

**PROPOSED SOETWATER WIND ENERGY FACILITY,
NORTHERN CAPE PROVINCE**

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

Produced for:

Soetwater Wind Farm (Pty) Ltd

On behalf of:



Savannah Environmental (Pty) Ltd
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- October 2017 -

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Lourens du Plessis, a specialist in visual assessment and Geographical Information Systems, undertook the comparative viewshed analysis and visual assessment for the proposed amendment to the turbine specifications. Lourens, then director of MetroGIS (Pty) Ltd, also did the Visual Impact Assessment for the original Hidden Valley Wind Energy Facility (submission date 2012).

Lourens has been involved in the application of Geographical Information Systems (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 are often utilised in Environmental Impact Assessments, State of the Environment Reports and Environmental Management Plans.

He 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 appointed Lourens du Plessis as an independent specialist consultant to undertake the visual assessment for the proposed amendment to the Soetwater Wind Energy Facility. He will not benefit from the outcome of the project decision-making.

1. INTRODUCTION

Soetwater Wind Farm (Pty) Ltd wishes to amend the dimensions and layout of their wind turbine generators (WTG) for the proposed Soetwater Wind Energy Facility (WEF), located between Matjiesfontein and Sutherland in the Northern Cape Province.

The intended amendment includes:

- The increase of the maximum turbine rotor diameter from 120m (as assessed in the EIA) to a maximum of 150m diameter (an increase of 30m).
- Increase in the individual WTG rating from between 2MW-3.5MW to up to 4.5MW.
- A minor revision of the WTG positions (refer to the map below).
- A reduction in the number of turbines from 56 to 43.

The hub-height of the WTGs will remain unchanged at 120m above ground level.

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 **180m** (120m hub-height + 60m blade length) to **195m** (120m hub-height + 75m blade length) above ground level. This translates to a total 15m maximum increase in height per WTG, although it is noted that it is likely that a lower hub height may be used due to the wind conditions of the site.

The maximum number of turbines (56 x 2.5MW - 3.5MW) will be reduced to 43 x 4.5MW turbines. The total generating capacity of the facility remains unchanged (140MW).

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 or altered position 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 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 and layout compared to the potential (additional) exposure of the increased (proposed) turbine dimensions and positions. The viewshed analysis focuses on a radius of 5-10km from the proposed turbine layout 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.

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

4. RESULTS

A visibility analysis was undertaken from each of the wind turbine positions (43 in total) at an offset of 180m (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 195m to indicate the visual exposure of the increased turbine dimensions and the revised positions (shown in red). The results of the visibility analyses are displayed on **Map 1** below.

It is clear that the approximately 7.7% maximum increase in turbine dimensions, would have a very small influence on the overall visual exposure, due to the already tall turbine structures. The surface area (within the study area) of the original turbine exposure is 739km², compared to the 747km² of the increased dimensions turbine exposure. This is an increase of only 8km², or alternatively, an increase of only 1% in potential visual exposure. It is hardly even visible on the map – i.e. there is effectively no change in the visual exposure by surface area.

There are no additional sensitive visual receptors located within a 5-10km radius of the proposed amended turbine positions.

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

- Damslaagte
- De Plaat
- De Hoop
- Oranjefontein
- De Kom
- Observers travelling along the secondary road traversing the proposed development site

Potential sensitive visual receptors within a 5-10km radius (identified during the EIA phase) include:

- Meintjiesplaas
- Ou Tuin
- Rooiwal
- Boesmanshoek
- Wegkruip
- Oliviersberg
- Komsberg
- Welgemoed
- Observers travelling along the R354 arterial road and secondary roads

Note:

The location of Damslaagte, De Hoop, Oranjefontein and De Plaat on properties earmarked for future WEF developments reduces the probability of this impact occurring.

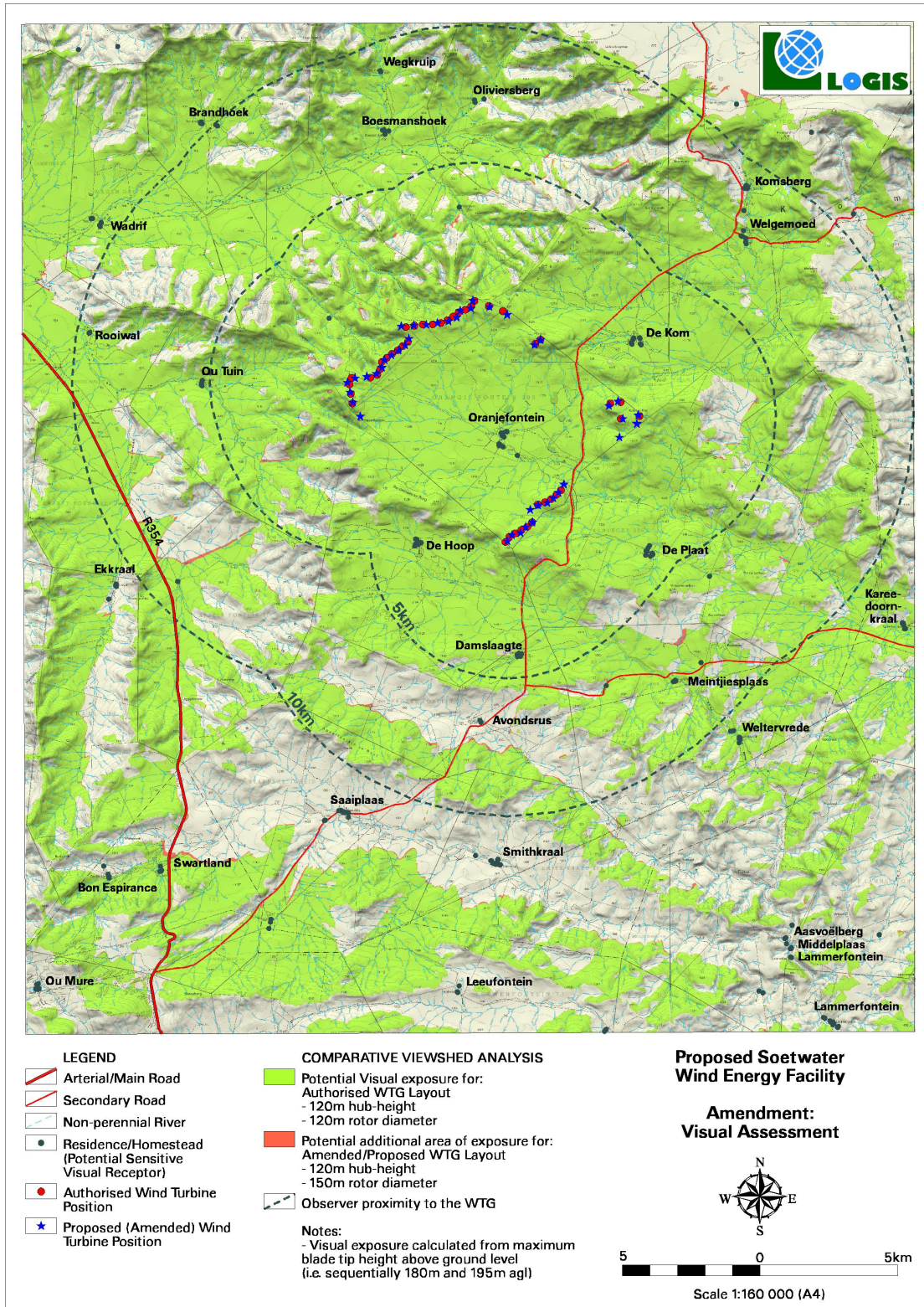
Boesmanshoek, Oliviersberg, Wegkruip and Welgemoed located between 5-10km are also located on the authorised WEF properties, once again negating or reducing the probability of the impact occurring.

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

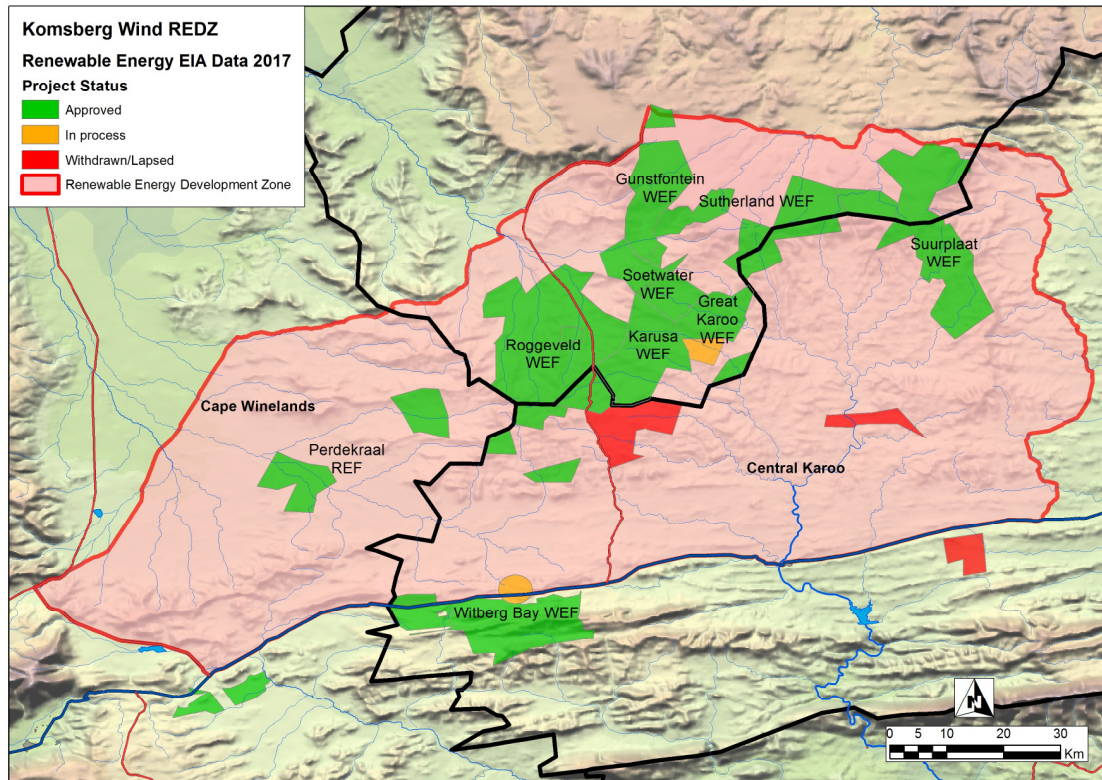
The increased area of visual exposure does not include any additional exposure to major roads within the study area.

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

It is worth noting that the consolidation of wind energy facilities in this area and the creation of a wind energy hub may contribute to the containment of a potentially scattered proliferation of wind energy infrastructure throughout the region. These abovementioned wind energy facilities are all located within the *Komsberg Wind 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 **Map 2**.



Map 1: Comparative Viewshed Analysis - Soetwater Wind Energy Facility. (Note that there is a negligible change in the viewshed of the site).



Map 2: The location of the Soetwater WEF in the Komsberg Wind REDZ.

5. CONCLUSION/RECOMMENDATIONS

The proposed increase in the dimensions of the wind turbine structures and the revised layout are **not expected to significantly alter** the influence of the WEF on *areas of higher viewer incidence* (observers traveling along 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 and revised layout 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). In fact, the reduction in turbine count may result in a reduction in visual impact of the Project.

There are no additional impacts, mitigation measures or alterations to the EMPr suggested for the proposed increased turbine dimensions, as the general appearance and functional design is not expected to change.

It is suggested that the proposed amendment to the turbine dimensions and slight turbine movements 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.

6. REFERENCES

Council for Scientific and Industrial Research (CSIR) / Department Environmental Affairs (DEA), 2015. *Strategic Environmental Assessment for Wind and Solar Photovoltaic Energy in South Africa*.

MetroGIS (Pty) Ltd, 2012. *Hidden Valley Wind Energy Facility - Visual Impact Assessment Report.*