the Karreebosch Wind Farm. The pre-construction monitoring programme also recorded the occurrence and behaviour of bird species along the ridges (where the proposed turbines were being proposed) paying special attention to Red Data list species of conservation concern. This was undertaken to assess the significance and acceptability of the likely impacts of the proposed development on local avifauna and finally, to suggest reasonable and feasible measures to mitigate any negative impacts.

Importantly, it must be stated that there have not been any material changes on site that would change the diversity and / or population of the birds previously recorded in the area. Therefore, the data collected in the original pre-construction monitoring study remains valid and sufficient to inform the current proposed amendment of the wind turbine specifications.

The key difference in terms of the original wind turbine specifications assessed in the EIA compared with the current proposed amendment assessment (**Appendix B**), is that the lower extent of the rotor blades will be raised from 30m to 45m above ground. This will greatly reduce the risk of collision impact on the majority of bird species that occur on the ridges where the turbines are to be located. There are differences in the potential avian collision risk based on the bird species which occur and the purposes of their flights on or above the ridges where the turbines are to be located. These differences are mainly focused on collision risks in terms of foraging birds, display heights, passage across ridges, passage along ridges and key risks species.

With regards to foraging bird collision risks, the increased height of the rotor blades above ground will reduce any potential collision risk of those bird species that forage for food in or near the vegetation along the ridges. Birds seeking food from, on or among the scrubby vegetation seldom fly at heights of more than 5m above the ground and so, are unaffected. Swallows and martins aerially forage for insects in flight over, or close to, the vegetation. Rock Kestrels hover to observe prey on the ground on the ground below but do so along the ridges from heights generally of less than 20m.

In terms of display heights, the few species of passerines, which perform display flights above the ridges do so largely within 20m of the ground and are therefore, well below the proposed lowest rotor blades.

For birds that pass across ridges, several species of birds were observed in the region to occasionally fly across ridges to move between valleys or further across country. To do so, they have no reason to fly high above the ridges. To avoid birds of prey, they may do this more at night than by day. Again, they will be exposed to reduced collision risk if the lowest sweep of the rotor blades is higher off the ground than was originally proposed. For birds that pass along ridges, the only species observed to sometimes fly for distances along the ridges in this region are Namaqua Sandgrouse. These species fly in small flocks at heights of 5-40m above the ground. The increased height of the rotor blades from ground level will therefore greatly reduce the potential collision risk for this species.

The potential for collision risk for key risk species is greatest for those that frequently fly above the ridges at heights which coincide with the turbine specifications. Based on the four seasons of observation these species fall into two categories: 1) foraging swifts; and 2) large predator/scavengers that cruise at height to visually detect food items below – in this region principally Verreaux's Eagle and White-necked Raven – and which have display or related activities that cause them to fly at turbine heights. To detect food when in flight and / or from considerable heights above potential food, birds in both categories have exceptional eyesight and forage by day. In most situations this should enable them to detect and avoid the turbines and rotor blades. Care has already been taken to ensure no turbines are located in areas which, based on four seasons of observation, are considered of particular local use by these aerial foragers. The ability of these aerial foragers to detect the turbine blades in time to avoid collision will be reduced when the cloud base is low. However, in such conditions these birds will either not fly or will fly below the cloud level and so, with suitable visibility to avoid collision. Nor will they be displaying in cloudy conditions.

In general, the paucity of birds in the study area of the proposed development has been described as extremely low. This statement is based on three (3) years of experience by the avifaunal specialist in the immediate vicinity of the site, as well as the four seasons of observations on the diversity and populations of birds at and above the ridges where the turbines will be located. The small numbers specifically apply to Verreaux's Eagle of which no more than 2-4 individuals occur locally. The number of birds likely to be at risk,

even with the original turbine specifications, is very small. The revised turbine specifications will therefore further reduce the collision risk.

#### **4.2.1. Comparative Assessment**

In consideration of the proposed amendments, there is **no (zero) change to the significance rating** compared with the original pre-construction bird monitoring and impact assessment report.

#### **4.2.2. Conclusion**

Overall, the new turbine specifications will reduce the risk of birds colliding with the turbines. In addition, the sound emanating from the turbines at the proposed new heights is not considered to have any impact on birds. Therefore, there are no negative aspects to the proposed amended wind turbine specifications. From an avifaunal perspective, the proposed changes will result in no (zero) changes to the significance rating within the original avifaunal impact assessment report that was used to inform the approved EIA. In addition to this, no new mitigation measures are required. **It is therefore the opinion of the avifaunal specialist, that the changed specifications will reduce the (already very small) risk of avian collision mortality. From an avifaunal perspective, the change is considered positive and should be approved.**

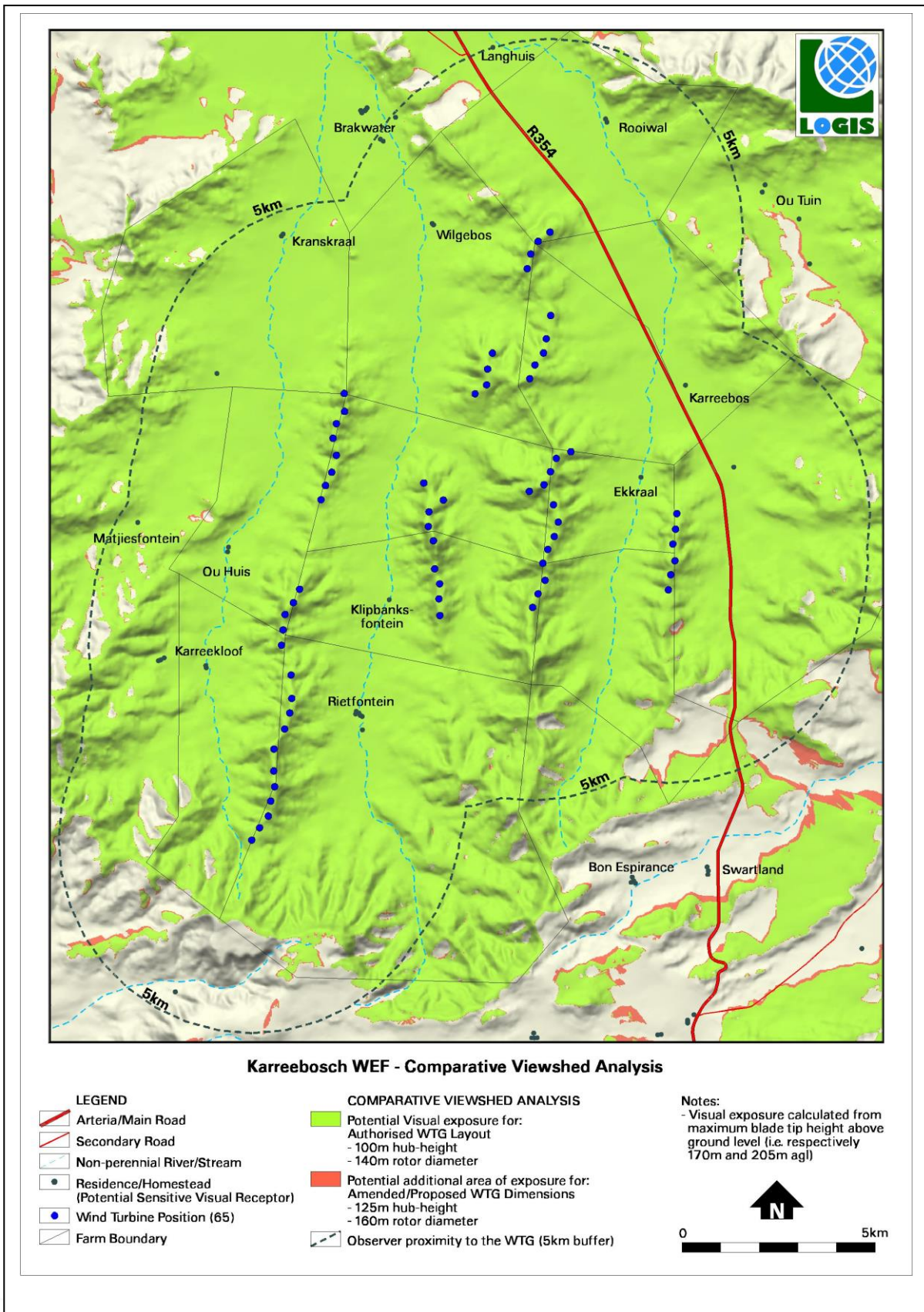
#### **4.3. Visual impact**

A visual assessment (**Appendix C**) was undertaken comparing the original visual impact assessment results with the current proposed wind turbine specification amendments. The assessment primarily included a comparative viewshed analysis and identification of potential sensitive visual receptors that may be influenced by the proposed amendments. The comparative assessment assesses the visual exposure (visibility) of the original (authorised) turbine dimensions compared to the potential (additional) exposure of the increased (proposed) turbine dimensions. The viewshed analysis focuses on a radius of 5km from the proposed turbine layout and potential visual receptors located within this zone. Where the change in dimensions of the wind turbine structures indicated that there may be a significant increase in the visual impact within the zone of high visual impact, as determined during the VIA, the study area was increased to also accommodate areas that were rated as moderate (i.e. beyond a 5km radius and up to a 20km radius from the structures).

The primary relevance of the proposed amendments (from a visual impact perspective), is that the total maximum vertical dimension (height) of the wind turbine increases from approximately 170m (100m hub-height + 70m blade length) to 205m (125m hub-height + 80m blade length) above ground level. This translates to a total 35m maximum increase in height per wind turbine (i.e. an increased tip height).

The visibility analysis was undertaken from each of the wind turbine positions (65 in total) at an offset of 170m (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 205m to indicate the visual exposure of the increased turbine dimensions (shown in red). The results of the visibility analyses are displayed on **Figure 4.1**.





**Figure 4.1:** Viewshed analysis representing the potential total visual exposure of the original turbine dimensions (illustrated in green) compared to the proposed new turbine dimensions (illustrated in red).

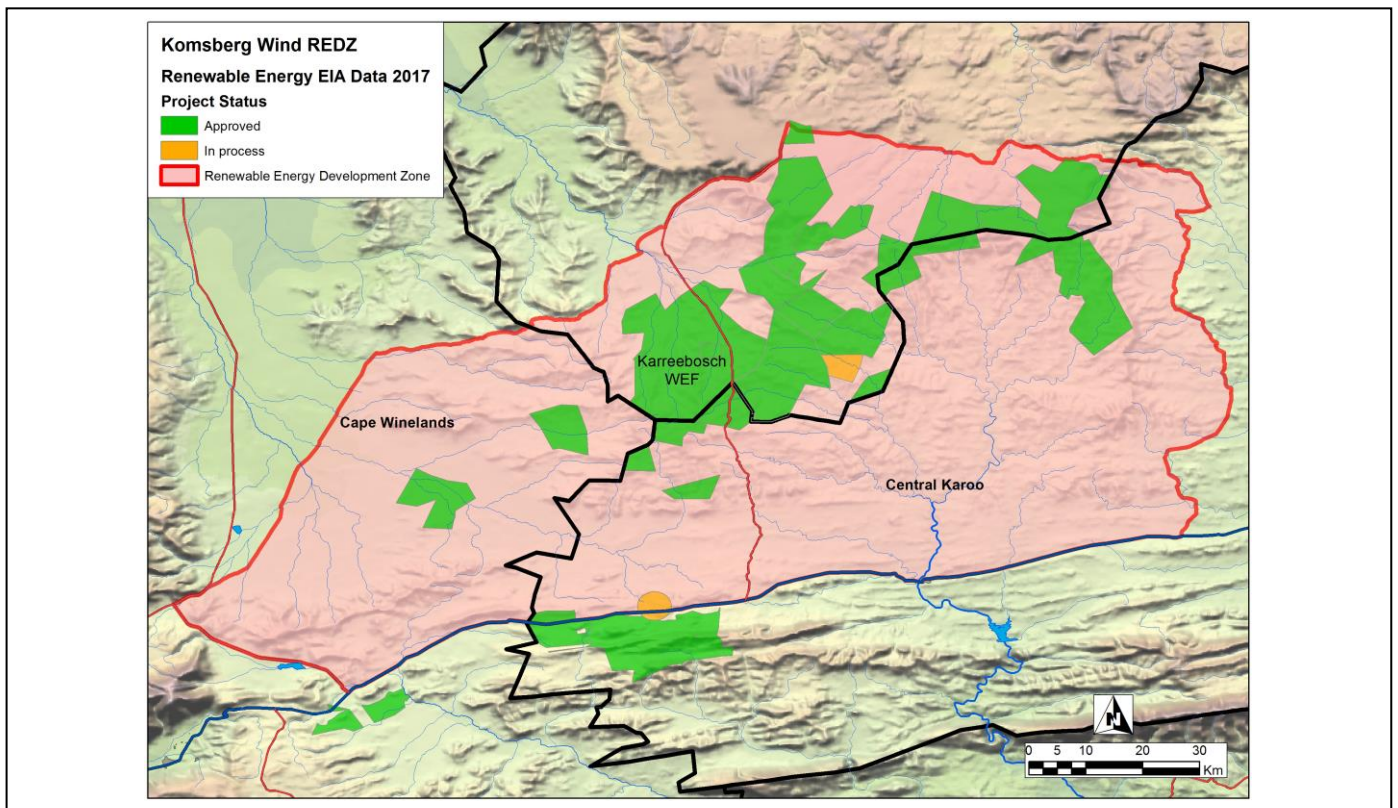
It is clear that the approximately 17% increase in turbine dimensions would have a relatively small influence on the overall visual exposure, due to the turbine structures previously approved and the elevated positions of the turbines on ridges. The surface area (within the study area) of the original turbine exposure is 435km<sup>2</sup>, compared to the 443km<sup>2</sup> of the increased dimensions of the wind turbine exposure. This is an increase of 7km<sup>2</sup>, or alternatively, an increase of only 1.6% in potential visual exposure. There are no additional sensitive visual receptors located within the area of increased visual exposure.

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

- » Karreekloof\*
- » Oude Huis\*
- » Kranskraal\*
- » Wilgebosch\*
- » Rooiwal\*
- » Karreebosch\*
- » Ekkraal\*
- » Rietfontein\*
- » Klipbanksfontein\*
- » Matjiesfontein
- » Brakwater
- » Langhuis
- » Ou Tuin
- » Observers travelling along the R354 arterial road and secondary roads

Note: The homesteads marked \* are located on the farms earmarked for the proposed Karreebosch Wind Farm. Where homesteads are derelict or deserted, the visual impact will be non-existent, until such time as these are inhabited again. The increased area of visual exposure does not include a significant portion of additional exposure to major roads within the study area.

It is expected that the wind turbine structures, both the original dimensions and the proposed increased dimensions, would be equally visible and noticeable from both the roads and homesteads identified above, therefore signifying a negligible change to the potential visual impact. As mentioned previously, it is worth noting that the Karreebosch Wind Farm is located within the Komsberg Renewable Energy Development Zone (REDZ) as determined by the Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa (2015 – CSIR/DEA). The consolidation and concentration of the wind energy facilities within this zone is therefore preferred and the cumulative visual impact is deemed to be of an acceptable level. Refer to **Figure 4.2**.



**Figure 4.2:** Location of the proposed Karreebosch Wind Farm in the Komsberg Renewable Energy Development Zone (REDZ).

#### 4.3.1. 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.

#### 4.3.2. Conclusion

The proposed increase in the dimensions of the wind turbine structures is not expected to significantly alter the influence of the proposed development on areas of higher viewer incidence (observers travelling along arterial or major 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 applies to potentially moderate to low visual impacts at distances of up to 20km from the structures. Given this, there are no additional impacts, mitigation measures or alterations to the Environmental Management Programme (EMPr) suggested for the proposed increased turbine dimensions from a visual perspective, as the general appearance and functional design is not expected to change.

**From a visual perspective, the proposed changes will 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 and layout be supported, subject to the conditions and recommendations as stipulated in the original Environmental Authorisation, and according to the EMPr and suggested mitigation measures, as provided in the original Visual Impact Assessment report.**

#### **4.4. Noise impact**

The original noise impact assessment (NIA) for the proposed Karreebosch Wind Farm was conducted by Jongens Keef Associates (August 2015). The NIA assessed the installation of up to 71 wind turbines, with each turbine generating between 2MW and 3.3MW. The hub height of each turbine would be up to 100 metres, and the rotor diameter up to 140 metres. The results of the original NIA indicated that the predicted equivalent continuous A-weighted sound level (LAeq) values on land surrounding the proposed Karreebosch Wind Farm boundaries as well as at the identified noise sensitive receptors (dwellings) within the property boundaries would comply with the Noise Control Regulations (NCR) legal requirements. Therefore, there would be no obligation to implement noise mitigation procedures. In accordance with standard procedures, the associated noise impact would be negligible.

The current noise assessment (**Appendix D**) undertaken by Safetech (2018) will serve as an addendum to the original NIA, which specifically addresses the proposed amendments in the turbine specifications. The noise model for the current proposed amendments considers the amended turbine specifications. The sound power levels at lower and higher wind speeds for the turbine model used were interpolated from the published data. The actual sound power levels for the proposed wind farm may therefore be less than those stated when the final turbine is selected. The levels used in the re-modelling of the current noise assessment are therefore a worst-case scenario. The maximum noise rating limit as per the EA (Condition 81) is 45 dB(A). The findings of the re-modelling exercise show that the EA limit of 45 dB(A) will not be exceeded at any of the noise sensitive areas. This includes the cumulative impacts from the other potential surrounding wind farms planned and authorised.

##### **4.4.1. Comparative Assessment**

In consideration of the proposed amendments, there is **no (zero) change to the significance rating** compared with the original EIA noise impact assessment report.

##### **4.4.2. Conclusion**

**From a noise perspective, the proposed changes will require no (zero) changes to the significance rating within the original noise impact assessment report that was used to inform the approved EIA. In addition to this, no new mitigation measures are required. Karreebosch Wind Farm with the current proposed amendments may therefore proceed.**

## **5. ADVANTAGES AND DISADVANTAGES OF THE PROPOSED AMENDMENTS**

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

<b>General</b>	
<b>Advantages of the amendment</b>	<b>Disadvantages of the amendment</b>
<p>The increase in rotor diameter, hub height and generation capacity for each wind turbine 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>The proposed amendments are beneficial from a macro-economic perspective as it results in the lower cost per unit of energy, ultimately benefiting the South African public.</p>	<p>The proposed amendment will not result in any additional impacts nor will it result in an increase in the significance of impacts identified and assessed within the EIA process. Therefore, no disadvantages at a general level are anticipated.</p>
<b>Bats</b>	
<b>Advantages of the amendment</b>	<b>Disadvantages of the amendment</b>
<p>The increased rotor swept height above ground will decrease the likelihood of impacts on bats due to the fact that there is higher bat activity at 10m than at 50m, as recorded through the pre-construction monitoring undertaken.</p>	<p>The increase in rotor swept area will result in a larger airspace of moving blades. However, the airspace of moving blades is in a lower risk zone and therefore the proposed amendment will not influence risk levels enough to change significance ratings in the impact assessment as assessed during the EIA process.</p>
<b>Avifauna</b>	
<b>Advantages of the amendment</b>	<b>Disadvantages of the amendment</b>
<p>Overall the new turbine specifications will reduce the risk of birds colliding with the turbines. The sound emanating from the turbines at the proposed new heights are not considered to have any impact on birds. Therefore, there are no negative aspects to the revised specifications.</p>	<p>None</p>
<b>Visual</b>	
<b>Advantages of the amendment</b>	<b>Disadvantages of the amendment</b>
<p>None</p>	<p>None</p>
<b>Noise</b>	
<b>Advantages of the amendment</b>	<b>Disadvantages of the amendment</b>
<p>None</p>	<p>None</p>

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

## **6. 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 there are no additional impacts and therefore the mitigation measures proposed within the EIA would be sufficient to manage potential impacts within acceptable levels. Therefore, no additional mitigation measures have

been proposed by any of the specialists. The EMPr would, therefore, not require any update in terms of the proposed amendments.

## 7. PUBLIC PARTICIPATION

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A public participation process will be conducted in support of the Part 2 amendment application for the amendment of the Environmental Authorisation for the Karreebosch Wind Farm in the Northern Cape and Western Cape Provinces.

A full Interested and Affected Party (I&AP) database is included in **Appendix E1**. It must be noted that the project is to be developed on the same farm portions as originally authorised, all of which, are privately owned. The amendment to the Authorisation will therefore not result in impacts on any additional interested and affected parties

The public participation for the proposed amendment process will include:

- » The draft motivation report will be made available for a public review period on <http://data.g7energies.com/part2/karreebosch> from **31 July 2018 until 31 August 2018**.
- » Written notification to registered I&APs regarding the availability of the amendment motivation report will be distributed on 31 July 2018 (refer to **Appendix E2**).
- » Advertisements will be placed in Die Burger on 01 August 2018 and in Die Noordwester Uitgewers (local newspaper) on 03 August 2018 (refer to **Appendix E3**).
- » Site notices were placed at the site on 26 July 2018 (refer to **Appendix E3**).

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 responded to and included in the Comments and Responses Report (refer to **Appendix E4**). Proof of requests made to obtain comments will be included in **Appendix E5**.

## 8. CONCLUSION

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**Based on the specialist findings, it is concluded that the proposed amendments to the turbine and wind measuring mast specifications are not expected to result in an increase to the significance ratings for any of the identified impacts.** Only in the case of the bat specialist assessment, there has been an increase and decrease in potential risk levels. However, these variances were found not to influence the risk levels enough to change the significance in ratings in the impact assessment. Therefore, there will not be a change to the qualitative category (i.e. Low, Medium, High) in the original significance ratings. This holds true for all specialist assessment in that there will also be no change to the qualitative category (i.e. Low, Medium, High) in the original significance ratings with respect to the avifaunal, visual and noise assessments. Moreover, there are no new impacts identified as a result of the proposed amendments. The amendment in itself furthermore, does not constitute a listed activity and will not require submission of a new application for EA, but rather the proposed amendment application to the current EA. The mitigation measures described in the original EIA document are adequate to manage the expected impacts for the proposed amendments and the project as a whole. No new mitigation measures are to be included in an updated EMPr.

Given the above, Karreebosch Wind Farm (Pty) Ltd requests the following:

- » An increase in each wind turbine generation capacity from 2MW to 3.3MW, to **2MW to 5.5MW** for each;
- » an increase of the rotor diameter for each wind turbine from 140m, to up to **160m**;
- » an increase of the hub height for each wind turbine from 100m, to up to **125m**;
- » an increase in blade length from 70m to **80m**; and
- » an increase in height of the wind measuring masts from 100m to **125m**.

In addition to the above, Karreebosch Wind Farm (Pty) Ltd, requests the change to the contact details of the holder of the EA to the current Director of the company.

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

**APPENDIX A:  
BAT SPECIALIST AMENDMENT REPORT**



**APPENDIX B:**  
**AVI-FAUNAL SPECIALIST AMENDMENT REPORT**

**APPENDIX C:  
VISUAL SPECIALIST AMENDMENT REPORT**

**APPENDIX D:  
NOISE SPECIALIST AMENDMENT REPORT**

**APPENDIX E:  
PUBLIC PARTICIPATION DOCUMENTATION**

**APPENDIX F:  
A3 MAPS**