

**PROPOSED SPREEUKLOOF WIND ENERGY FACILITY,
EASTERN CAPE PROVINCE**

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

Produced for:

Spreeukloof Wind Farm (Pty) Ltd

On behalf of:



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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 for the Spreeukloof Wind Energy Facility (WEF). Lourens, then director of MetroGIS (Pty) Ltd, did the Visual Impact Assessment for the original Dorper WEF (submission date 2010).

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 Spreeukloof Wind Energy Facility (WEF). He will not benefit from the outcome of the project decision-making.

1. INTRODUCTION

Spreeukloof Wind Farm (Pty) Ltd wishes to amend the specifications of their wind turbine generators (WTG) for the proposed Spreeukloof WEF located between Molteno and Sterkstroom in the Eastern Cape Province.

The proponent is applying for a substantive amendment (Part II) towards amending the EA with the inclusion and amendment of the following:

- i. Amendment of the turbine specifications, to be as follows:
 - a. The increase of the rotor diameter from '125m' (authorised in 2013) to reflect as 'up to 176m', with a resulting blade length of 'up to 88m'.
 - b. Update of the authorised range of the hub height from '120m' (authorised in 2013) to reflect as 'up to 120m based on the number of turbines implemented'
- ii. A reduction in the authorised number of turbines from the currently authorised turbine number 21, to reflect as per the revised layout (12).
- iii. Update the layout as required to accommodate and reflect the removal of the respective turbines from the total authorised turbine number in amendment no. 2 above.
- iv. Update of the project description to reflect the revised 132kV grid connection line location and substation.
- v. Removal of the specification of the facility capacity within the EA, to rather reflect the number of authorised turbines as per the revised layout.
- vi. Extension of the Environmental Authorisation (EA) validity by an additional two years.

These amendments are proposed in order to increase the efficiency of the facility and consequently the economic competitiveness thereof. No additional properties will be affected by the amendments as the proposed amendments are within the original authorised development footprint.

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 **182.5m** (120m hub-height + 62.5m blade length) to **208m** (120m hub-height + 88m blade length) above ground level. This translates to a total **25.5m** maximum increase in blade tip height per WTG.

The increase in turbine dimensions is expected to increase the area of potential visual exposure, and potentially the area of visual impact.

The proposed amendment will reduce the number of wind turbines by 9, a positive when considering the overall frequency of visual exposure of the WEF. It is expected that the reduction in wind turbines may reduce the area of visual exposure, thereby potentially mitigating the visual impact to some degree.

The revised 132kV grid connection line location and substation position both fall within the wind turbine development footprint and is not expected to influence the potential visual impact significantly.

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. 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 EIA phase);
- If there are any potentially affected receptors that may benefit from the revised layout and the reduction in the number of 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

The 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. The viewshed analysis focuses on a radius of 5km from the proposed 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 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 arterial, main or secondary roads traversing near or over the proposed development site.

4. RESULTS OF THE COMPARATIVE VIEWSHED ANALYSIS

A visibility analysis was undertaken from each of the wind turbine positions (21 in total) at an offset of 182.5m (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 and purple). The viewshed analysis was repeated at an offset of 208m to indicate the visual exposure (shown in red) of the increased turbine dimensions and reduced number of turbines (9 in total). The results of the visibility analyses are displayed on **Map 1** below.

It is clear that the approximately **12%** increase in turbine dimensions, would have a relatively small influence on the overall visual exposure, due to the already tall turbine structures previously approved and the elevated positions of the turbines within the landscape. The surface area (within the study area) of the original turbine exposure is **274km²**, compared to the **277km²** of the increased dimensions of the wind turbine exposure. This is an increase of **3km²**, or alternatively, an increase of less than **1%** in potential visual exposure.

It should be noted that the above calculation includes an area of **4km²** that represents the surface area that won't be visually exposed after the reduction in the number of wind turbines.

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

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

- Sieraadsfontein
- Spreeukloof
- Leeukuil
- Onverwacht
- Fairview
- Friedenheim
- Vredevelei
- Eldorado
- Molteno
- Margate
- Malanhof
- Paardekraal
- Colworth
- Hillcroft
- Wyvern
- Rooikop
- Rocklyn¹
- Westmeade²
- Cyphergat²
- Cyphergat³
- Tolkop³
- Kings Glen³
- Carlskroon⁴
- Observers travelling along the R397 main, R56 arterial and secondary roads traversing near or over the proposed development site

Note:

- *The homestead marked ¹ is located on the farm earmarked for the Spreeukloof WEF development, assuming its approval of the WEF development.*
- *The homesteads marked ² are located on the farm earmarked for the Loperberg WEF development, assuming their approval of the WEF development.*
- *The homesteads marked ³ are located on the farm earmarked for the Malabar WEF development, assuming their approval of the WEF development.*
- *The homestead marked ⁴ is located within the existing Dorper WEF, assuming its approval of the WEF development.*
- *Where homesteads are derelict or deserted, the visual impact will be non-existent, until such time as it is inhabited again.*

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

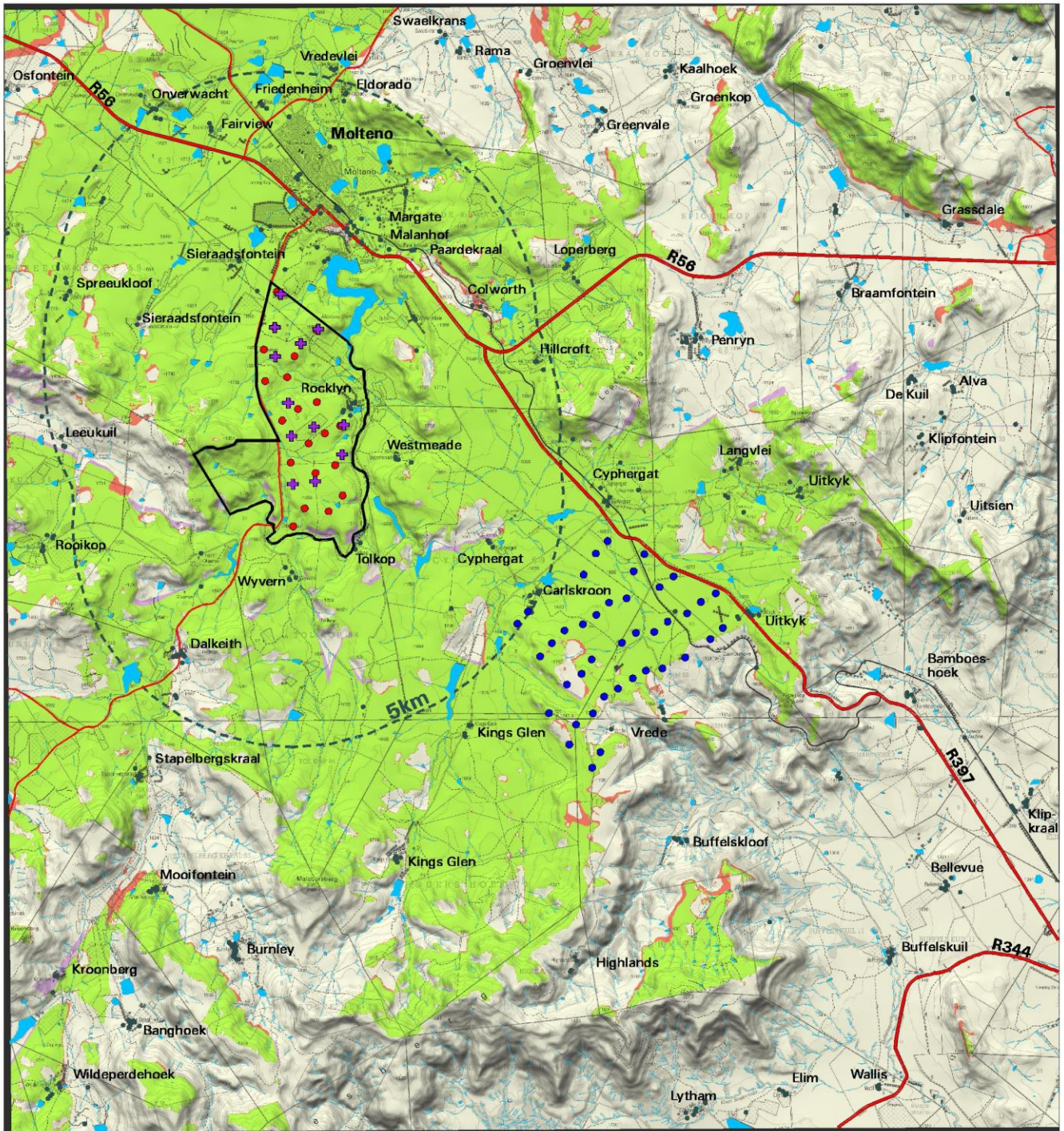
It is expected that the wind turbine structures, both the original dimensions and the proposed increased dimensions would be equally visible and noticeable from both the roads and homesteads identified above, therefore signifying a negligible change to the potential visual impact.

The revised 132kV grid connection line location and substation position both fall within the wind turbine development footprint and is not expected to influence the potential visual impact significantly.

Cumulative visual impact

It is worth noting that the Spreeukloof WEF is located within the Stormberg Wind Renewable Energy Development Zone No. 4 (REDZ4) as determined by the *Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa* (2015 – CSIR/DEA). Refer to **Map 2**.

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 i.e. the amendment is not expected to alter the potential cumulative visual impact rating as stated in the original VIA report.



Proposed Spreeukloof WEF - Amendment (2021)

LEGEND

- Farm Identified for the WEF
- Authorised Wind Turbine Positions (2013)
- Proposed Amended Wind Turbine Positions (2021)
- Arterial/Main Road
- Secondary Road
- Non-perennial River
- Dam/Waterbody
- Residence/Homestead
- Existing Dorper Wind Turbines

COMPARATIVE VIEWSHED ANALYSIS

- Potential visual exposure for: Authorised WTG Layout (182.5m blade-tip height)
 - 120m hub-height
 - 125m rotor diameter
- Potential additional area of exposure for: Amended/Proposed WTG Dimensions (208m blade-tip height)
 - 120m hub-height
 - 176m rotor diameter
- Area of Reduced Visual Exposure of Authorised WTG Layout
- Observer proximity to the WTG (5km buffer)



0 5km

Scale 1 : 120 000 (A4)

Map 1: Comparative Viewshed Analysis – Spreeukloof Wind Energy Facility.



Map 2: The location of the Spreekloof WEF in the Stormberg REDZ (also indicating all other authorised or operational WEFs).

5. COMPARATIVE VISUAL ASSESSMENT STATEMENT

In consideration of the proposed amendments, there is no (zero) change to the significance rating compared with the original EIA visual impact assessment report. Furthermore, no additional mitigation measures are considered necessary for the purposes of the amended scenario and the mitigation measures provided in the original EIA therefore remain suitable and applicable.

6. CONCLUSION/RECOMMENDATIONS

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

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

In spite of the fact that no individual receptors would benefit from the reduction in the number of wind turbines from 21 to 12, it is still considered to be a positive from a visual impact perspective. It will reduce the overall frequency of visual exposure of wind turbine structures within the region.

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

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

7. REFERENCES

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.*

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