

**PROPOSED WIND GARDEN WIND FARM,
EASTERN CAPE PROVINCE**

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

Produced for:

Wind Garden (Pty) Ltd

On behalf of:



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MAPS

Map 1: Comparative Viewshed Analysis – Wind Garden Wind Farm.

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 Wind Garden Wind Farm.

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 layout for the Wind Garden Wind Farm. He will not benefit from the outcome of the project decision-making.

1. INTRODUCTION

Wind Garden (Pty) Ltd wishes to amend the specifications of their wind turbine generators (WTG) and the facility layout for the proposed Wind Garden Wind Farm located near Makhanda in the Eastern Cape Province in order to address outstanding concerns raised by I&APs.

The intended amendment includes:

- i. Amendment of the wind turbine specifications, as follows:
 - a. The reduction of the hub height from 120m to 115m.
 - b. The rotor diameter will remain at 150m.
 - c. The reduction of the blade tip height from 200m to 190m.
- ii. A reduction in the number of turbines from 47 to 23.
- iii. Update (optimise) the layout as required to accommodate and reflect the removal of 24 turbines.

The primary relevance of this amendment from a visual impact perspective is the reduction in the number of wind turbines from 47 to 23 (approximately 50% of the original total). The removal of 24 wind turbines is expected to reduce the frequency of visual exposure and has the potential to benefit specific sensitive receptor sites where turbines have been removed.

Of secondary importance is the reduction in WTG dimensions from a total blade tip height of **195m** to **190m** above ground level. This translates to an overall reduction of **5m** blade tip height per WTG, potentially reducing 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 reduction in the

number of wind turbines, the reduction in the dimensions of the turbines, and the change (optimisation) in the facility layout. This is done in order to determine:

- If there are any additional (new) visual receptors that may be negatively influenced by the amended turbine layout;
- Whether the reduction in turbine dimensions would significantly mitigate the potential visual impact on identified receptors (identified during the BA process undertaken for the project);
- If there are any mitigation of visual impacts associated with the removal of 24 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 turbine layout and dimensions compared to the potential exposure of the reduced (optimised) turbine layout and dimensions. The viewshed analysis focuses on a radius of 20km 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 **high** to **moderate** visual impacts of the proposed infrastructure.

Potential sensitive visual receptors include observers residing at homesteads (farm residences and dwellings) within the study area, observers travelling along the local public roads traversing near or over the proposed development site, and visitors to the nature reserves or other tourist attractions within the region.

4. RESULTS OF THE COMPARATIVE VIEWSHED ANALYSIS

A viewshed analysis was undertaken from each of the original wind turbine positions (47 in total) at an offset of 195m (maximum blade tip height) above ground level. The result of this analysis represents the potential total visual exposure of the original turbine layout and dimensions (indicated in red and green on **Map 1**). The viewshed analysis was repeated at an offset of 190m to indicate the visual exposure (shown in green) of the reduced turbine dimensions and reduced number of turbines (23 in total) proposed as part of the optimised layout. The results of the viewshed analyses are displayed on **Map 1** below.

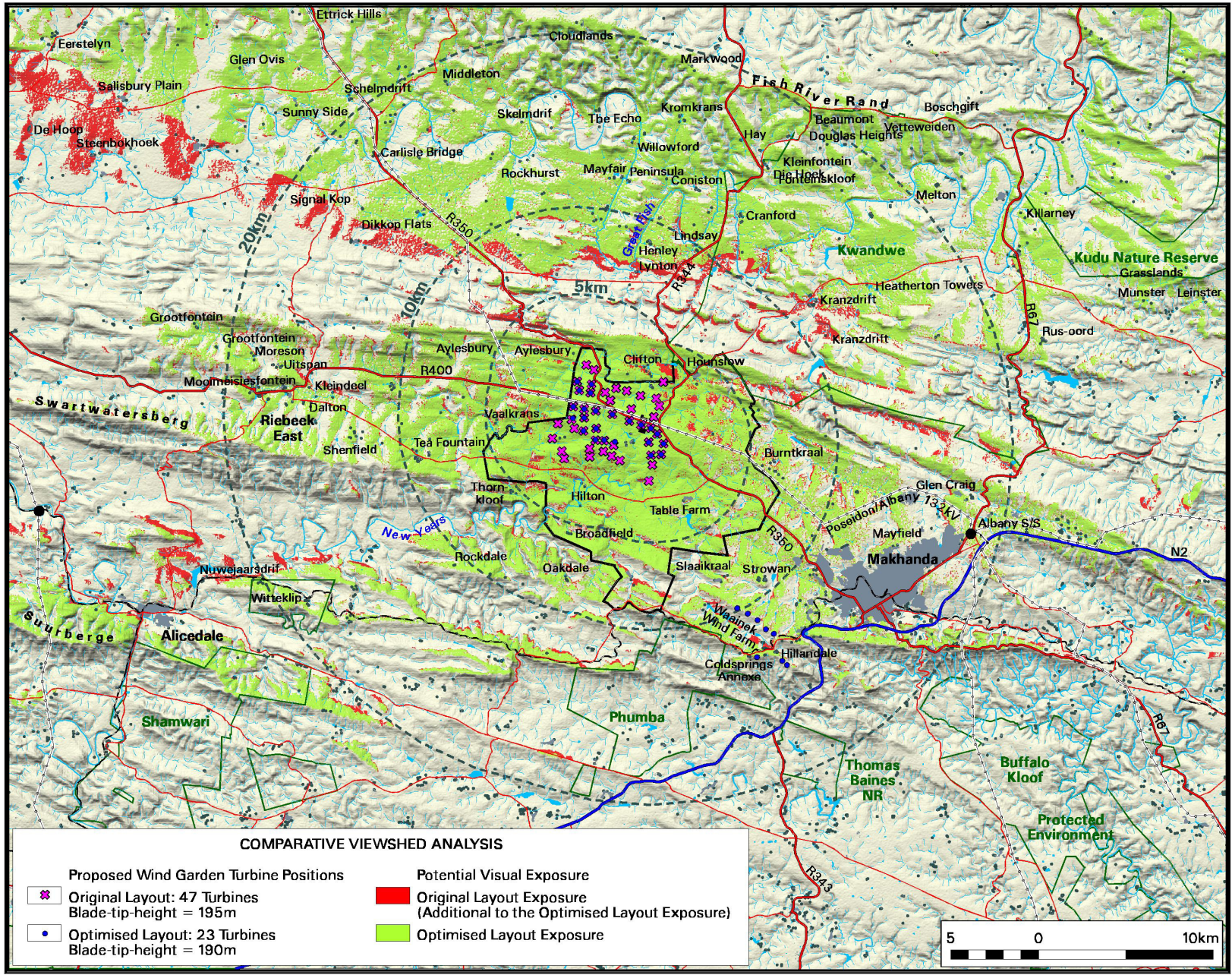
The total area of visual exposure for the original turbine layout (47) and dimensions is 885km². The proposed optimised layout (23) and reduced dimensions covers a surface area of 769km², 116km² less, or approximately 13% less than the original. The area of reduced visual exposure is predominantly located within a fine band along the south-facing, lower lying slopes to the north of the wind turbines. This viewshed pattern is brought about by the increased setback of the turbines from the northern edge of the *plateau* (i.e. 12 of the northern turbines are removed). The area of reduced visual exposure is expected to benefit sensitive receptor sites to the north, especially within a 5 – 10km radius of the WEF. These include the Lynton homestead and parts of the Kwandwe Nature Reserve (e.g. Kranzdrift 1 and 2). The overall encroachment of wind turbine structures to the north is expected to dissipate somewhat, due to the increased distance in between the receptor sites and the turbines. This may also apply, to a lesser degree to the Clifton and Aylesbury homesteads, located within a 5km radius of the proposed turbines. The closest wind turbine to the Clifton homestead was 1km (original layout) and is just over 3km with the

optimised layout. The closest turbine to the Aylesbury homestead was just less than 1km, and is now 1.6km with the optimised layout.

In summary: The red visible areas (on Map 1) will fall away with the optimised layout. Some point receptor sites (e.g. residences) may not be exposed any more, but large tracts of land will remain exposed. The frequency of visual exposure (overall number of exposed turbines) will be halved and there will be a slight benefit from the reduced height of the turbines. These are all positives, but the visual impacts associated with the remaining (optimised layout) turbines will remain high, especially for observers located within a 5km radius of the wind turbine structures (e.g. observers travelling along the R350 arterial road).

There are no additional (new) visual receptors that may be negatively influenced by the amended turbine layout.

Overall, the reduction of the number of wind turbines and (marginally) reduced turbine dimensions are seen as positives in mitigating the visual impact to some degree. However, it is expected that the remaining wind turbine structures would be visible and noticeable from both the roads and homesteads identified within the VIA report (with the exception of those mentioned above). This signifies a marginal improvement of the visual impact, which is expected to remain high.



WIND GARDEN Wind Farm

- LEGEND**
- National Road
 - Arterial/Main Road
 - Secondary Road
 - Railway Line
 - Power Line
 - Substation
 - Town/Built-up Area
 - Homestead/Dwelling
 - Perennial River
 - Non-perennial River
 - Dam
 - Designated Protected Area (SAPAD2019-20)
 - Waainek Wind Farm (turbine positions)
 - Farms Identified for the WEF
 - Observer Proximity to the Optimised Layout (5km, 10km & 20km)



COMPARATIVE VIEWSHED ANALYSIS

- | | |
|--|---|
| Proposed Wind Garden Turbine Positions | Potential Visual Exposure |
| Original Layout: 47 Turbines
Blade-tip-height = 195m | Original Layout Exposure
(Additional to the Optimised Layout Exposure) |
| Optimised Layout: 23 Turbines
Blade-tip-height = 190m | Optimised Layout Exposure |

Map 1: Comparative Viewsshed Analysis – Wind Garden Wind Farm.

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 and is considered a positive from a visual impact perspective. The remaining 23 (marginally smaller) turbines are expected to remain visible within a 10 - 20km radius of the wind farm, and highly visible within a 5km radius.

6. CONCLUSION/RECOMMENDATIONS

The proposed reduction in the dimensions of the wind turbine structures is **not expected to significantly alter** the influence of the Wind Garden Wind Farm on *areas of higher viewer incidence* (observers traveling along the public roads within the region) or *potential sensitive visual receptors* (residents of homesteads in close proximity to the wind farm).

The proposed reduction in the number of turbines is to be commended, but is ultimately **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. 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 (if applicable), and according to the Environmental Management Programme and suggested mitigation measures, as provided in the original Visual Impact Assessment report.

7. REFERENCES/DATA SOURCES

LOGIS, 2021. *Proposed Wind Garden Wind Farm, Eastern Cape Province. Visual Impact Assessment.*