

**PROPOSED ZONNEQUA WIND FARM,  
NORTHERN CAPE PROVINCE**

**AMENDMENT:  
COMPARATIVE VIEWSHED ANALYSIS AND VISUAL ASSESSMENT**

**Produced for:**

**Genesis Zonnequa Wind (Pty) Ltd**

**On behalf of:**



Savannah Environmental (Pty) Ltd  
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Lourens du Plessis (t/a LOGIS), a specialist in visual assessments and Geographical Information Systems (GIS), undertook the comparative viewshed analysis and visual assessment for the proposed amendment to the turbine specifications and facility layout for the Zonnequa Wind Farm. Lourens compiled the Visual Impact Assessment (VIA) for the original Zonnequa Wind Farm in 2018.

Lourens has been involved in the application of GIS in Environmental Planning and Management since 1990. He has extensive practical knowledge in spatial analysis, environmental modeling and digital mapping, and applies this knowledge in various scientific fields and disciplines. His expertise is often utilised in Environmental Impact Assessments, State of the Environment Reports and Environmental Management Plans.

Lourens is familiar with the "Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes" (Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning) and utilises the principles and recommendations stated therein to successfully undertake visual impact assessments.

Savannah Environmental (Pty) Ltd appointed Lourens du Plessis as an independent specialist consultant to undertake the visual assessment for the proposed amendment to the Zonnequa Wind Farm. He will not benefit from the outcome of the project decision-making.

## **1. INTRODUCTION**

**Genesis Zonnequa Wind (Pty) Ltd** wishes to amend the specifications of their wind turbine generators (WTG) and the facility layout for the proposed Zonnequa Wind Farm located near Kleinsee in the Northern Cape Province.

The intended amendment includes:

- A reduction in the number of turbines from up to 56 to up to 35 turbines.
- The increase of the hub height from up to 130m (authorised in 2019) to up to 150m (an increase of 20m).
- Increase of the tip height from up to 205m (authorised in 2019) to up to 240m (an increase of 35m).
- Increase of individual turbine capacity from up to 4.5MW to up to 7MW.
- Update the layout as required to accommodate the removal of 21 turbines.

The primary relevance of this proposed increase in dimensions, from a visual impact perspective, is that the total maximum vertical dimension (height) of the wind turbine increases from approximately **205m** to up to **240m** above ground level. This translates to a total **35m** maximum increase in tip height per WTG, potentially increasing the visual exposure and subsequently the potential visual impact.

## **2. SCOPE OF WORK**

The scope of work includes a comparative viewshed analysis and identification of potential sensitive visual receptors that may be influenced by the increase in dimensions of the WTGs and the change in the facility layout. This is done in order to determine:

- If there are any additional visual receptors that may be negatively influenced by the amendment;

- Whether the increase in dimensions would significantly aggravate the potential visual impact on identified receptors (identified during the BA process undertaken for the project);
- If there are any positive visual impacts associated with the removal of 21 wind turbines;
- If additional impact mitigation measures are relevant; and
- To suggest amendments or additions to the Environmental Management Programme (EMPr) (if applicable).

### 3. METHODOLOGY

This visual assessment includes a comparative viewshed analysis in order to determine the visual exposure (visibility) of the original (authorised) turbine dimensions compared to the potential (additional) exposure of the increased (proposed) turbine dimensions and amended layout. The viewshed analysis focuses on a radius of 5km from the proposed amended turbine layout (development footprint) and potential visual receptors located within this zone. The original VIA report determined that receptors, where visible, within this zone may experience a **high** visual impact of the proposed infrastructure. Should this review of the change in dimensions of the wind turbine structures and the amended layout indicate that there may be a significant increase in the visual impact within this zone, as determined during the VIA, the study area may need to be increased to accommodate areas that were rated as **moderate** as well (i.e. beyond a 5km radius and up to a 20km radius from the structures).

Potential sensitive visual receptors include observers residing at homesteads (farm residences and dwellings) within the study area, and observers travelling along the secondary roads traversing near or over the proposed development site.

### 4. RESULTS OF THE COMPARATIVE VIEWSHED ANALYSIS

A viewshed analysis was undertaken from each of the authorised wind turbine positions (56 in total) at an offset of 205m (maximum tip height) above ground level. The result of this analysis represents the potential total visual exposure of the original and authorised turbine dimensions (indicated in green on **Map 1**). The viewshed analysis was repeated at an offset of 240m to indicate the visual exposure (shown in orange) of the increased turbine dimensions and reduced number of turbines (35 in total) proposed as part of the amendment. The results of the viewshed analyses are displayed on **Map 1** below.

From the analysis it is clear that the approximately **14.5%** increase in turbine dimensions, would have a relatively small influence on the overall visual exposure of the wind farm, due to the already tall turbine structures previously authorised and the predominantly flat topography of the surrounding landscape. The surface area (within the study area) of the original turbine exposure is **509.4km<sup>2</sup>**, compared to the **518.7km<sup>2</sup>** of the increased dimensions of the wind turbine exposure. This is an increase of **9.3km<sup>2</sup>**, or alternatively, an increase of only **1.8%** in the potential visual exposure.

There are no sensitive visual receptors located within the area of increased visual exposure that will be affected by the amended turbine dimensions and layout.

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

- Hoë Heuwel

- Sonnekwa A
- Lewies se Duin
- Rooivlei (south)
- Sonnekwa
- Graafwater
- Observers travelling along the Komaggas-Kleinsee secondary road (the magnitude spans from very high to moderate)

*Note:*

*The location of Sonnekwa, Graafwater, Rooivlei (south) and Sonnekwa A on properties earmarked for the Zonnequa, Namas or Kap Vley Wind Farms reduces the probability of this impact occurring due to their assumed support and endorsement of WEF developments on these farms and within the region.*

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

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

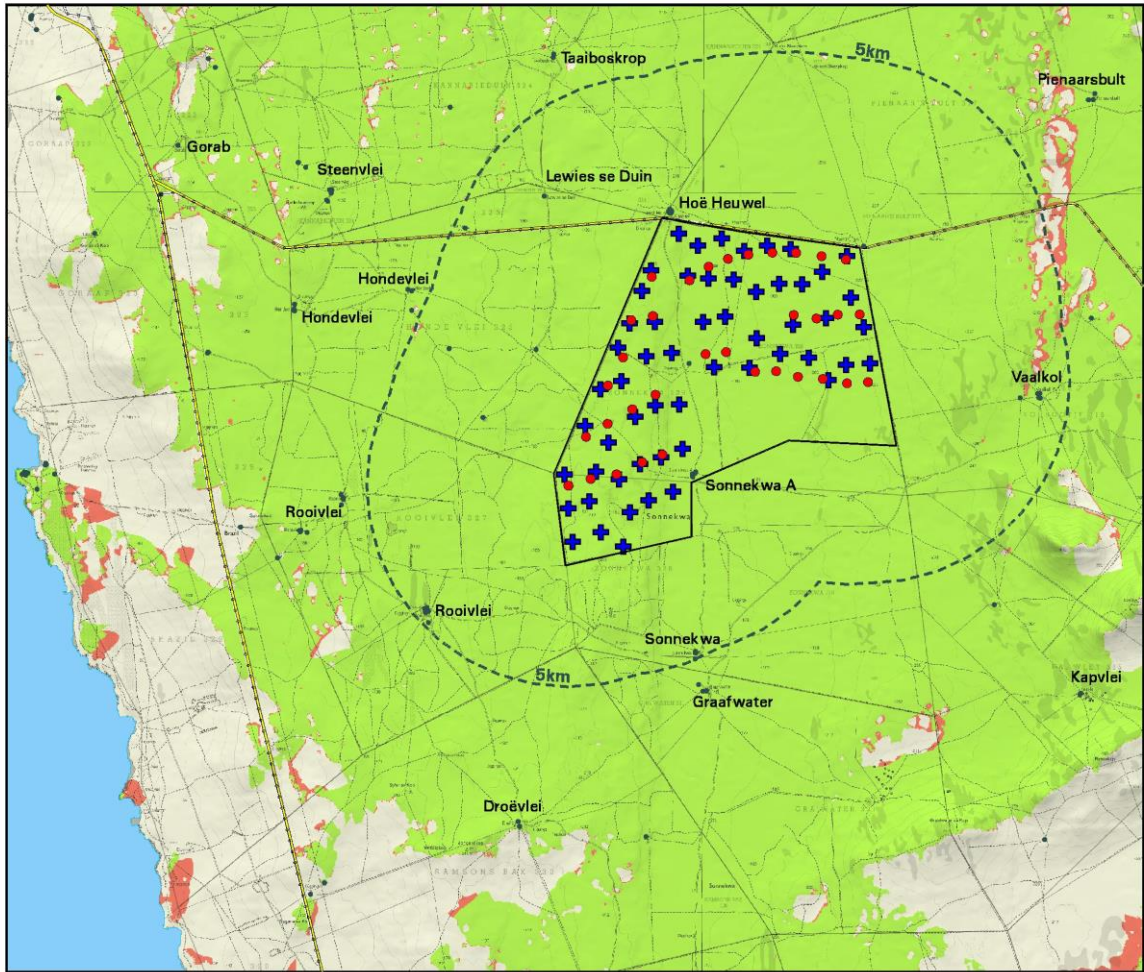
In spite of the reduction in the number of turbines it is expected that the wind turbine structures, both the original dimensions and the proposed increased dimensions would be equally visible and noticeable from both the roads and homesteads identified above. This signifies a negligible change to the potential visual impact with the implementation of the increased turbine dimensions and amended layout.

It is worth noting that the Zonnequa Wind Farm is located within the Springbok Renewable Energy Development Zone No. 8 (REDZ8) as determined by the *Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa* (2015 – CSIR/DEA).

Other authorised WEFs in closer proximity to the proposed Zonnequa Wind Farm include:

- Namas Wind Farm
- Kannikwa Vlake Wind Energy Facility
- Kleinzee Wind Energy Facility
- Kap Vley Wind Energy Facility
- Koiingnaas Wind Energy Facility

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 **Map 2**.



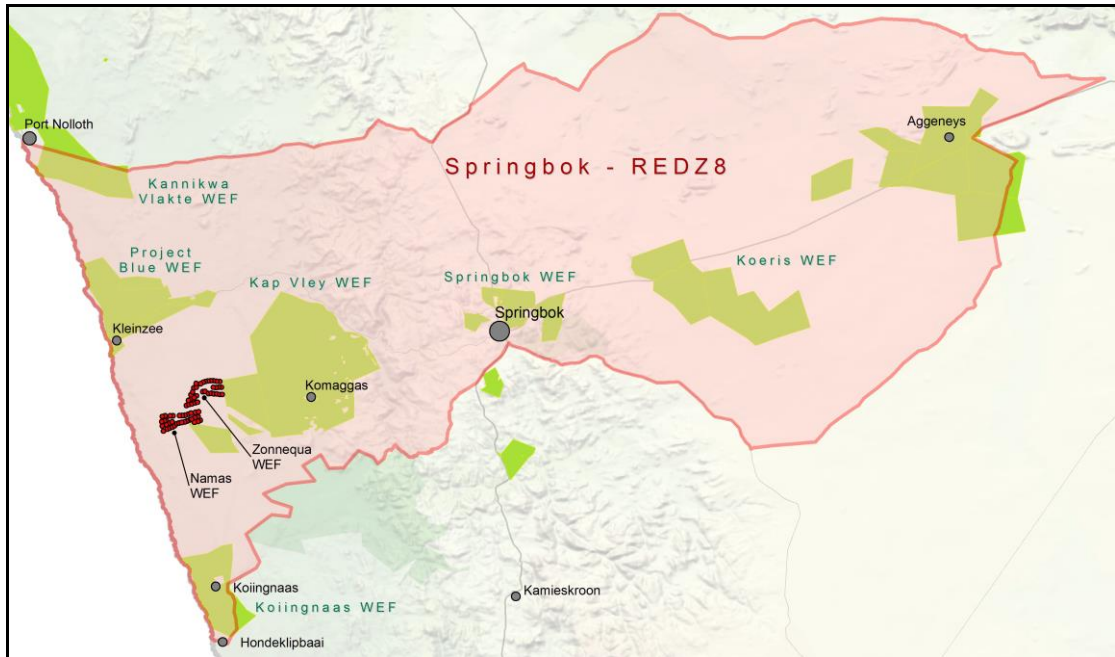
**Proposed Zonnequa WEF Amendment 2019**

- LEGEND**
- Farms identified for the WEF
  - Secondary Road
  - Residence/Homestead
  - Authorised Wind Turbine Position (2018)
  - Proposed Wind Turbine Position (2019)

- COMPARATIVE VIEWSHED ANALYSIS**
- Potential visual exposure for: Authorised Wind Turbine Layout (56 turbines)
    - 130m hub-height
    - 150m rotor diameter
  - Potential additional area of exposure for: Amended/Proposed Wind Turbine Dimensions (35 turbines)
    - 150m hub-height
    - 180m rotor diameter
  - Observer proximity to the WEF (5km buffer)
- Notes:**
- Visual exposure calculated from maximum blade tip height above ground level (i.e. sequentially 205m and 240m agl)



**Map 1:** Comparative Viewshed Analysis – Zonnequa Wind Farm.



**Map 2:** The location of the Zonnequa Wind Farm (and Namas Wind Farm) in the Springbok REDZ (also indicating other authorised wind energy facilities).

## 5. COMPARATIVE VISUAL ASSESSMENT STATEMENT

In consideration of the proposed amendments, there is no (zero) change to the impacts identified and the associated significance ratings compared with the original EIA Visual Impact Assessment report. The reduction in the number of wind turbines is expected to reduce the frequency of visual exposure to some extent, although the remaining 35 (larger) turbines are expected to remain visible within a 5km radius of the wind farm.

## 6. CONCLUSION/RECOMMENDATIONS

The proposed increase in the dimensions of the wind turbine structures is **not expected to significantly alter** the influence of the Zonnequa Wind Farm 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 wind farm).

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

From a visual perspective, the proposed changes to the turbine dimensions and turbine layout will therefore require no (zero) changes to the significance ratings of the impacts identified 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 Environmental Authorisation, and according to the Environmental Management Programme and suggested mitigation measures, as provided in the original Visual Impact Assessment report.

## **7. REFERENCES/DATA SOURCES**

Council for Scientific and Industrial Research (CSIR), 2015. *The Strategic Environmental Assessment for wind and solar photovoltaic energy in South Africa.*

CSIR, 2017. *Delineation of the first draft focus areas for Phase 2 of the Wind and Solar PV Strategic Environmental Assessment.*

DEA, 2018. *South African Renewable Energy EIA Application (REEA) Database.*

LOGIS, 2018. *Proposed Zonnequa Wind Farm, Northern Cape Province - Visual Impact Assessment Report.*