

This chapter discusses the potential visual impacts the proposed Roggeveld Wind Farm may have on the landscape of the proposed site and surrounding area. ERM appointed Bernard Oberholzer Landscape Architects in association with MLB Architects and Urban Designers to undertake the required visual specialist study for the proposed development, which is appended to this report as *Annex I*. The potential impacts are assessed and mitigation measures to reduce the impacts are outlined below.

The Roggeveld site is located on 22 farms and straddles both the Western and Northern Cape. The Roggeveld site is located adjacent to the R354 arterial road, about 20km north of Matjiesfontein and 45km south of Sutherland.

The area is characterised by flat plains interspersed with hills and mountains, the dry riverbeds being indicative of the fairly arid landscape. The topography is dominated by the Klein Roggeveld Mountains with peaks ranging from 1300 to 1500 metres height.

The R354 Main Road from Matjiesfontein to Sutherland is an important tourist route, which has scenic value in places. The general area is otherwise sparsely populated, with only a few scattered farmsteads.

The visual impact would be largely limited to the operation phase, however, large machinery would be visible on site as soon as site preparation would begin and aspects of the Wind Farm would be visible during the construction phase.

The visual impacts would be perceived by two types of receptors during the operational phase, namely:

- receptors located at a fix points, i.e. dwelling on the site and surrounding areas; and
- receptors who would temporarily come into contact with the Wind Farm, such as passing motorists and tourists in the area.

The potential visual impacts are summarised in Table 12.1

Table 12.1 *Impact characteristics: Visual Impacts*

Summary	Construction	Operation
Project Aspect/ activity	Construction equipment	Operation of the Wind Farm
Impact Type	Direct negative	Direct negative
Stakeholders/ Receptors Affected	Affected landowners, neighbouring land owners, road users, visitors to the area.	Affected landowners, neighbouring land owners, road users, visitors to the area.

The potential visual impacts of the Roggeveld Wind Farm were determined using a series of quantitative and qualitative criteria. These were rated to determine both the expected level and significance of the visual impacts (Oberholzer *et al*, 2010). Table 12.2 below describes the visual assessment criteria in relation to the proposed Roggeveld Wind Farm. A pre-mitigation proposed turbine layout, Layout Alternative 1, was assessed (see Figure 12.1). Additionally photo montages were created (see *Figures 12.5 – 12.7*)

Table 12.2 *Criteria used to Assess Visual Impacts*

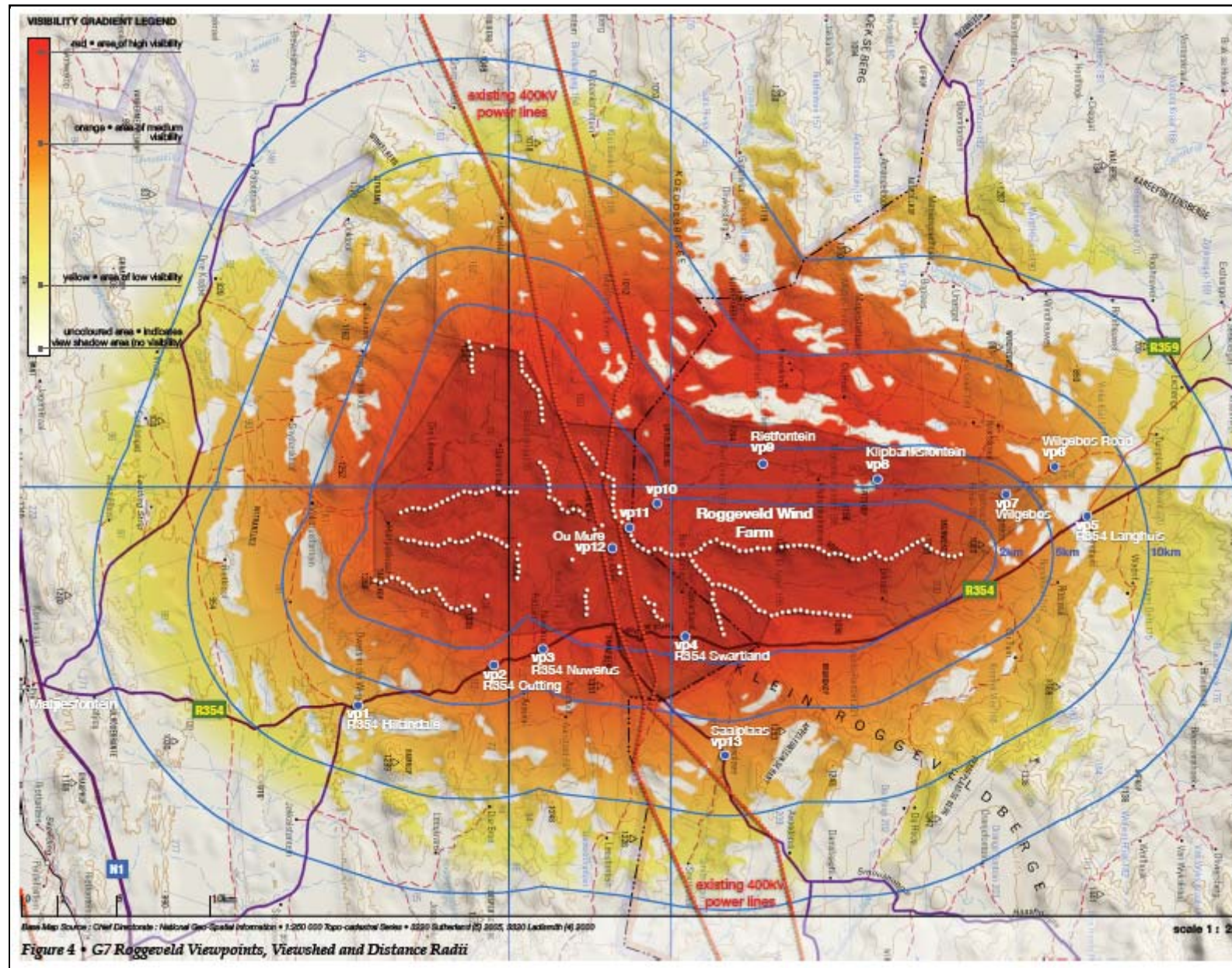
Criteria	Description	Comment
Viewpoints	Viewpoints were selected based on prominent viewing positions in the area, where uninterrupted views of the proposed energy facilities could be obtained, including potentially sensitive viewpoints.	The proposed facilities would be potentially visible from the R354 and a number of farmsteads
Visibility	Determined by the distance between the Wind Farm and the viewer. The degrees of visibility of the key components of the Wind Farm in relation to distance are given in Table 12.3 and Table 12.4.	Given the size of the wind turbines, visibility tends to be significant up to distances of 5km. to assist in quantifying visibility of the proposed facilities.
Visual Exposure	Determined by the geographical features of the area surrounding the site. Certain areas may fall within view shadows, where geographical features intervene with the line of sight from the Wind Farm to the receptor.	The viewshed boundary tends to follow ridgelines and high points in the landscape. Some areas within the view catchment area fall within a view shadow, and would therefore not be affected by the proposed energy facilities. The zone of visual influence tends to fade out beyond 5km distance.
Visual Sensitivity	Determined by the presence of topographical features, steep slopes, rivers, protected areas, scenic routes or airfields.	The Roggeveld site includes mountain ridgelines, steep mountain slopes
Landscape Integrity	Determined by the intactness of the landscape and the lack of other visual intrusions.	The Roggeveld site has a number of visual intrusions, including substations and existing Eskom power line, which have affected the character of the lower slopes. The upper mountain slopes and ridges have a number of existing access roads to the ridges, but otherwise have a wilderness character.
Cultural Landscape	Determined in a landscape by attributes that possess a cultural value, enhanced by the presence of historical settlements, old routes, graves and heritage sites.	Some cultural resources identified, however, these were found to be clustered and not impacted by any of the turbines.

Criteria	Description	Comment
Visual Absorption Capacity	This is the potential for the landscape to screen or absorb the Wind Farm.	Given the scale of the proposed facilities, their siting on a mountain skyline and the open nature of the landscape, there is little opportunity for screening.
Cumulative Visual Impact	This is the accumulation of visual impacts in the area, particularly in relation to other existing or proposed wind energy farms and industrial-type facilities.	Wind energy facilities are proposed at Konstabel and at Perdekraal within 35km. A solar energy facility is proposed near Touwsrivier within 40km distance.

Table 12.3 *Visibility of the wind turbines*

Degree of Visibility	Comments	Distance
Highly Visible	Clearly noticeable within the observers' viewframe	0 - 5 km
Moderately Visible	Recognisable feature within observer's viewframe	5 - 7.5 km
Marginally Visible	Not particularly noticeable within observer's viewframe	7.5 - 10 km
Hardly Visible	Practically not visible unless pointed out to the observer	10 - 15+ km

Figure 12.1 View Points and Viewshed for Roggeveld



12.2 *Visual Impact on fixed points*

12.2.1 *Impact Description and Assessment*

The mountainous terrain results in much of the surrounding area, particularly to the south, being in a view-shadow, where the proposed turbines would not be visible. There are no known nature reserves in the area. Some potentially historic, but derelict farm buildings occur in the north near Wilgebos.

Views of wind turbines from the R354 tend to be the most significant (2 to 6km distant). Farmsteads range from 1 to 6km. The proposed wind turbines would be visible to a number of scattered farmsteads, and also from the R354 arterial road between Matjiesfontein and Sutherland over a distance of almost 50km. Both of these destinations have tourism importance. The navigational lights on the turbines would also be potentially visible for a considerable distance at night.

The proposed Roggeveld Wind Farm would involve the introduction of up to 250 wind turbines as well as associated infrastructure such as a substation complex. It is anticipated that the wind turbines would have the greatest visual significance in the landscape, due to their large scale (100 m hub height). The associated infrastructure would be less visible from surrounding areas.

The physical presence of the proposed Wind Farm may alter the visual character of the landscape, as the proposed infrastructure, particularly the turbines, is in contrast to the rural surrounding landscape. The current landscape should not be regarded as pristine as there are existing visual intrusions on the site, such as a currently 2 major power line (400kV) running across the site and connection Gauteng to Cape Town, and a future larger power line (765kV) to be built parallel to these lines.

It is important to note that whether the visual impact is seen as positive or negative is highly subjective, and people's attitude towards and perception of the visual impacts associated with the proposed Wind Farm may differ vastly. Concerns have, however, been expressed during the public participation by some stakeholders that the proposed wind farm would have an aesthetic impact on the rural character and serenity of the area and that navigation warning lights would be visible at night (see *Annex H*). Note as well that most of the farmsteads are benefiting directly from the project and have no objection to its possible environmental impact. On the positive side, it should be recognized that other stakeholders consider the wind farms as attractive, showing economic development and sends out a visual signal of a commitment towards renewable energy.

Degrees of visibility in relation to distance tend to be as follows for the wind turbines, based on field observations and photographic panoramas. Visibility

is increased by the location of the turbines on a mountain skyline shown in [Table 12.4](#).

Table 12.4 *Potential Visibility from Surrounding Dwellings and Places of Interest*

View Pt	Location	Distance	Comments
VP1	R354 at Hillandale	6.42 km	Marginally visible in the distance.
VP2	R354 at road cutting	3.04 km	Clearly noticeable on the ridgeline in the middle distance.
VP3	R354 at Nuwerus	3.05 km	Clearly noticeable in the foreground.
VP4	R354 at Swartland	2.08 km	Highly visible in the foreground within the site.
VP5	R354 at Langhuis	6.91 km	Not visible because of view shadow.
VP6	Wilgebos Road	6.78 km	Clearly visible in the distance, but narrow view cone.
VP7	Wilgebos	3.93 km	Clearly visible on the ridgeline in the middle distance.
VP8	Klipbanksfontein	3.83 km	Clearly noticeable feature on the ridgeline in the middle distance.
VP9	Rietfontein	4.43 km	Partly visible in the middle distance.
VP10	road pass	2.03 km	Highly visible on the ridgeline.
VP11	ridge boundary	0.76 km	Highly visible in foreground.
VP12	Ou Mure	1.08 km	Highly visible in all directions.
VP13	Saaiplaas	6.43 km	Clearly visible in the distance.

Figure 12.12.2 View Point 3; looking north - west from R354 at Nuwerus



Figure 12.12.3 View Point 4; looking west from R354 at Swartland



Figure 12.12.4 View Point 13; looking north - west from Saaiplaas farmstead



Viewpoint 13 • looking north-west from Saaiplass farmstead
distance to nearest turbine • 6.43km

32.8967S, 20.6234E • 07/10/2010 • 15h52

Construction Phase Impacts

Although the turbines would be manufactured off-site and the construction phase would be relatively short-term in duration (24 months per 200 MW), large construction equipment will be required on site. Additionally, the presence of borrow pits would increase the potential visual impact and mitigation measures such as adequate siting and screening would be required.

Box 12.1 ***Construction Impact: Fixed receptors***

<p>Nature: Construction activities would result in a negative direct impact on the visual landscape in the area surrounding the site.</p> <p>Impact Magnitude - medium-high</p> <ul style="list-style-type: none">• Extent: The extent of the impact is local, as the facility would be hardly visible beyond 15km from the site.• Duration: The duration would be short-term as the construction phase would last approximately 24 months.• Intensity: The intensity would be medium-high, as the Wind Farm would be highly visible from the surrounding farmsteads. <p>Likelihood - There is a definite likelihood that this impact will occur.</p> <p>IMPACT SIGNIFICANCE (PRE-MITIGATION) - MAJOR-MODERATE (-VE)</p> <p>Degree of Confidence: The degree of confidence is High.</p>

Construction Phase

- The construction camp, material stores and lay-down area should be located as far as possible out of sight of the R354, possibly in the vicinity of the proposed substation and operations and management buildings.
- The extent of the construction camp and stores should be limited in area to only that which is essential.
- Disturbed areas rather than pristine or intact landscape areas should preferably be used for the construction camp.
- Measures to control wastes and litter should be included in the contract specification documents.
- Provision should be made for rehabilitation/ re-vegetation of areas damaged by construction activities.
- Borrow pits for the construction (which have not been identified), would be subject to permits from the relevant authorities. Borrow pits on the site are to be rehabilitated and re-vegetated according to the botanist's recommendations.

12.2.2 ***Operational***

Operational phase stem from the turbines itself, associate infrastructure such as O&M building, lighting, power lines and substations. these impacts are assessed in detail below.

Operational Phase Impacts

The following issues were observed regarding potential visual impacts during the operational phase of the proposed Wind Farm:

- The proposed energy facility will not be visible from any major transport routes (N1) but there will be visibility from tertiary roads in the area and especially the R543 between Matjiesfontein and Sutherland, a scenic tourism route.
- Visibility of lights at night: This is dependent on the number of turbines with navigation lights, and the amount of security lighting present on site. The navigation lights would have reflectors in order to minimise light pollution on the ground at night;
- Visual exposure (the zone of visual influence or view catchment): There would be an extensive viewshed, due to the location of the proposed turbines on the mountain ridgeline;
- Visual sensitivity (the effect on landscape features and scenic value): The site is characterized by the exposed Karoo landscape and visually sensitive skyline. The turbines would create a distinctive feature in the sparsely populated, rugged Karoo landscape.
- Landscape integrity (the effect on character of the area): The proposed Wind Farm contrasts with the rural / wilderness landscape of the Roggeveld site. There are existing 2 large 400kV power lines crossing the middle of the proposed Wind Farm;
- Cultural landscape (the heritage value of the landscape): see Heritage impact assessment for significance; Although this is a highly scenic area, it is very remote and not celebrated as a place with visual heritage qualities.
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- Visual absorption capacity: There would be a low potential for the open landscape and exposed ridgeline to visually absorb the proposed wind turbines.

Box 12.2 ***Operational Impact: Wind turbines on Fixed Receptors***

<p>Nature: Operational activities would result in a negative direct impact on the visual landscape in the area surrounding the site.</p> <p>Impact Magnitude – Medium-high</p> <ul style="list-style-type: none"> • Extent: The extent of the impact is local, as the facility would be hardly visible beyond 15km from the site. • Duration: The duration would be long-term as the impact would continue until the project is decommissioned, an approximately 25 year period. • Intensity: The intensity would be medium-high, as the Wind Farm would be highly visible from the surrounding farmsteads. <p>Likelihood – There is a definite likelihood that this impact would occur.</p> <p>IMPACT SIGNIFICANCE (PRE-MITIGATION) – MAJOR (-VE)</p> <p>Degree of Confidence: The degree of confidence is high.</p>
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The substation complex would house site offices, storage areas and ablution facilities in addition to the substation building. The substation would be a single-storey structure of approximately 2500 m² in size. The potential visual impact of the substation complex would be lower than that of the proposed turbines due to the single storey nature of the proposed complex, however, as it would be located on the ridge, it would be visible from the N1.

Box 12.3

Operational Impact: Substation Complex on Fixed receptors

<p>Nature: The presence of the substation complex would result in a negative direct impact on the visual landscape in the area surrounding the site.</p> <p>Impact Magnitude – Medium</p> <ul style="list-style-type: none"> • Extent: The extent of the impact is local, as the facility would not be visible beyond 10 km from the site. • Duration: The duration would be long-term since it will persist until the development would be decommissioned. • Intensity: The intensity will be medium, as the substation complex would be visible, but partly screened by low ridges from the N1. <p>Likelihood – There is a definite likelihood that the substation complex would result in visual impacts.</p> <p>IMPACT SIGNIFICANCE (PRE-MITIGATION) – MODERATE (-VE)</p> <p>Degree of Confidence: The degree of confidence is high as the assessment is based on a view shed analysis and photomontages.</p>
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12.2.3 Mitigating Visual Impacts at Fixed Points

- A minimum visual buffer zone of 500m for the wind turbines along the R354 Arterial Road.
- A visual buffer of 500m for the wind turbines from farmsteads.
- A visual buffer of 500m for the substation and O&M buildings from the R354 and farmsteads.

- The substation and O&M buildings to be grouped together as far as possible.
- The substation transformers, which have a high degree of visual intrusion, to be screened by the various buildings.
- The design of the buildings to be compatible in scale and form with buildings of the surrounding area, preferably using the regional Karoo architectural style. All yards and storage areas to be enclosed by masonry walls.
- Signage related to the enterprise to be discrete and confined to the entrance gates. No other corporate or advertising signage, particularly billboards, to be permitted.
- The navigation lights on the wind turbines to be fitted with reflectors so that the lights are not visible from below.

12.2.4 Residual Impact

The significance of the residual impacts associated with potential visual impacts on fixed points would be reduced as indicated below (see Table 12.5)

Table 12.5 Pre- and Post-Mitigation Significance: Visual Impact on Fixed Points

Phase	Significance (Pre-mitigation)	Residual Impact Significance
Construction (Short Term)	MAJOR (-VE)	MODERATE MAJOR (-VE)
Operation (wind turbines)	MAJOR (-VE)	MAJOR (-VE)
Operation (substation complex)	MODERATE (-VE)	MODERATE-MINOR (-VE)
Operation (at night)	MAJOR-MODERATE (-VE)	MODERATE-MINOR (-VE)

12.3

Visual Impact on Temporary Receptors

12.3.1 Impact Description and Assessment

The Roggeveld Wind Farm would be visible to motorists travelling on all of the above mentioned roadways to varying degrees. Motorists travelling along the R345 would be able to see the Wind Farm from distances up to approximately 6 km from the site, with the Wind Farm ranging from marginally visible to high visibility (for approximately 1km). People using the R345 would be able to see the Wind Farm, with the Wind Farm having a clear visibility. The Wind farm would have a high visibility from Ou Mure and along the ridge boundary. Temporary receptors would also be potentially impacted by the wind turbines being visible at night.

Table 12.6 Potential Visibility from Surrounding Roads

Box 12.4 *Operational Impact: Temporary receptors*

Nature: Operational activities would result in a **negative direct** impact on the visual landscape in the area surrounding the site.

Impact Magnitude – Medium-high

- **Extent:** The extent of the impact is **local**, as the turbines will be hardly visible beyond 10km from the site.
- **Duration:** The duration would be **short-term** as the Wind Farm will be visible to the receptor temporarily.
- **Intensity:** The intensity would be **medium-high**, as a motorist or traveller would be passing the Wind Farm with a range of visibility from low to high.

Likelihood – There is a **definite** likelihood that this impact will occur.

IMPACT SIGNIFICANCE (PRE-MITIGATION) – MAJOR-MODERATE (-VE)

12.3.2 Mitigating Visual Impacts at Temporary Receptors

Operational

- The footprint of the operations and maintenance facilities, as well as parking and vehicular circulation, should be clearly defined, and not be allowed to spill over into other areas of the site.
- The operations and maintenance areas should be screened by buildings, walls, hedges and/or tree planting, and should be kept in a tidy state to minimise further visual impact.

12.3.3 Residual Impact

The significance of the residual impacts associated with potential visual impacts on temporary receptors would be reduced for operation at night as indicated below (see Table 12.7).

Table 12.7 *Pre- and Post-Mitigation Significance: Visual Impact on Temporary Receptors*

Phase	Significance (Pre-mitigation)	Residual Impact Significance
Operation (day time)	MAJOR-MODERATE (-VE)	MAJOR-MODERATE (-VE)
Operation (night time)	MAJOR-MODERATE (-VE)	MODERATE-MINOR (-VE)

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