

VISUAL IMPACT ASSESSMENT OF THE PROPOSED AMENDMENTS

PLAN 8 GRAHAMSTOWN WIND ENERGY FACILITY, EASTERN CAPE, SOUTH AFRICA

PREPARED BY:



ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

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Relevant VIA experience:

Project	Responsibility
Waaioek WEF	Project Leader/Reviewer
Chaba WEF	Project Leader/Reviewer
Great Kei WEF	Project Leader/Reviewer
Tomas River WEF	Project Leader/Reviewer
Peddie WEF	Project Leader/Reviewer
Qunu WEF	Project Leader/Reviewer
Albany WEF	Project Leader/Reviewer
Boulders WEF	Project Leader/Reviewer
Bayview WEF	Review and Quality Control
Rietkloof WEF	Review and Quality Control
Nqanakwe WEF	Project Leader/Author
SANBI Kwelera National Botanical Garden	Project Leader/ Reviewer
East London IDZ Solar PV Facility	Project Leader/ Author
Langa Energy Solar PV Facility	Project Leader/ Author
Theza Langa Solar PV Facility	Project Leader/ Author
Zulu Dam (Lusikisiki Regional Bulk Water Scheme)	Project Leader/ Author
Blacklight Solar PV Facility	Project Leader/ Author
Peddie Solar PV Facility	Project Leader/ Author

EXECUTIVE SUMMARY

In 2015, EOH Coastal and Environmental Services (EOH CES) was appointed by Plan 8 (Pty) Ltd. as independent environmental assessment practitioners (EAP) to conduct the Full Scoping and Environmental Impact Assessment (EIA) for the proposed Plan 8 Grahamstown Wind Energy Facility (WEF). Subsequently, Plan 8 (Pty) Ltd. received Environmental Authorisation (EA), dated 22 October 2015, from the Department of Environmental Affairs (DEA) to construct and operate the Grahamstown WEF. The EA authorised Plan 8 (Pty) Ltd. to develop a 66MW WEF which included authorisation to construct 22 wind turbines, each with a hub height of 91.5m above ground level and a rotor diameter of 100m-117m.

Plan 8 (Pty) Ltd. now wish to increase the maximum generation capacity of each turbine. This will result in an increase in hub height (from 91.5m to up to 125m) and rotor diameter (from 100 - 117m to up to 163m). In addition to this, due to the proposed amendment in turbine specifications, a reduction in the number of turbines (from 22 to 14) has also been proposed.

In terms of Regulation 31 and 32 of the 2014 National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations, Plan 8 (Pty) Ltd. wishes to apply for an amendment to the EA issued.

One of the significant environmental issues identified during the scoping phase for the former EIA process was the visual impact of the proposed development on the landscape. A Visual Impact Assessment (VIA), conducted by Henry Holland of Map(this) in 2015, was therefore, included as one of the specialist studies.

Based on the requirements of Regulation 32 of the EIA Regulations, specialist input regarding the proposed amendments is required for each proposed split project to enable the DEA to make an informed decision on whether to grant for reject the amendment application.

This report provides specialist input to assess the proposed changes in the context of the former 2015 VIA to determine the visual impacts resulting from the proposed amendments. This VIA is to be read in conjunction with the former 2015 VIA as it does not repeat information in that report that is still relevant to the current VIA.

From a visual impact assessment perspective, significant changes include:

- the reduction in the number of turbines (from 22 to 14);
- the increase in hub height (91.5m to up to 125m); and
- the increase in rotor diameter (from 100 - 117m to up to 163m).

Two viewsheds were calculated to assess the impacts of the proposed changes to the approved Plan 8 Grahamstown WEF.

- Viewshed 1 was calculated as per the EA (i.e. 22 turbines each with a hub height of 91.5m and a rotor diameter of 117m)
- Viewshed 2 was calculated as per the proposed changes (i.e. 14 turbines each with a hub height of 125m and a rotor diameter of 163m).

This was followed by an analysis looking at the visibility of the project, visual exposure of the wind turbines and visual intrusion of the project.

It was found that although there would be a marginal change in visibility and visual intrusion, the proposed amendments will not introduce any new visual impacts.

Apart from the visual impact of construction activity, which has been decreased to moderately negative post-mitigation, the proposed amendments will not significantly alter the visual impacts as assessed in the former 2015 VIA Report, for which Environmental Authorisation was granted.

Furthermore, in assessing the direct impacts to visual resources, it has been recognised that, although the lifespan of the project is likely to extend for 20-25 years, all of the components of the superstructures can be removed on decommissioning, after which the landscape will be rehabilitated back to a near natural state. This means that although the proposed facility will undoubtedly have an impact on the visual resources of the area, it does not represent a completely irreversible loss of scenic resources.

Concluding Remarks

It is concluded that the proposed amendments will not increase any identified impacts significantly, nor introduce any new impacts which are sufficiently significant to present a fatal flaw.

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1. INTRODUCTION

In 2015, EOH Coastal and Environmental Services (EOH CES) was appointed by Plan 8 (Pty) Ltd. as independent environmental assessment practitioners (EAP) to conduct the Full Scoping and Environmental Impact Assessment (EIA) for the proposed Plan 8 Grahamstown Wind Energy Facility (WEF). Subsequently, Plan 8 (Pty) Ltd. received Environmental Authorisation (EA), dated 22 October 2015, from the Department of Environmental Affairs (DEA) to construct and operate the Grahamstown WEF. The EA authorised Plan 8 (Pty) Ltd. to develop a 66MW WEF which included authorisation to construct 22 wind turbines, each with a hub height of 91.5m above ground level and a rotor diameter of 100m-117m.

Plan 8 (Pty) Ltd. now wish to increase the maximum generation capacity of each turbine. This will result in an increase in hub height (from 91.5m to up to 125m) and rotor diameter (from 100 - 117m to up to 163m). In addition to this, due to the proposed amendment in turbine specifications, a reduction in the number of turbines (from 22 to 14) has also been proposed.

In terms of Regulation 31 and 32 of the 2014 National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations, Plan 8 (Pty) Ltd. wishes to apply for an amendment to the EA issued. Regulation 31 (Part 2) of the 2015 NEMA EIA Regulations states that:

“An environmental authorisation may be amended by following the process prescribed in this Part if the amendment will result in a change to the scope of a valid environmental authorisation where such change will result in an increased level or nature of impact where such level or nature of impact was not-

- (a) assessed and included in the initial application for environmental authorisation; or*
- (b) taken into consideration in the initial environmental authorisation; and the change does not, on its own, constitute a listed or specified activity.”*

As per sub-regulation (a) the proposed application for the amended changes were not considered as part of the in the initial EIA process, therefore, these (potential) impacts need to be assessed according to the change in level or nature of impact.

1.1. SCOPE OF STUDY

One of the significant environmental issues identified during the scoping phase for the former EIA process was the visual impact of the proposed development on the landscape. A Visual Impact Assessment (VIA), conducted by Henry Holland of Map(this) in 2015, was therefore, included as one of the specialist studies.

Based on the requirements of Regulation 32 of the EIA Regulations, specialist input regarding the proposed amendments is required to enable the DEA to make an informed decision on whether to grant for reject the amendment application.

This report provides specialist input to assess the proposed changes in the context of the former 2015 VIA to determine the visual impacts resulting from the proposed amendments. This VIA is to be read in conjunction with the former 2015 VIA as it does not repeat information in that report that is still relevant to the current VIA.

1.2. LIMITATIONS AND ASSUMPTIONS

This report is based on current available information and, as a result, the following limitations and assumptions are implicit:

- It is assumed that the project information provided by the client is accurate.
- The former 2015 VIA comprehensively described the baseline information such as description of the site and surrounding area. The emphasis of this VIA is thus placed on the impact assessment of the proposed amendments.
- The description of the environment as described in the former 2015 VIA remains largely unchanged.
- Spatial data used for visibility analysis originate from various sources and scales. Inaccuracy and errors are, therefore, inevitable. Where relevant, these are highlighted in the report. Every effort was made to minimize their effect.
- The following relates to the Viewshed Calculations:
 - Calculation of the viewsheds is based on the use of the Shuttle Radar Topography Mission (SRTM) Digital Elevation Models (DEMs) downloaded from the USGS Earth Explorer Website. These raster images have a resolution of 30 metres, which means that each pixel of the raster covers an area of 30 m x 30 m (900 m²) and is assigned a single height value.
 - Calculation of the viewsheds does not consider the potential screening effect of vegetation and buildings. Due to the size and height of the wind turbines, and the screening potential of vegetation is likely to be low over most distances.

1.3. METHODOLOGY

A GIS was used to calculate two viewsheds for the project. The first was based on the components that received EA, the second was based on components of the proposed changes. These viewsheds as well as information gathered by the former 2015 VIA and site photographs were used to define criteria such as visibility, viewer sensitivity, visual exposure and visual intrusion for the proposed changes. These criteria are, in turn, used to determine the severity of potential visual impacts on sensitive viewers. All information and knowledge acquired as part of the assessment process were then used to determine the potential significance of the impacts according to the standardised rating methodology as described in the former EIA.

2. PROJECT DESCRIPTION

2.1. OVERVIEW OF PROJECT

Plan 8 (Pty) Ltd. received EA (DEA Ref number: 12/12/20/2523) from the DEA to construct the Plan 8 Grahamstown WEF comprising 22 wind turbines. The site is located approximately 30 kilometres outside of Grahamstown along the N2 in an easterly direction towards East London, in the Eastern Cape Province of South Africa (Figure 1).

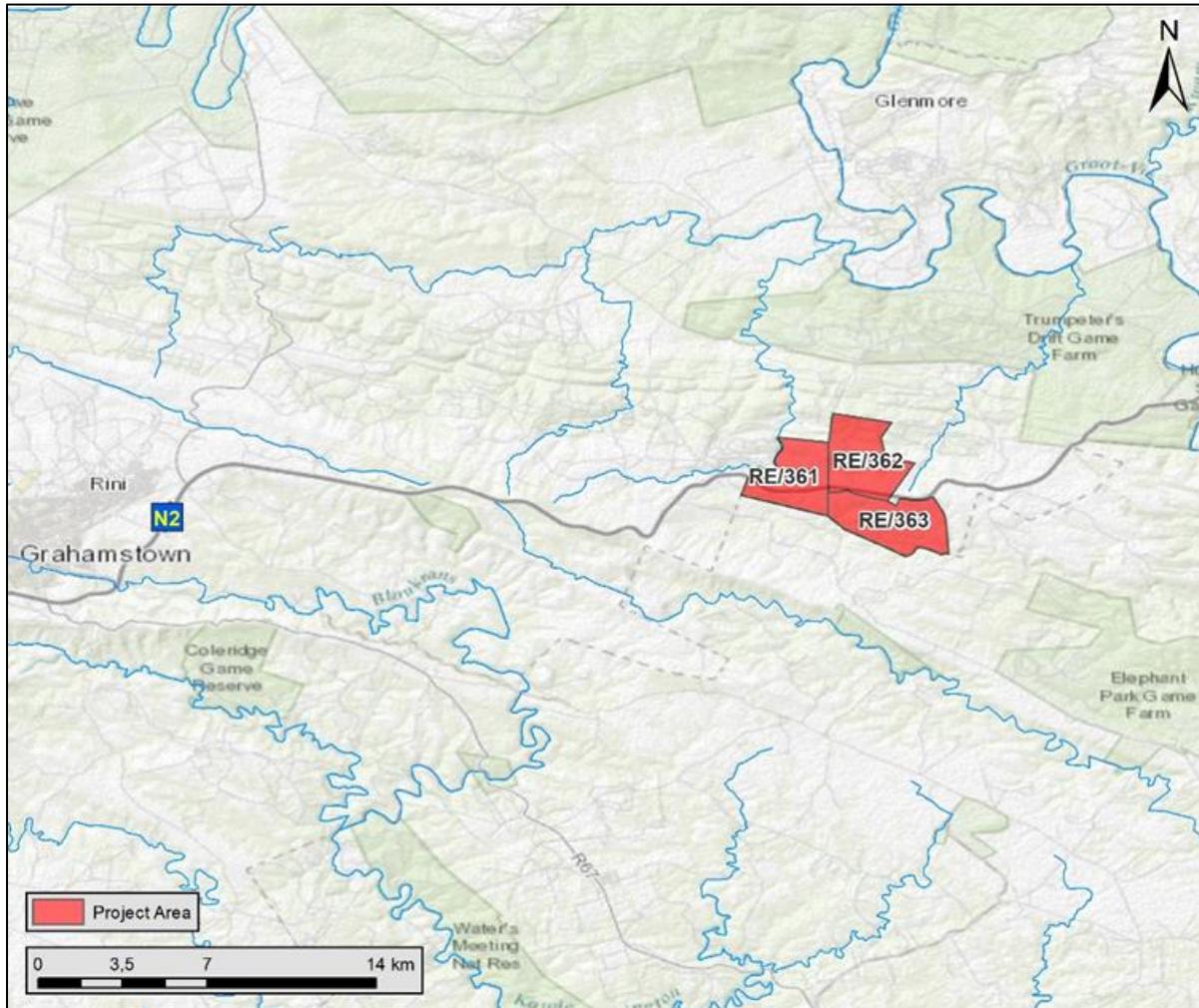


Figure 1: Location of the authorised Plan 8 Grahamstown WEF.

2.2. PROPOSED AMENDMENTS

As part of this amendment application, Plan 8 (Pty) Ltd. is proposing to increase the maximum generation capacity of each turbine. The proposed changes to the development description entail the following components:

TECHNICAL ASPECTS TO BE AMENDED	AUTHORISED	PROPOSED AMENDMENT
Number of Turbines	22	14
Overall Capacity	66 MW	76 MW
Hub Height	91.5 m	Up to 125 m
Rotor Diameter	100 - 117 m	Up to 163 m
Hard Stand Areas	5.2 ha	7 ha
Roads	16.35 km	12.0 km
Development Footprint	13.7 ha	11.5 ha
Substation Footprint	0.65 ha	1.2 ha

The changes to the layout can be seen in Figure 2 below.

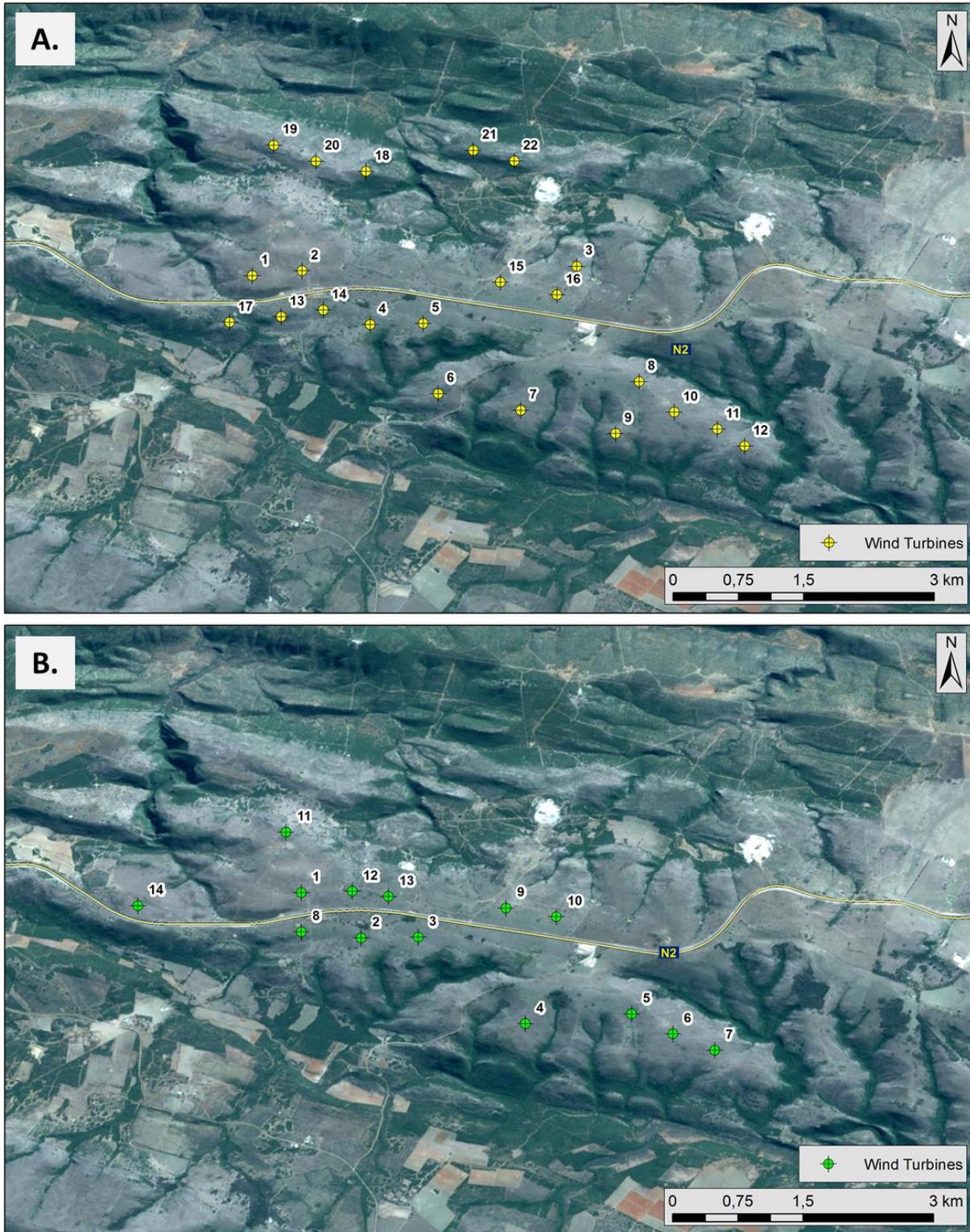


Figure 2: A) Authorised 22 Turbines. B) Proposed 14 Turbines.

From a visual impact assessment perspective, significant changes include the proposed changes to the turbine layout (i.e. the reduction in the number of turbines), as seen in Figure 2, and the increase in rotor diameter, as seen in Figure 3. The assessment of these changes is therefore the focus of this report.

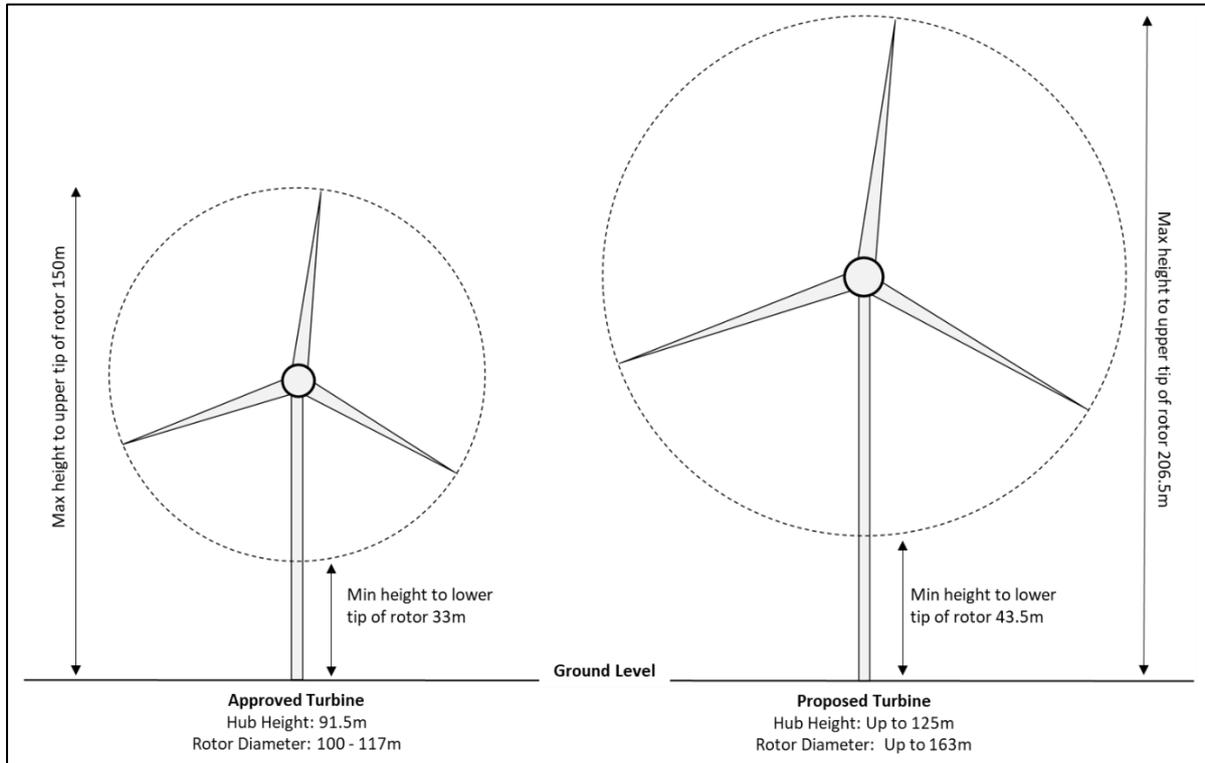


Figure 3: Schematic comparison of approved and proposed turbine sizes (Scales are internally consistent).

3. ASSESSMENT OF THE PROPOSED CHANGES

Oberholzer (2005) notes that thresholds of significance define the level or limit at which point an impact changes from low to medium significance, or medium to high significance. These thresholds are often determined by current societal values which define what would be acceptable or unacceptable to society and may be expressed in the form of legislated standards, guidelines or objectives. However, unlike water quality or air quality, thresholds for visual or scenic quality cannot be easily quantified, as they tend to be abstract, and often relate to cultural values or perceptions. A second difficulty is that natural, rural and urban landscapes are constantly changing, and the assessment will, therefore, need to consider this in determining the significance of impacts. A third difficulty may be the divergence of opinion on what constitutes 'acceptable' change, by the individual, the community or society in general.

The visual assessment should recognise that some change to the landscape over time is inevitable with the expansion of urban areas and introduction of new technologies. This will have a bearing on significance ratings, particularly in identified growth areas.

3.1. VISUAL IMPACT CRITERIA

Oberholzer (2005) recommends that specific visual impact assessment criteria should be considered. These include

- the visibility of the project;
- the visual exposure;
- the visual intrusion;
- the visual absorption capacity (VAC);
- the visual sensitivity of the area; and
- the visual sensitivity of receptors.

These visual impact criteria are used to help determine the severity of the impacts. Thus, the proposed project needs to be assessed against these criteria before attempting to rate the impacts using the standard rating scale (i.e. extent, duration, severity and probability).

Therefore, by assessing the proposed amendments in terms of these visual impact criteria. It can be determined if any identified impacts will change significantly.

It has been assumed that the visual sensitivity of the area, visual sensitivity of receptors and visual absorption capacity have remained unchanged since the former 2015 VIA was undertaken. Therefore, the assessment that follows will focus on the visibility of the project, the visual exposure and the visual intrusion.

3.1.1 Viewshed Calculation

Two viewsheds were calculated to assess the impacts of the proposed changes to the approved project.

- Viewshed 1 was calculated as per the EA (i.e. 22 turbines each with a hub height of 91.5m and a rotor diameter of 117m)
- Viewshed 2 was calculated as per the proposed changes (i.e. 14 turbines each with a hub height of 125m and a rotor diameter of 163m).

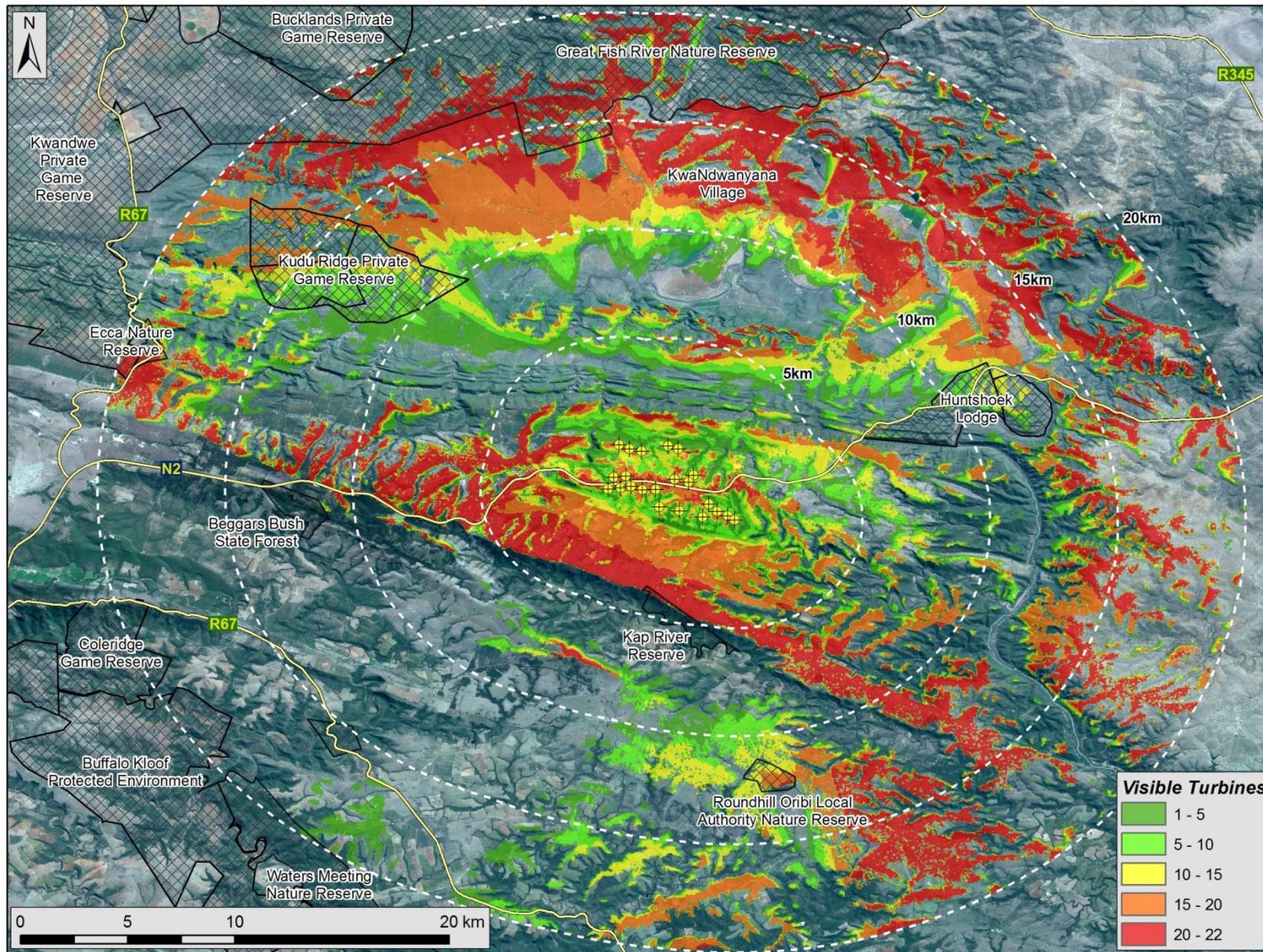


Figure 4: Viewshed 1 – Authorised Plan 8 Grahamstown WEF (22 turbines; hub height: 91.5m; rotor diameter: 117m)

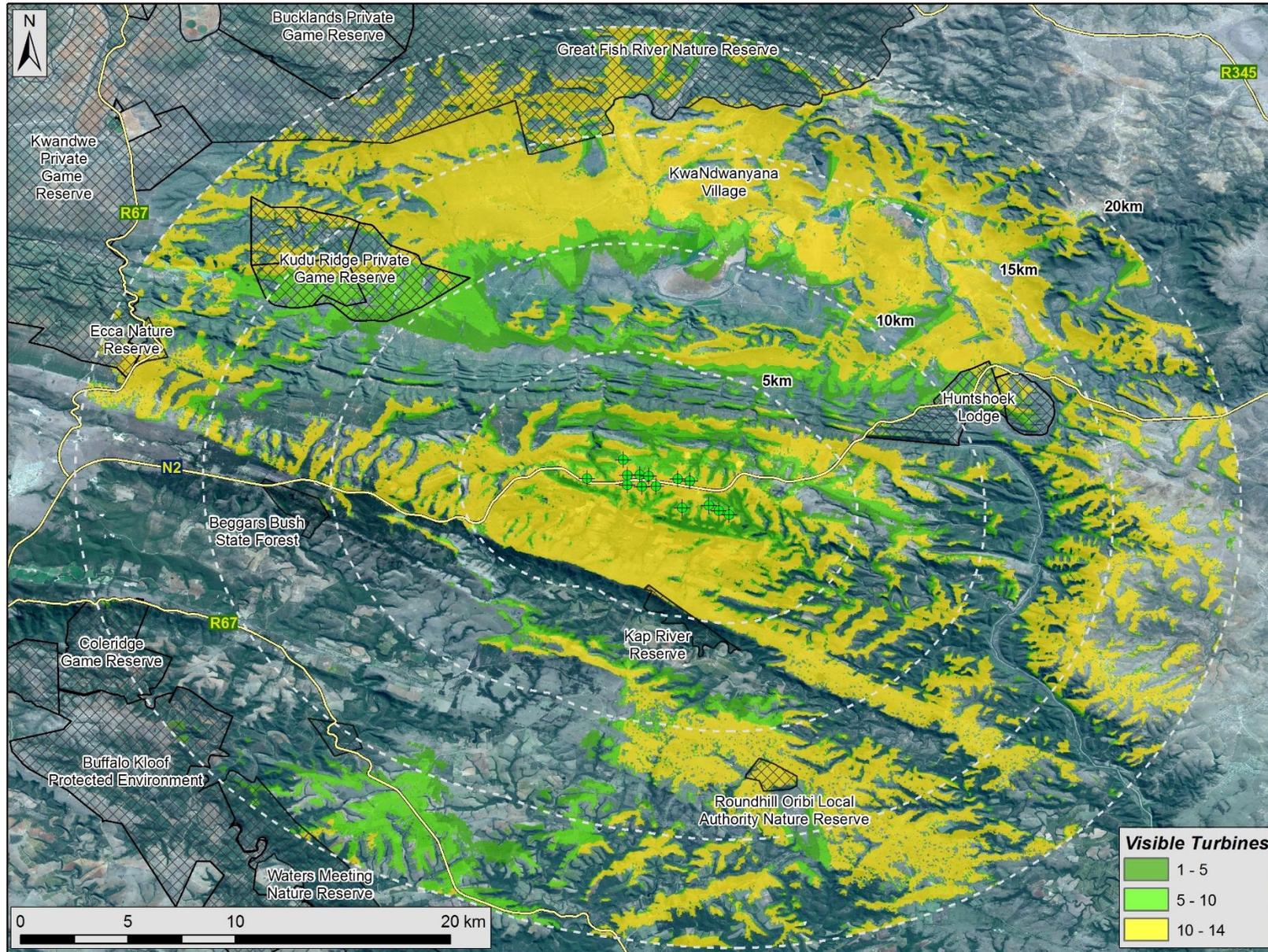


Figure 5: Viewshed 2 – Proposed Plan 8 Grahamstown WEF amendments (14 turbines; hub height: 125m; rotor diameter 163m)

3.1.2 Visibility

The visibility of the project is an indication of where in the region the development will potentially be visible from. The rating is based on viewshed size and is an indication of how much of a region will potentially be affected visually by the development. A high visibility rating does not necessarily signify a high visual impact, although it can if the region is densely populated with sensitive visual receptors.

Wind turbines are highly visible structures in most landscapes due to their height, colour (in contrast with most background colours) and motion of the blades. Their visibility is also a function of the layout and the topography of the landscape. The table below (Table 1) shows the viewshed areas for the two scenarios.

Table 1: Viewshed analyses for the two scenarios

WEF Layout	Viewshed Area (within 20 km distance from the turbines)
Viewshed 1 – Authorised Plan 8 Grahamstown WEF	616.0 km ²
Viewshed 2 – Proposed Plan 8 Grahamstown WEF amendments	650.5km ²

The viewshed analysis, shown in Table 1 and Figures 4 to 10, provides an indication of the potential effect that a change in the size, number and layout of turbines may have on the significance of the visual impacts identified in the former 2015 VIA Report. While the total viewshed size will increase by approximately 6.5%, a comparison of the two viewsheds indicate that there will be a reduction in the number of turbines that will be visible by the surrounding receptors.

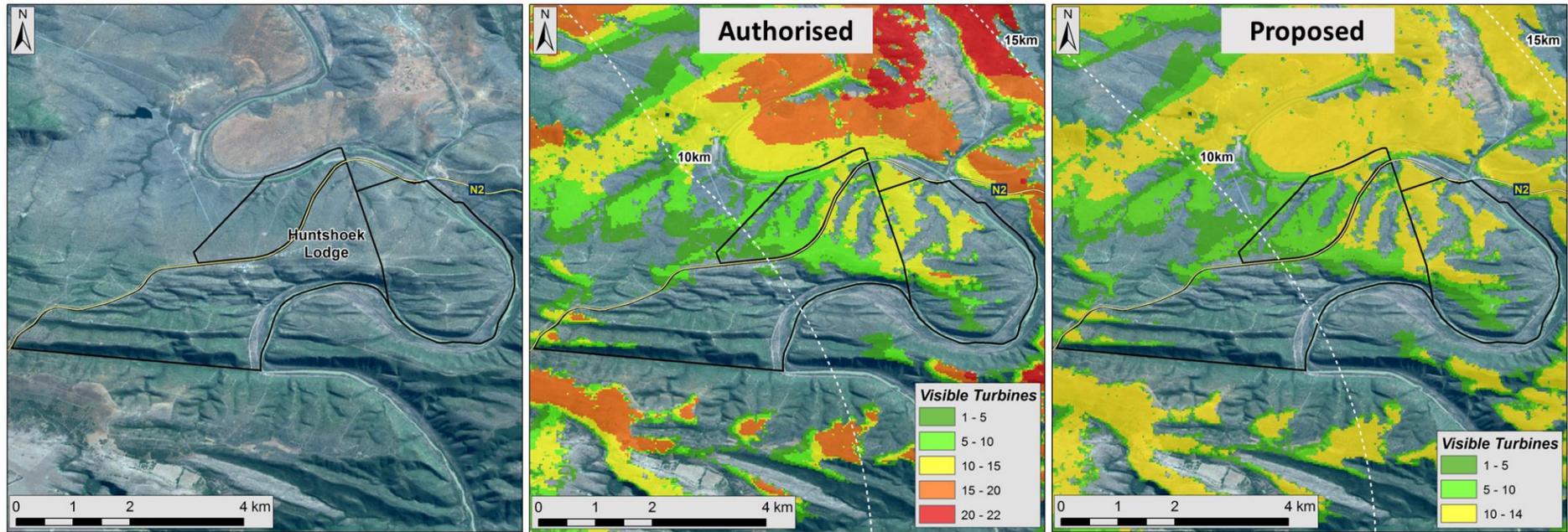


Figure 6: Change in visibility from Huntshoek Lodge

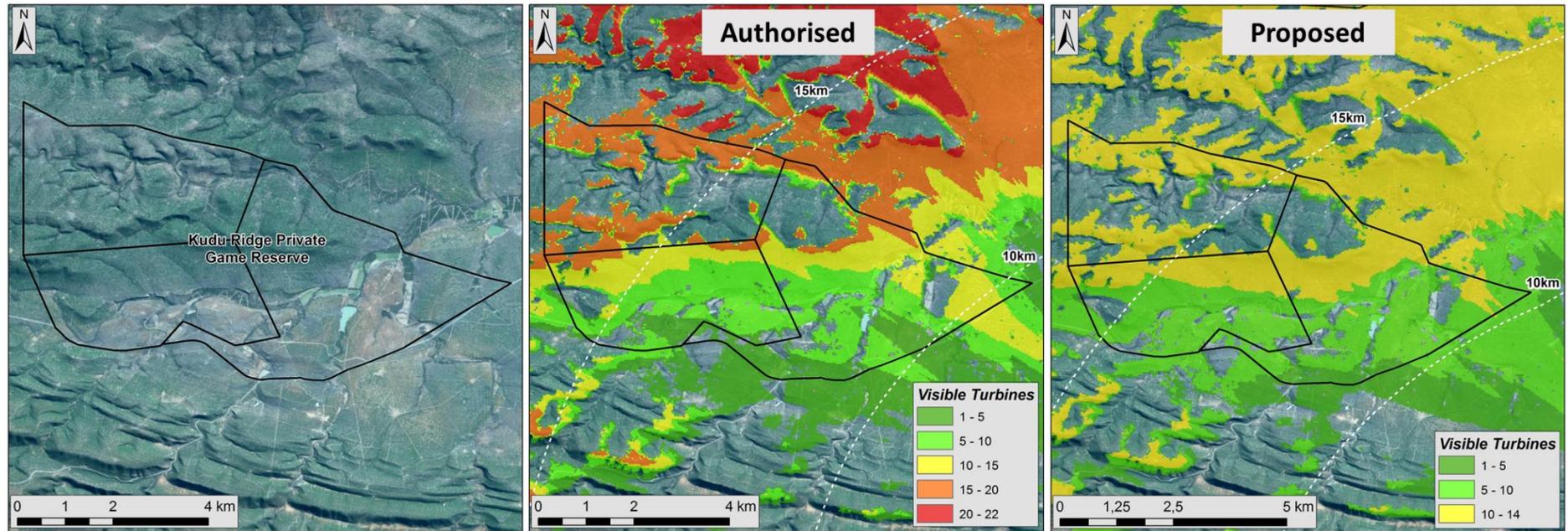


Figure 7: Change in visibility from Kudu Ridge Private Game Reserve

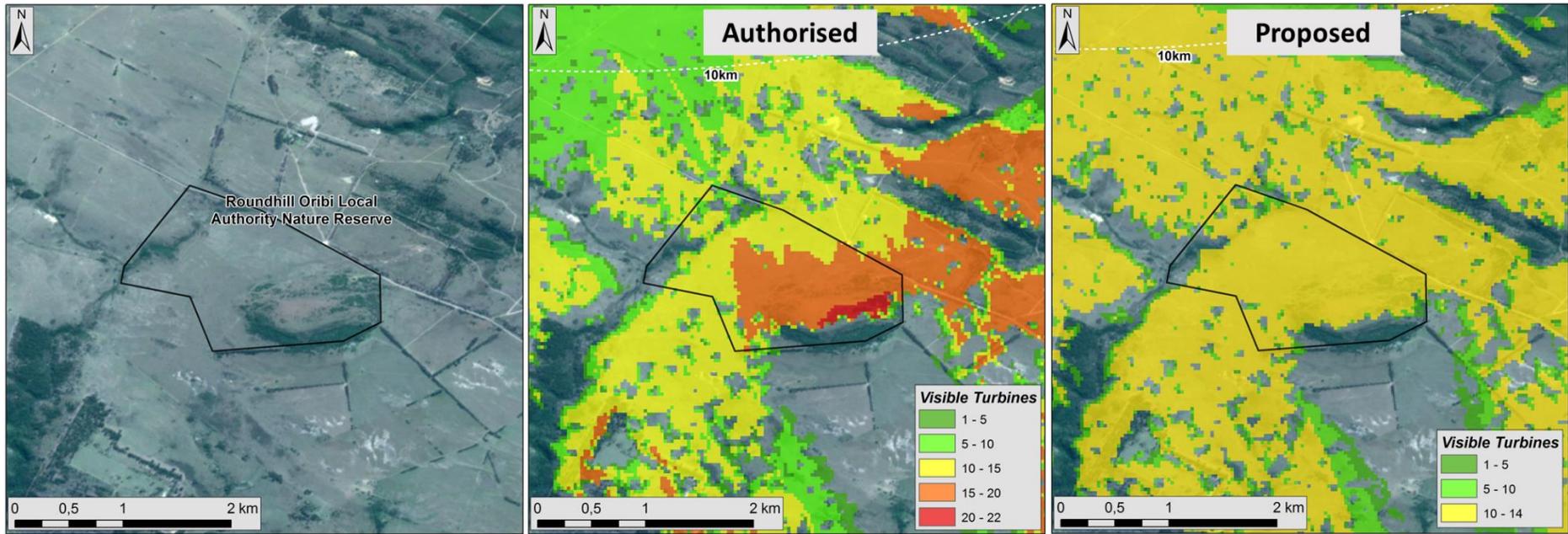


Figure 8: Change in visibility from Roundhill Oribi Local Authority Nature Reserve

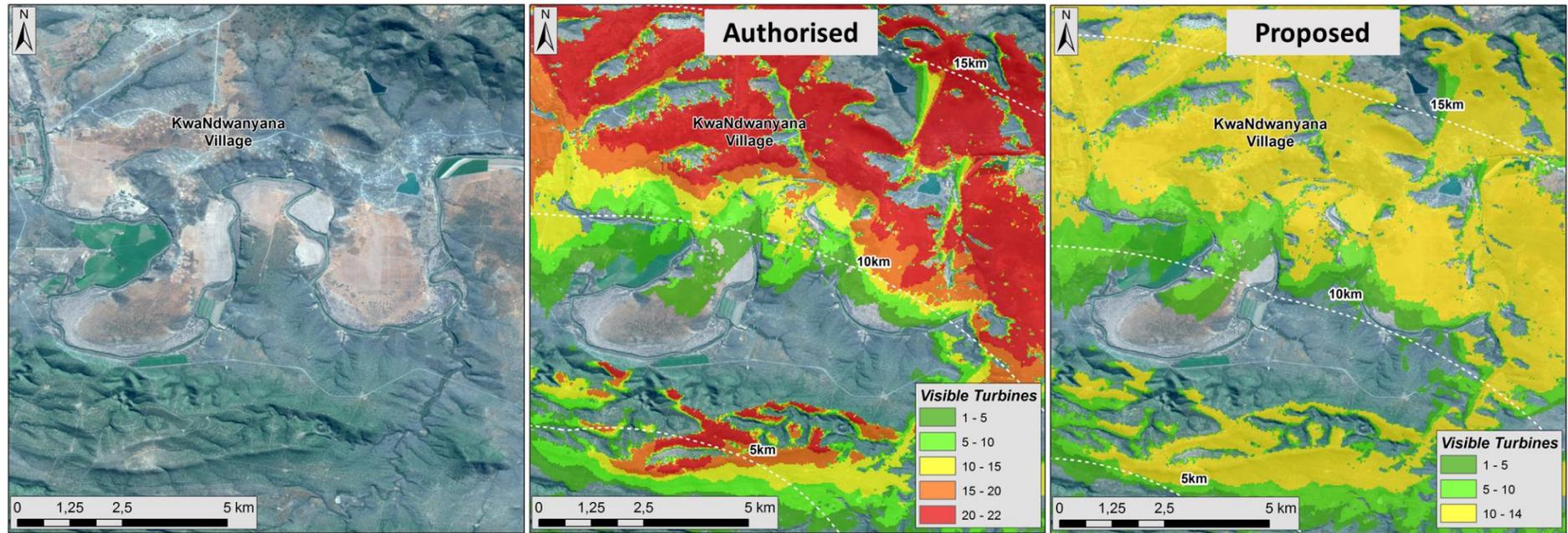


Figure 9: Change in visibility from KwaNdwanyana Village

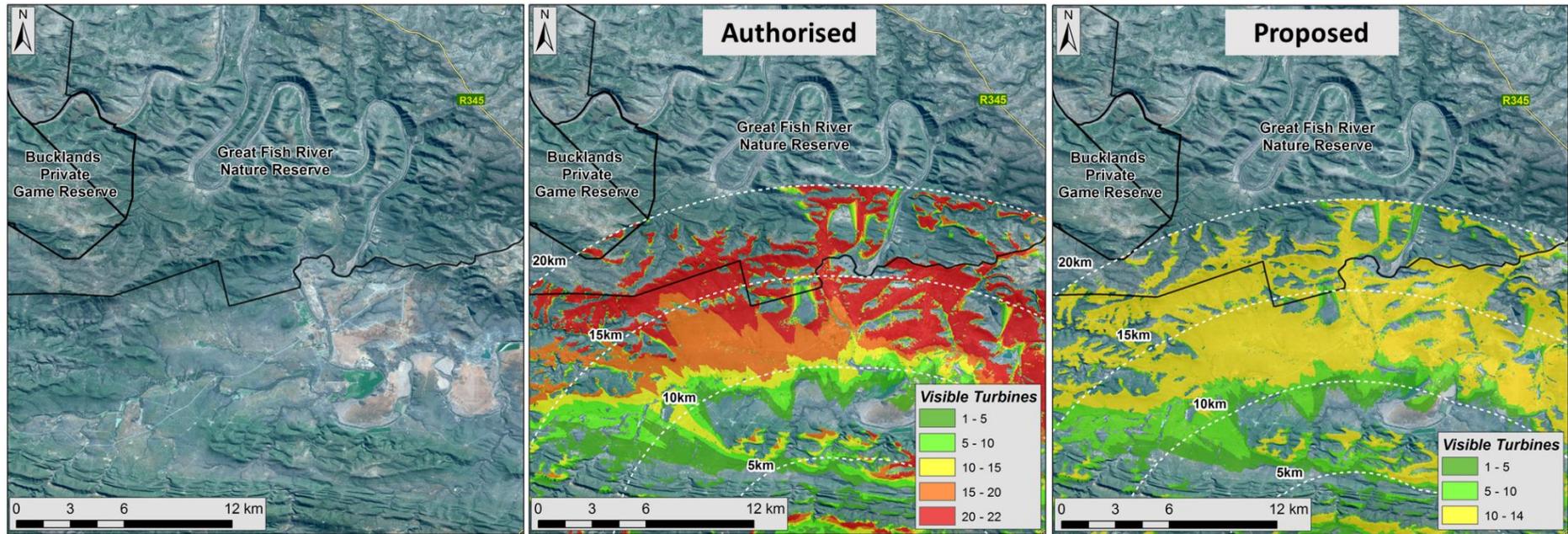


Figure 10: Change in visibility from the Great Fish River Nature Reserve

3.1.3 Exposure

Visual exposure is defined as the relative visibility of a project or feature in the landscape, and is related to the distance between the observer and the project. Exposure and visual impact tend to diminish exponentially with distance since the observed element comprises a smaller part of the view (as seen in Figure 11). The visual exposure of potential sensitive receptors in the surrounding landscape for each scenario was calculated using the viewsheds and distances from the proposed turbines. Visual exposure is classified as follows:

- High – dominant or clearly noticeable;
- Moderate – recognisable to the viewer; and
- Low – not particularly noticeable to the viewer

In this report the following distances from the site are used as proxy for categories of exposure:

- High exposure – 0 to 2.5km from the development.
- Moderate exposure – 2.5km to 5km from the development.
- Low exposure – 5km to 20km from the development.

The table below provides an indication as to how the visual exposure of potential sensitive receptors may change as a result of the proposed amendments. As can be seen there will be no significant change to the visual exposure should the proposed amendments received authorisation.

Table 2: Visual Exposure (Distance to nearest turbine)

Observation Points	Distance to Nearest Turbine	
	Authorised Layout	Proposed Layout
Kap River Reserve	3 685 m	3 790 m
Huntshoek Lodge	6 292 m	6 393 m
Kudu Ridge Private Game Reserve	9 663 m	10 200 m
Roundhill Oribi Local Authority Nature Reserve	11 118 m	11 310 m
KwaNdwanyana Village	10 608 m	11 740 m
Ecca Nature Reserve	18 140 m	17 322 m
Great Fish River Nature Reserve	13 861 m	14 580 m
Beggars Bush State Forest	11 044 m	10 223 m
Bucklands Private Game Reserve	19 169 m	19 878 m
Buffalo Kloof Protected Environment	18 112 m	17 670 m
Waters Meeting Nature Reserve	19 214 m	19 814 m
Coleridge Game Reserve	18 796 m	18 092 m

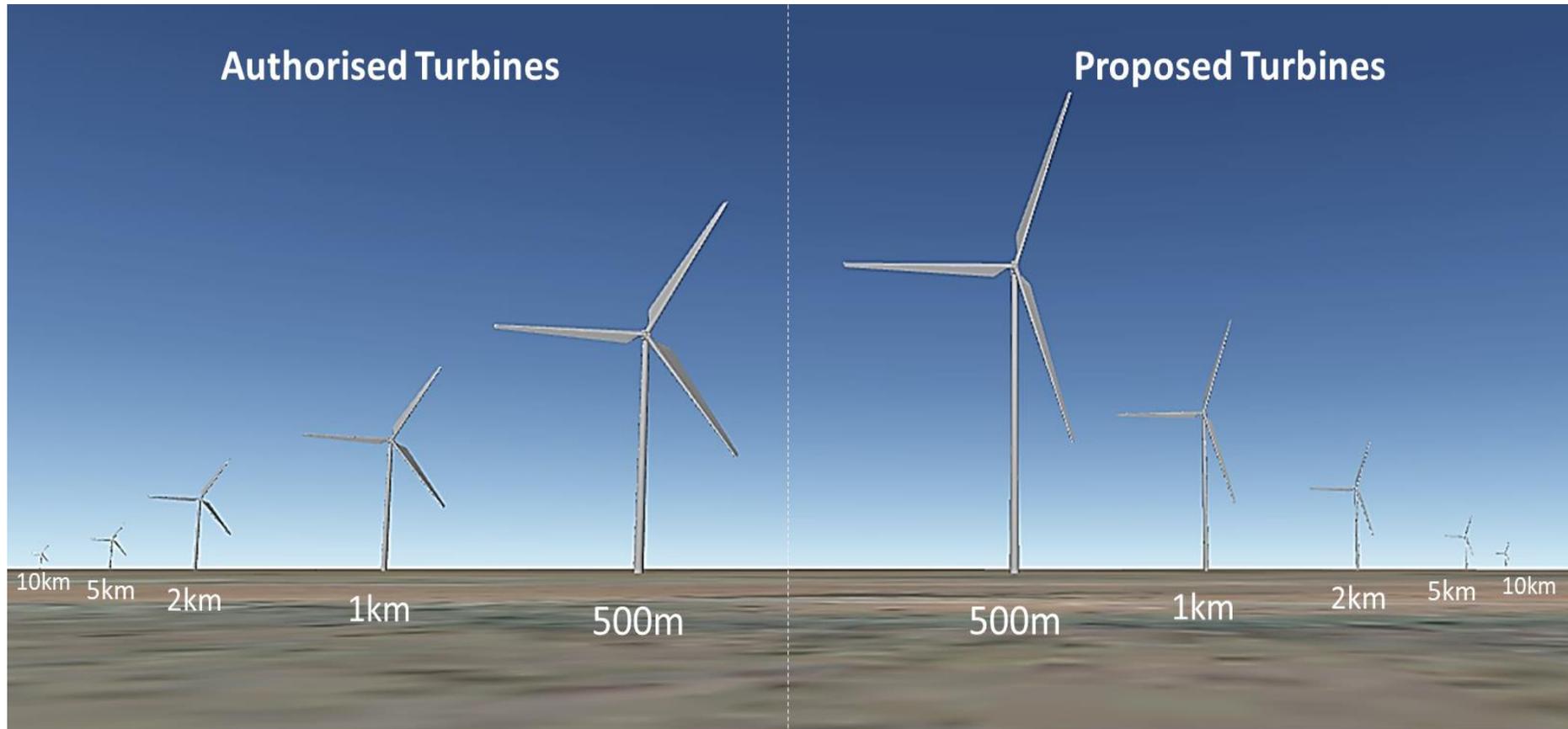


Figure 11: Conceptual example of the diminishing effect of a wind turbine

3.1.4 Visual Intrusion

Visual intrusion is the level of compatibility or congruence of the project with the particular qualities of the area, or its 'sense of place'. This is related to the idea of context and maintaining the integrity of the landscape or townscape.

- High visual intrusion – results in a noticeable change or is discordant with the surroundings;
- Moderate visual intrusion – partially fits into the surroundings, but clearly noticeable;
- Low visual intrusion – minimal change or blends in well with the surroundings.

Sense of place is defined by Oberholzer (2005) as: 'The unique quality or character of a place... relates to uniqueness, distinctiveness or strong identity.' It describes the distinct quality of an area that makes it memorable to the observer.

Although the increase in rotor diameter will slightly increase the visual intrusion of each individual turbine, the reduction in the total number of wind turbines and proposed change in layout would slightly reduce the visual intrusion of the project.

To illustrate the potential changes in visual impacts, 3D simulations were created for four viewpoints surrounding the proposed WEF. The viewpoints are shown in the figure below and explained in the following pages.

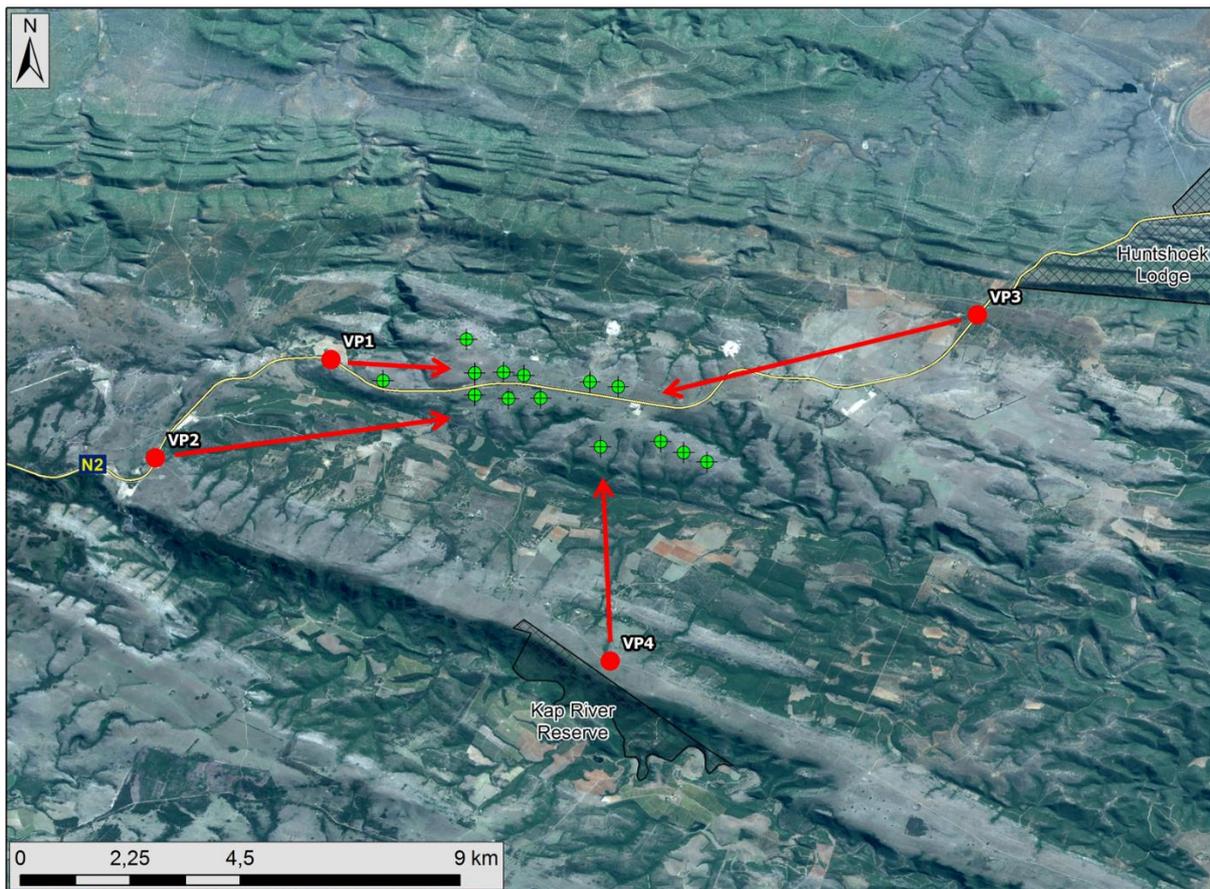


Figure 12: Location of viewpoints in relation to the proposed turbines

Viewpoint 1

Coordinates: 33°16'39.34"S (*Latitude*), 26°48'11.85"E (*Longitude*)

Figure 13 is an indication of the view from viewpoint 1. Figure 13A is a 3D model of the authorised turbines and figure 13B is a 3D model of the proposed turbine amendments.

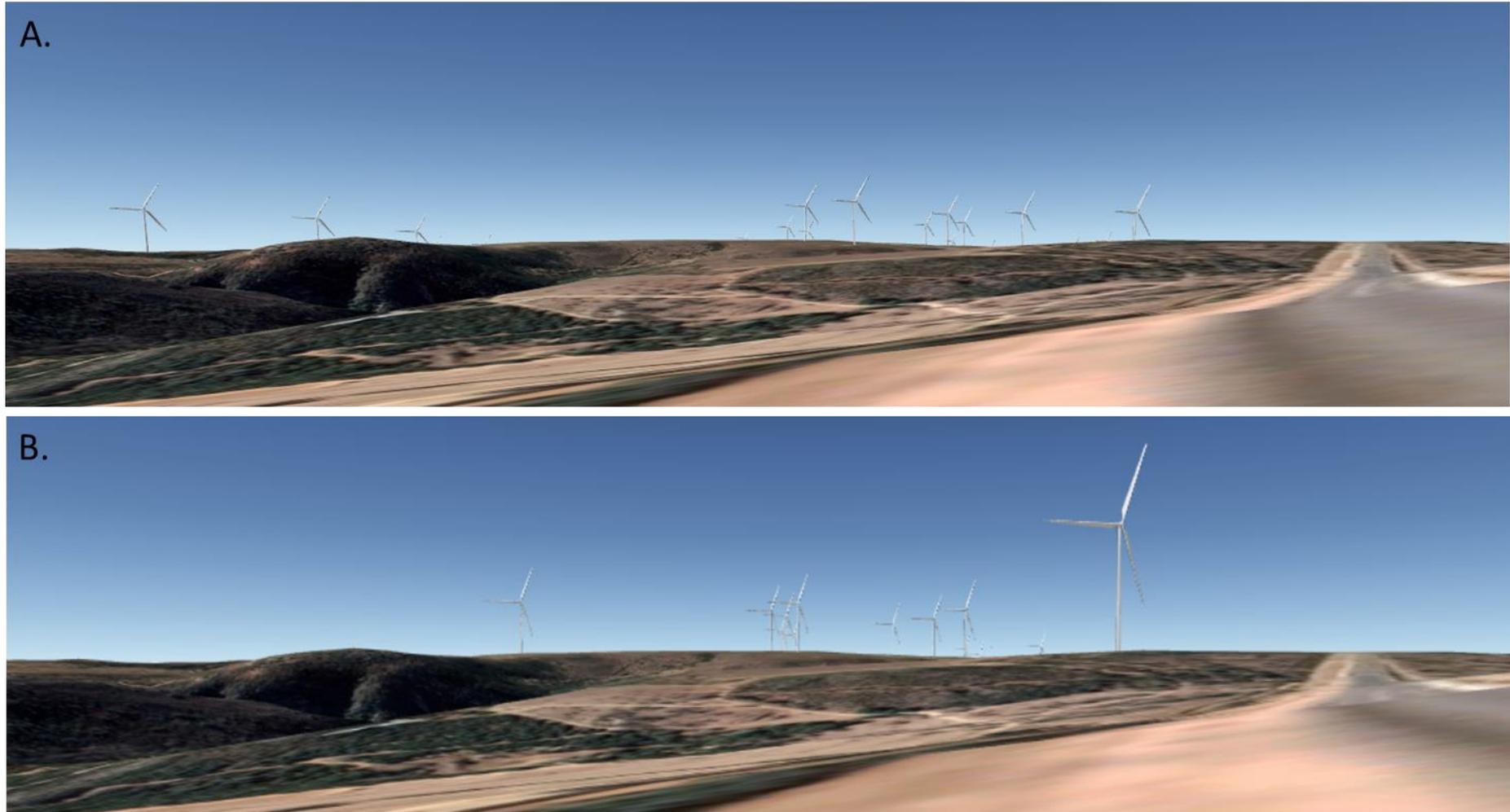


Figure 13: 3D simulation for viewpoint 1. A) Authorised turbines. B) Proposed turbine amendments.

Viewpoint 2

Coordinates: 33°17'45.09"S (*Latitude*), 26°46'15.62"E (*Longitude*)

Figure 14 is an indication of the view from viewpoint 2. Figure 14A is a 3D model of the authorised turbines and figure 14B is a 3D model of the proposed turbine amendments.

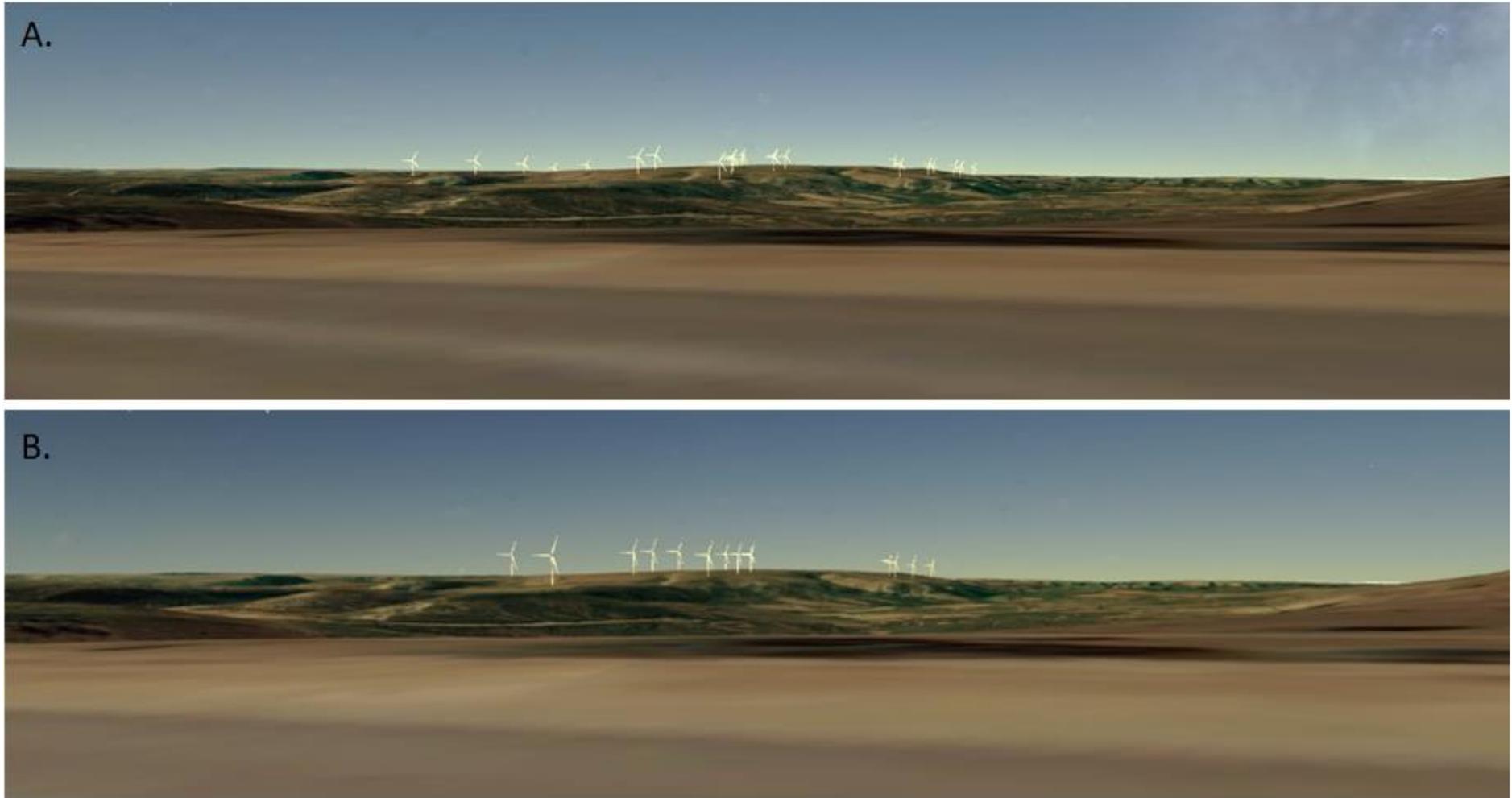


Figure 14: 3D simulation for viewpoint 2. A) Authorised turbines. B) Proposed turbine amendments.

Viewpoint 3

Coordinates: 33°16'9.47"S (*Latitude*), 26°55'20.38"E (*Longitude*)

Figure 15 is an indication of the view from viewpoint 3. Figure 15A is a 3D model of the authorised turbines and figure 15B is a 3D model of the proposed turbine amendments.

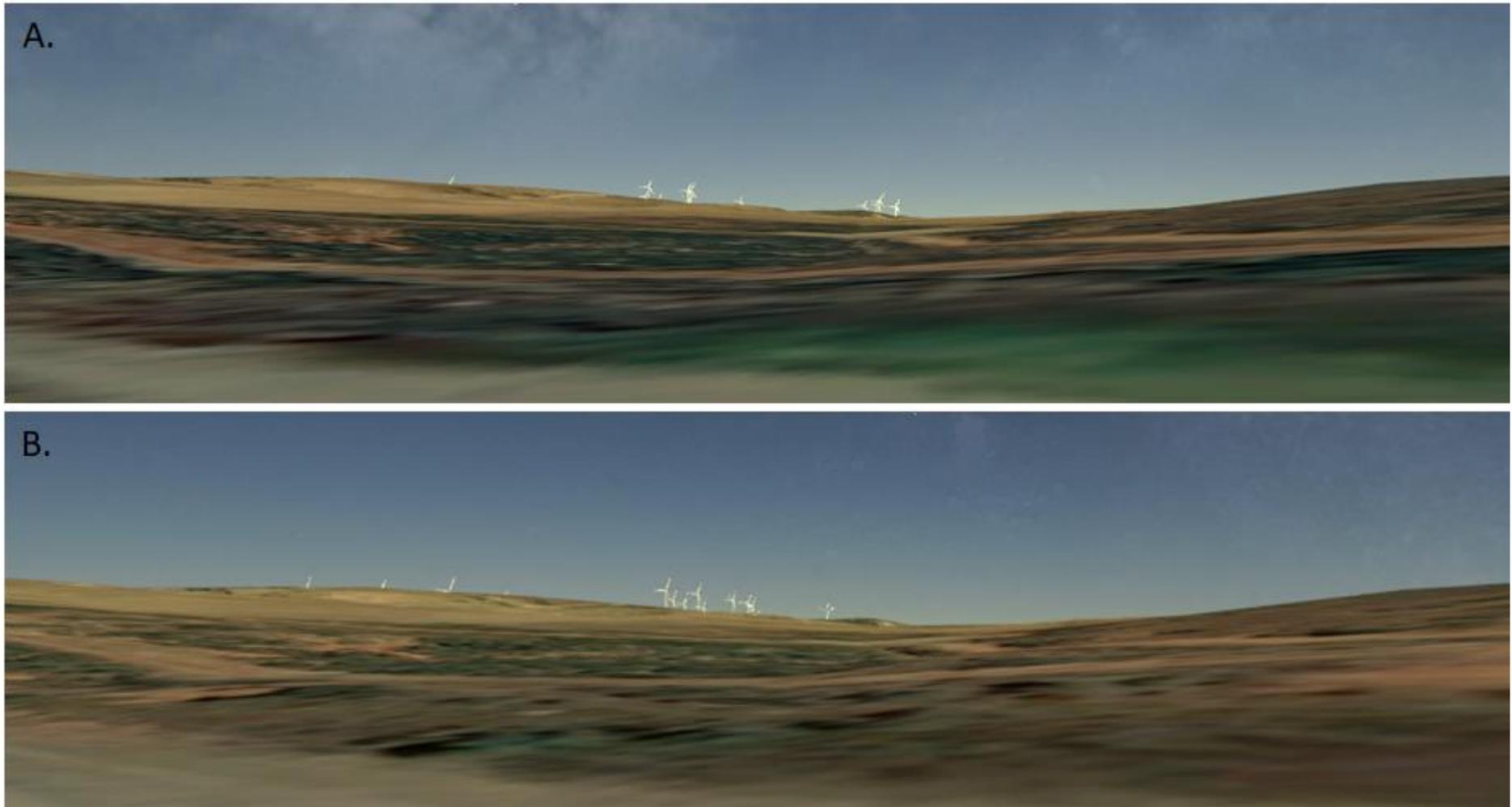


Figure 15: 3D simulation for viewpoint 3. A) Authorised turbines. B) Proposed turbine amendments.

Viewpoint 4

Coordinates: 33°20'0.76"S (*Latitude*), 26°51'16.95"E (*Longitude*)

Figure 16 is an indication of the view from viewpoint 4. Figure 16A is a 3D model of the authorised turbines and figure 16B is a 3D model of the proposed turbine amendments.

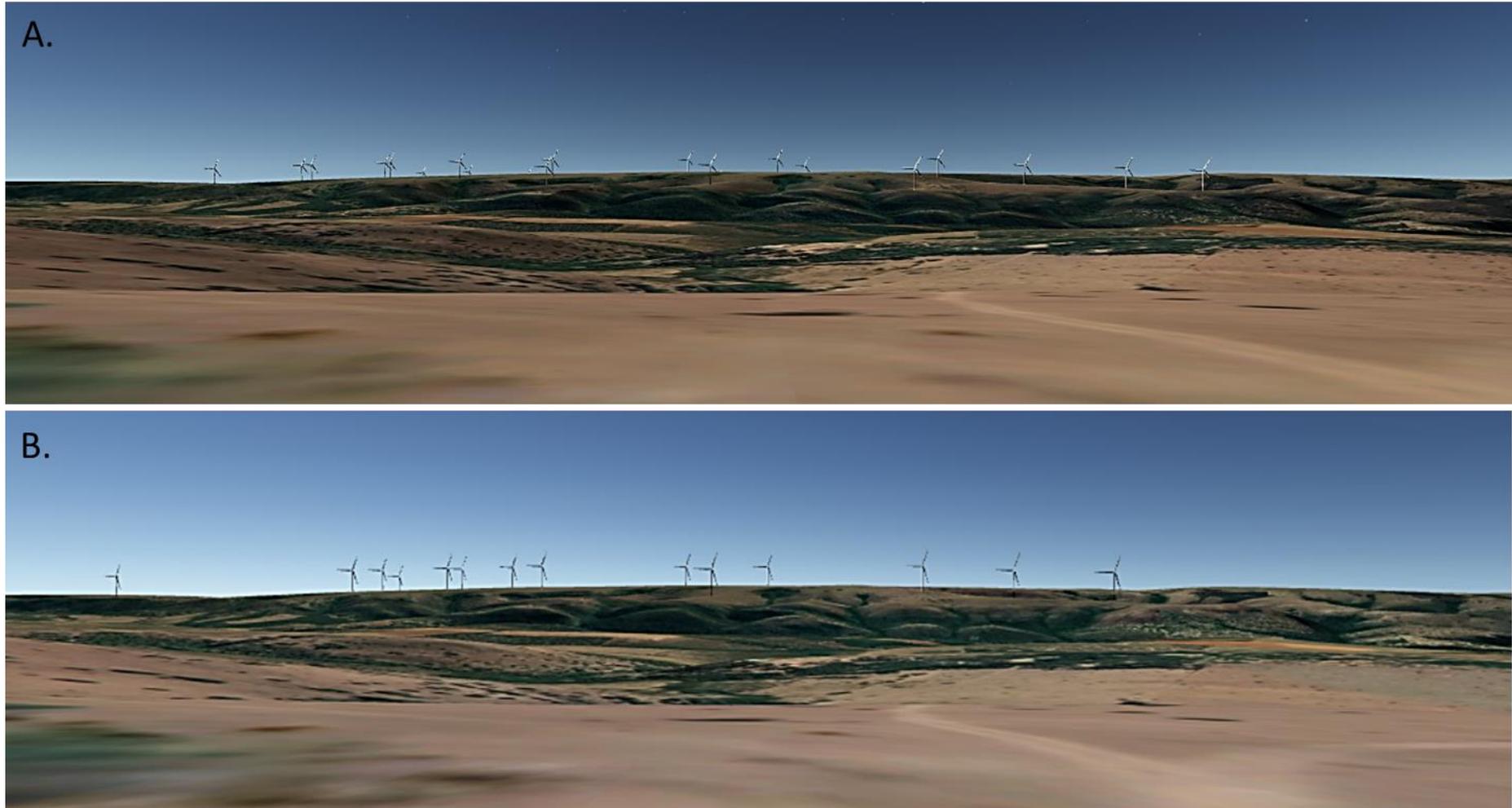


Figure 16: 3D simulation for viewpoint 4. A) Authorised turbines. B) Proposed turbine amendments.

3.2. Assessment of Significance

3.2.1 Impact 1: Impact of introducing highly visible wind turbines into a rural-agricultural landscape

The former 2015 VIA identified three main landscape types, including rural villages, stock and game farms and crop farms. These were all identified to have a low sensitivity to the proposed wind farm development since they were regarded as not pristine or prized for their natural beauty. This is due to the fact that much of the land has been transformed in some way resulting in man-made structures, activities and effects being present in most views of the landscape.

However, many game farms and nature reserves in the surrounding areas are not transformed to an extent where they are not prized for their natural beauty, and it is these areas which should be regarded as highly sensitive.

Therefore, depending on location within the landscape, the severity of the impact ranges from slight to high. The likelihood of the impact is definite. The overall significance is rated as high negative. As mentioned in the former 2015 VIA, there are no mitigation measures that will change the significance of the landscape impact other than avoiding the site entirely.

Table 3: Significance of the visual impact of wind turbines on the landscape

Impact (Operation Phase Only)	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
All Alternatives					
Without Mitigation	Long Term	Regional	Slight to High	Definite	High Negative
With Mitigation	Long Term	Regional	Slight to High	Definite	High Negative

3.2.2 Impact 2: Intrusion of large and highly visible construction activity on sensitive viewers

The overall significance of this impact has been changed from highly negative in the former 2015 VIA to moderately negative in the current VIA. This is due to the fact that the temporal scale of the impact is short term and that construction activities and large vehicles, on busy roads in the region, are currently a familiar occurrence (due to road works/construction of the N2) and will therefore not seem out of place. Furthermore, the reduction in turbines will decrease the duration of the construction period and construction activities required on site. Mitigation measures for this impact as per the former 2015 VIA must be upheld.

Table 4: Significance of the visual impact of construction activities on sensitive viewers

Impact (Construction Phase Only)	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
All Alternatives					
Without Mitigation	Short Term	Regional	Moderate	Definite	Moderate Negative
With Mitigation	Short Term	Regional	Slight	Definite	Moderate Negative

3.2.3 Impact 3: Intrusion of large wind turbines on the existing views of sensitive visual receptors

The proposed changes to the previously-approved Plan 8 Grahamstown WEF would not affect Impact 3 as described in the former 2015 VIA by Henry Holland. Mitigation measures as per the former 2015 VIA must be upheld.

Table 5: Significance of the visual impact of the proposed wind farm on sensitive viewers

Impact (Operation Phase Only)	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
All Alternatives					
Without Mitigation	Long Term	Regional	Severe	Definite	High Negative
With Mitigation	Long Term	Regional	Severe	Definite	High Negative

3.2.4 Impact 4: Impact of night lights on the existing nightscape

Wind farms are required by law to be lit at night as they represent hazards to aircraft due to the height of the turbines. Marking of turbines depends on wind farm layout and not all turbines need to be lit. Marking consists of a red flashing light of medium intensity (2000 candela).

While light pollution does exist in the form of single or multiple lights related to farmsteads, communication towers, vehicles travelling along the N2 and the background glow caused by towns such as Grahamstown, Peddie and the rural villages spread out along the opposite bank of the Fish River, the sight of a large number of closely and regularly spaced synchronized flashing lights is unique to wind facilities, and can be quite conspicuous, with the bright red of the lights contrasting highly with the nearly black backdrop.

The severity of Impact 4 has thus been increased from slight in the former 2015 VIA to moderate in terms of the current VIA. However, the change in severity will not increase the

overall significance of this impact. Mitigation measures as per the former 2015 VIA are still relevant and should be upheld.

Table 6: Significance of the visual impact of night lighting on sensitive viewers

Impact (Operation Phase Only)	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
All Alternatives					
Without Mitigation	Long Term	Study Area	Moderate	Probable	Moderate Negative
With Mitigation	Long Term	Study Area	Moderate	Probable	Moderate Negative

3.2.5 Shadow flicker effect

Shadow flicker results from the shade cast by a wind turbine and its rotating blades. The shade cast by the blades “flicker” from the point of view of a stationary observer as the blades rotate. This is most pronounced when the shadow is cast through a building’s opening, such as a window, especially when the window is one of the main sources of light in a room.

The impact of shadow flicker caused by wind turbines appears to be a minor issue in most countries where wind farms are common. There are no official regulations governing the levels of exposure to shadow flicker and it is unclear what the health risks are. Most reports on shadow flicker suggest that the threshold for a significant impact is 30 hours per year or more and many countries have adopted this as an informal regulation, following a court judgement made in Germany (EDR 2009).

England’s Companion Guide to PPS22 (2004) and Northern Ireland’s Best Practice Guidance to PPS18 (2009) state that only properties within 130 degrees either side of north of a particular turbine can be affected by shadows (Parsons Brinckerhoff, 2011). We assume therefore that the situation in South Africa is opposite i.e. only properties within 130 degrees either side of south of a particular turbine can be affected by shadows.

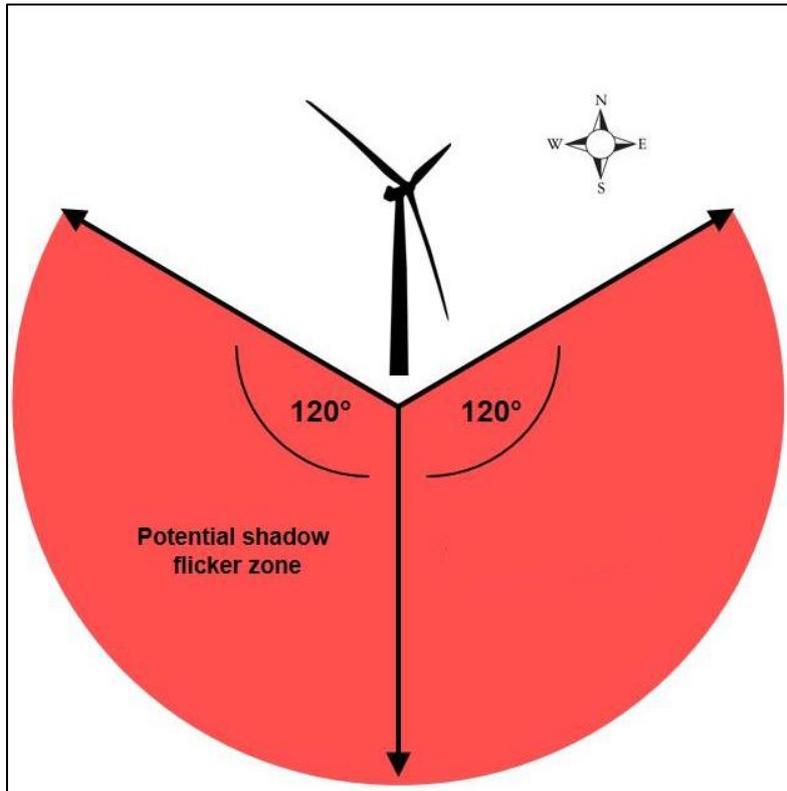


Figure 17: Potential shadow flicker zone in the southern hemisphere

When considering shadow flicker, local conditions also need to be taken into account. These include:

1. The latitude of the sight
Turbines at lower latitudes will cast longer shadows because the sun spends more time closer the horizon. In Australia the South Australian Planning Bulletin (2002) notes that shadow flicker is unlikely to be a significant issue at distances greater than 500 m. Australia lies within approximately the same lines of latitude as South Africa (South Africa: 22°S to 35°S; Australia: 10°S to 44°S).
2. The hub height
When the hub is higher, the same shadow will be spread over a larger area resulting in a reduced intensity of shadow in the vicinity of the turbine. The proposed changes to Plan 8 Grahamstown WEF are to increase the hub height from 91.5m to 125m.
3. Intervening vegetation
Vegetation may screen shadows. In the study area, vegetation is not dense or tall enough to reduce potential shadow flicker impacts.

Shadow flicker only needs to be considered relevant to buildings that are occupied most of the time: residential dwellings and places-of-work. It is not relevant to unoccupied structures, such as storage sheds. Furthermore, shadow flicker is only relevant to occupied buildings that have a window which faces the turbine. Shadow flicker cast against a wall will not impact occupants. As stated previously, it will only be a nuisance to occupants when that shadow temporarily blocks light streaming through a window, resulting in the “flicker” effect.

According to the former 2015 VIA, Shadow flicker modelling indicated that only one building (a homestead) is at a slight risk of being affected more often than international guidelines suggest as the threshold (30 hours/year, or 30 minutes on the worst affected day) at which mitigation measures should be implemented to reduce the impact. Residents of the house own the property on which the turbines will be installed. As discussed above the increase in hub height is likely to cause a reduction in the severity of this impact. Therefore the proposed changes to the previously-approved Plan 8 Grahamstown WEF would not affect this impact as the severity was already classified as slight in the former 2015 VIA by Henry Holland. Mitigation measures as per the former 2015 VIA are still relevant and should be upheld.

Table 7: Significance of the visual impact of shadow flicker

Impact (Operation Phase Only)	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
All Alternatives					
Without Mitigation	Long Term	Study Area	Slight	May Occur	Moderate Negative
With Mitigation	Long Term	Study Area	Slight	Unlikely	Low Negative

3.2.6 Cumulative Impacts

At the time of submission of the Second Final Amended EIA Report for the Plan 8 Grahamstown WEF, in April 2015, there were a number of facilities in the general area of the Plan 8 site that were operational (or close to operational), had been approved, or had been proposed by their developers. The facilities that were within 70km of the Plan 8 site were as follows:

Operational:

- Grahamstown Wind Energy Facility: 36km from the Plan 8 site.

Approved:

- Peddie Wind Energy Facility: 25km from the Plan 8 site.
- Canyon Springs Wind and Solar Facility: approximately 45km from the Plan 8 site.
- Uncedo Lwethu Wind Energy Facility: approximately 50km from the Plan 8 site.
- Riverbank Wind Energy Facility: adjacent to Uncedo Lwethu, approximately 50km from the Plan 8 site.
- Lushington Park WEF: approximately 65 km from the Plan 8 site.

Proposed:

- Terra Power Solutions Riebeeck East WEF (approximately 30 km away)
- The Spitskop WEF (approximately 45 km away)
- The Amakhala Emoyeni WEF (approximately 70 km away)

The locations of these facilities, and other facilities further than 70km from the Plan 8 site, are shown on Figure 18.

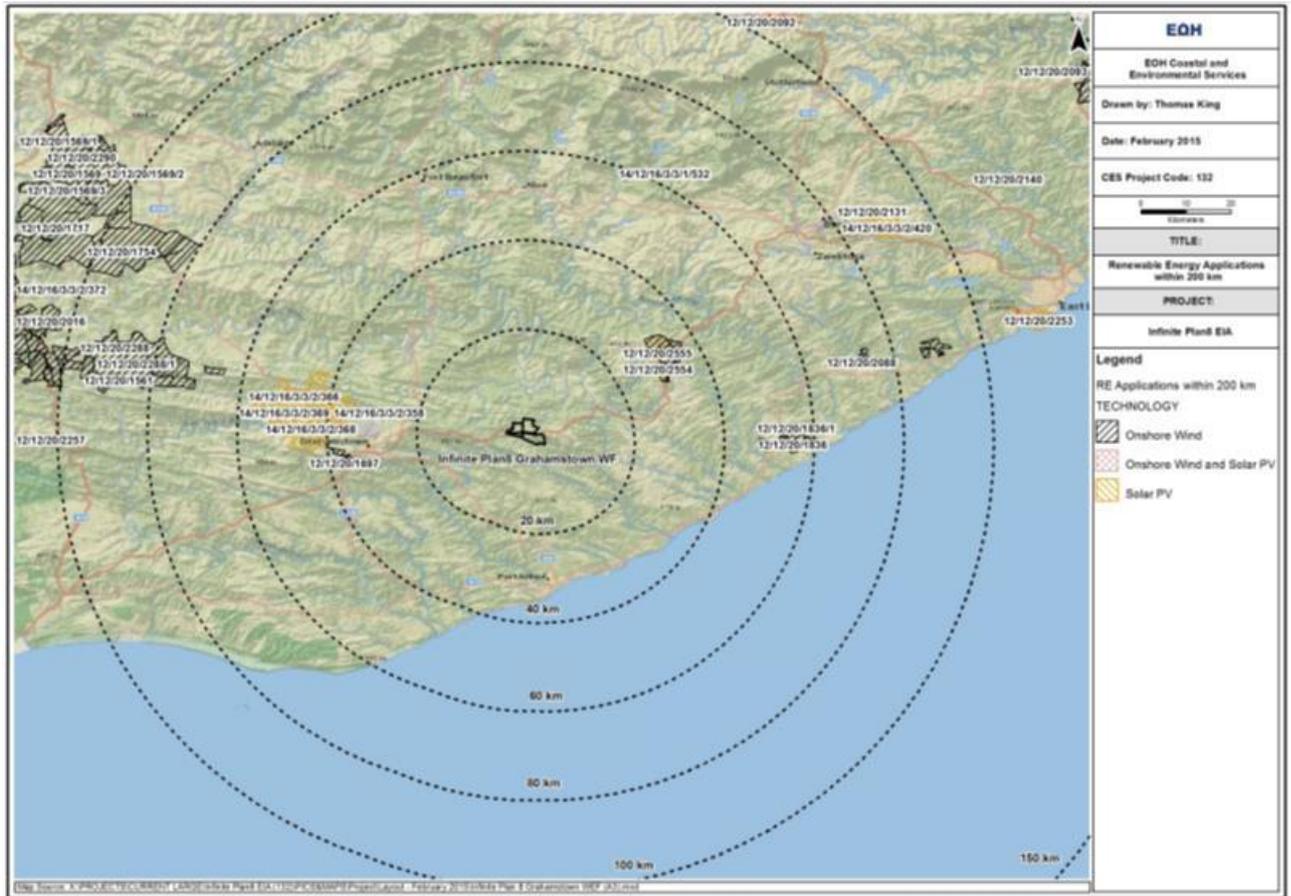


Figure 18: Renewable energy projects (at the time of the 2015 study) surrounding the proposed Plan 8 WEF

Since the nearest facility (the Peddie WEF) is 25km away, the contribution of the Plan 8 facility to cumulative impacts was considered to be negligible.

However, in recent months an EIA has been commenced for the proposed Albany Wind Energy Facility, the site for which is situated between the Plan 8 site and Grahamstown. The Albany facility will comprise up to 35 turbines. The hub height of the turbines is planned to be up to 130m, with blade lengths of up to 85m. The location of the proposed Albany facility in relation to the Plan 8 facility is shown on Figure 9. The closest turbines on the two sites will be separated by just over 6km.

The visual impact of the Albany facility will be considerable. Given that there will be up to 35 turbines on the Albany site (compared with 14 on the Plan 8 site), and the maximum height from ground level to the tip of the blades will be up to 215m, the visual impact will be significantly higher.

The cumulative visual impacts of the two facilities will be high, with the proposed Albany WEF making the largest contribution to the impact.

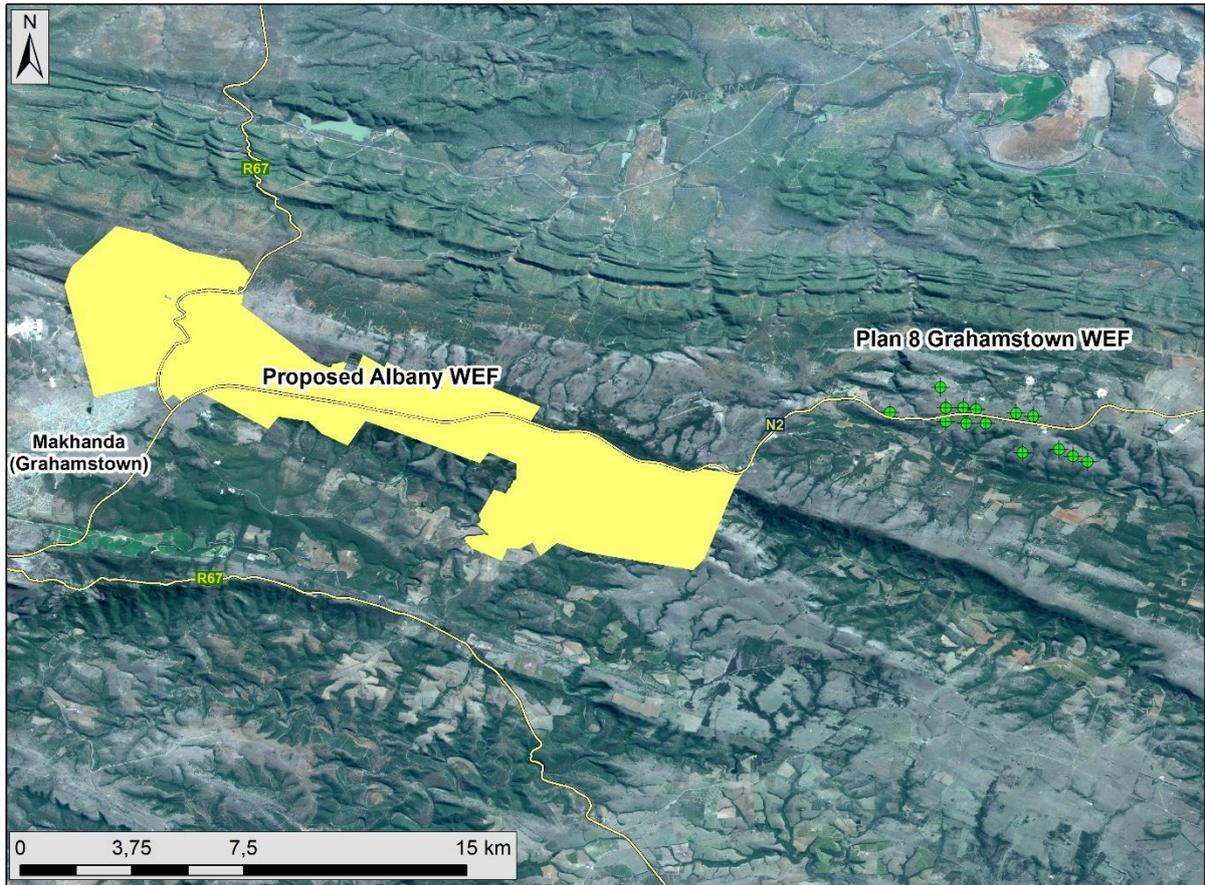


Figure 19: Location of the proposed Albany WEF in relation to the Plan 8 WEF

4. CONCLUSION & RECOMMENDATIONS

Plan 8 (Pty) Ltd. received EA (DEA Ref number: 12/12/20/2523) from the DEA to construct the Plan 8 Grahamstown WEF. In terms of Regulation 31 and 32 of the 2014 National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations, Plan 8 (Pty) Ltd. wishes to apply for an amendment to the EA issued. From a visual impact assessment perspective, the most significant changes are those to the number of turbines (from 22 to 14) and the proposed increase in the hub height (from 91.5m to up to 125m) and rotor diameter (from 117m to up to 163m).

Assessment of Impacts

An assessment of the proposed amendments was undertaken in terms of the specific visual impact assessment criteria recommended by Oberholzer (2005). It was found that although there would be a marginal change in visibility and visual intrusion, the proposed amendments will not introduce any new visual impacts.

Apart from the visual impact of construction activity, which has been decreased to moderately negative post-mitigation, the proposed amendments will not significantly alter the visual impacts as assessed in the former 2015 VIA Report, for which Environmental Authorisation was granted.

Furthermore, in assessing the direct impacts to visual resources, it has been recognised that, although the lifespan of the project is likely to extend for 20-25 years, all of the components of the superstructures can be removed on decommissioning, after which the landscape will be rehabilitated back to a near natural state. This means that although the proposed facility will undoubtedly have an impact on the visual resources of the area, it does not represent a completely irreversible loss of scenic resources.

Concluding Statement

It is concluded that the proposed amendments will not increase any identified impacts significantly, nor introduce any new impacts which are sufficiently significant to present a fatal flaw.

5. REFERENCES

CES 2015a: Second Final Amended Environmental Impact Assessment Report: Proposed Plan 8 Grahamstown Wind Energy Project, Makana Municipality. Volume 3, CES, Grahamstown, April 2015.

CES 2015b: Addendum to Second Final Amended EIA Report, CES, Grahamstown, April 2015.

DEA 2015: Environmental Authorisation in terms of Regulation 36 of the Environmental Impact Assessment Regulations, 2010,; Establishment of the Plan 8 Grahamstown Wind energy Facility (WEF) and its associated infrastructure within the Makana Local Municipality, Eastern Cape, Cacadu District Municipality, Department of Environmental Affairs, 22nd October 2015.

Government of South Australia. 2002. Planning Bulletin – Wind Farms (Draft for Consultation).

Holland, H (MapThis). 2015. Visual Impact Assessment of Proposed Plan 8 Grahamstown Wind Energy Facility.

Oberholzer, B. 2005. Guideline for involving visual & aesthetic specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Parsons Brinckerhoff. 2011. Update of UK Shadow Flicker Evidence Base - Final Report, London, England: Department of Energy and Climate Change.

Plan 8, July 2018: Personal communications via e-mail, Zuben Jessa, July 2018.

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APPENDIX A: CURRICULUM VITAE