

PROPOSED SPRINGBOK WIND ENERGY FACILITY NEAR SPRINGBOK, NORTHERN CAPE PROVINCE: APPLICATION FOR AMENDMENT OF ENVIRONMENTAL AUTHORISATION (DEA REF NO: 12/12/20/1721).

Addendum to Specialist Visual Impact Assessment, October 2010: dated January 2017

1.0 INTRODUCTION

1.1 Background

KHLA was commissioned by Holland and Associates Environmental Consultants, Tokai, January 2017, to undertake the following study on behalf of the Applicant.

1.2 Original Approved Scheme

Environmental Authorisation for the proposed 55.5MW Springbok Wind Power Generation Facility, near Springbok in Northern Cape Province was granted by the Department of Environmental Affairs, (DEA) on 27th July 2011. The applicants, (Mulilo Renewable Energy (Pty) Ltd), preferred alternative, (Alternative A1) of 37 wind turbine generators, (WTG), with a generating capacity of 1.5MW per turbine has been so approved.

1.3 Current Proposed Amendment

Mulilo Springbok Wind Power (Pty) Ltd, (Applicant) now propose to amend the project description of the proposed WEF. These amendments require the re-assessment of the potential impacts associated with the proposed project to update the specialist study. The proposed amendments would provide for a lesser number of turbines with an individual, greater generating capacity but the total power output would not exceed that authorised, 55.5MW.

The applicant notes that the change in turbine output is motivated by recent developments in the efficiency of the technology. The applicant seeks authorisation to use up to twenty-five 2.0 to 2.2MW turbines (i.e. a potential range of 12 turbines at 4.5MW each up to 25 turbines at 2.0 – 2.2MW each, with the same maximum dimensions).

The original, approved project is referred to as the *Authorised Project*, and this amendment is referred to as the *Proposed Amended Option*.

2.0 COMPARISON OF ORIGINAL 2010 REPORT WITH THE CURRENT SCHEME

2.1 Amendments to Sections 1, 2 and 3 of the original report

There would be no material changes to section 1, apart from the revised Terms of Reference for this Amendment which are included at the end of this report.

There would be no material changes to section 2, apart from the revised Project Description, as described in Table 1. There would be no material changes to section 3.

Table 1 Proposed Amendments To Project Description

Component	Authorised	Proposed Amended Option
<u>Infrastructure Elements Amended:</u>		
Number of turbines	37	Maximum of 25 (i.e. potential range of 12 turbines @ 4.5MW to 25 turbines @ 2.0MW - 2.2MW)
Generation capacity per turbine	1.5MW	2.0MW – 4.5MW
Generation capacity of the WEF	55.5MW	Same as authorised (55.5MW)
Rotor diameter	88m \emptyset	Maximum of 160m \emptyset
Hub height	80m	Maximum of 140m
Temporary construction pad	40 x 20m	40 x 40m
Permanent affected area (foundation size)	16 x 16m and 2 m deep, (256m ² visible)	16 x 16m and 3 m deep
Network of 22kV transmission lines through the site	Each turbine linked with network	Each turbine linked with network; transmission lines reduced pro rata
Gravel roadways through the site	Link each turbine with existing roads	Link each turbine with existing roads, but reduced in line with reduced number of turbines
<u>Infrastructure mainly unchanged:</u>		
Built form, no significant change	Control centre, local substation, three laydown areas	Control centre, local substation, three laydown areas; no change in specification or location
Power evacuated with 66kV line to:	Nama substation	Nama substation, over the same route
Affected locations	Local settlements and roads N7, N14, R355	Local settlements and roads N7, N14, R355
Sensitive Receptors affected by the change in scale of impact	People living in the settlements, local golf club, aerodrome, and visiting Goegap Nature Reserve	People living in the settlements, local golf club, aerodrome, and visiting Goegap Nature Reserve

In summary, the proposed scheme provides for:

- 25 turbines would result in 30% fewer turbines (12 turbines would result in 66% fewer turbines)
- Correspondingly reduced visual clutter from transmission lines through the site
- The turbines have increased in total height from 124m to 220m, a factor of 77%
- The mast diameter \emptyset could increase by up to 25%
- Permanently affected local ground area at each turbine has not increased

The site area, the disposition of the proposed turbines in the landscape and other infrastructure is similar to the original scheme.

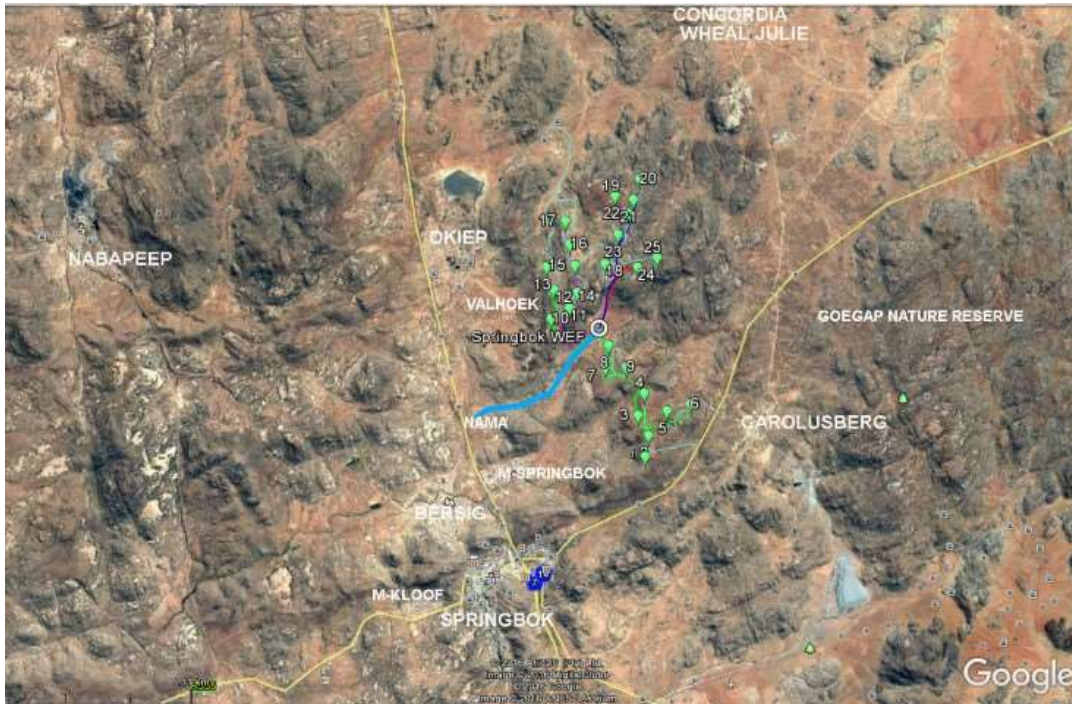


Figure 2.1, a screengrab of layout provided by the proponent imposed on Google Earth; local centres of population are named. The rugged terrain is evident. They are roughly in two groups – seventeen in the north group and eight in the south group. Source Google Earth/Mulilo/Holland

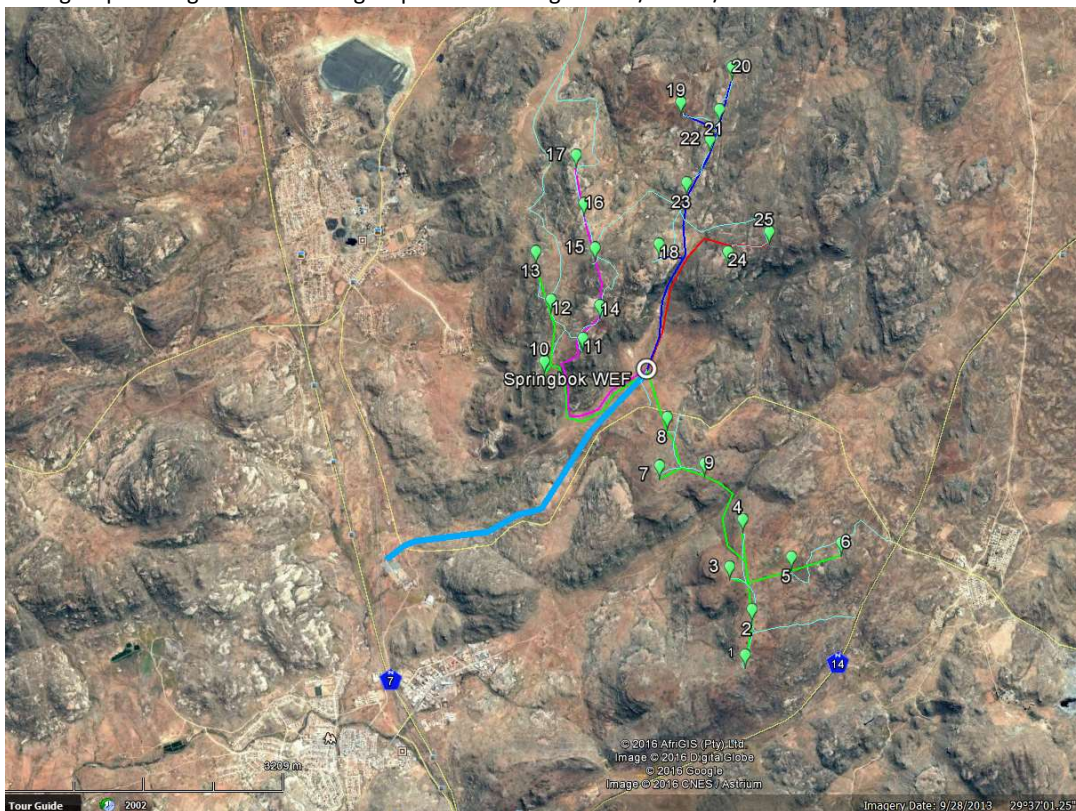


Figure 2.2 is the above image at a greater scale for clarity. This blue lines are gravel roads; green lines are 22kV overhead transmission network. Source Google Earth/Mulilo/Holland

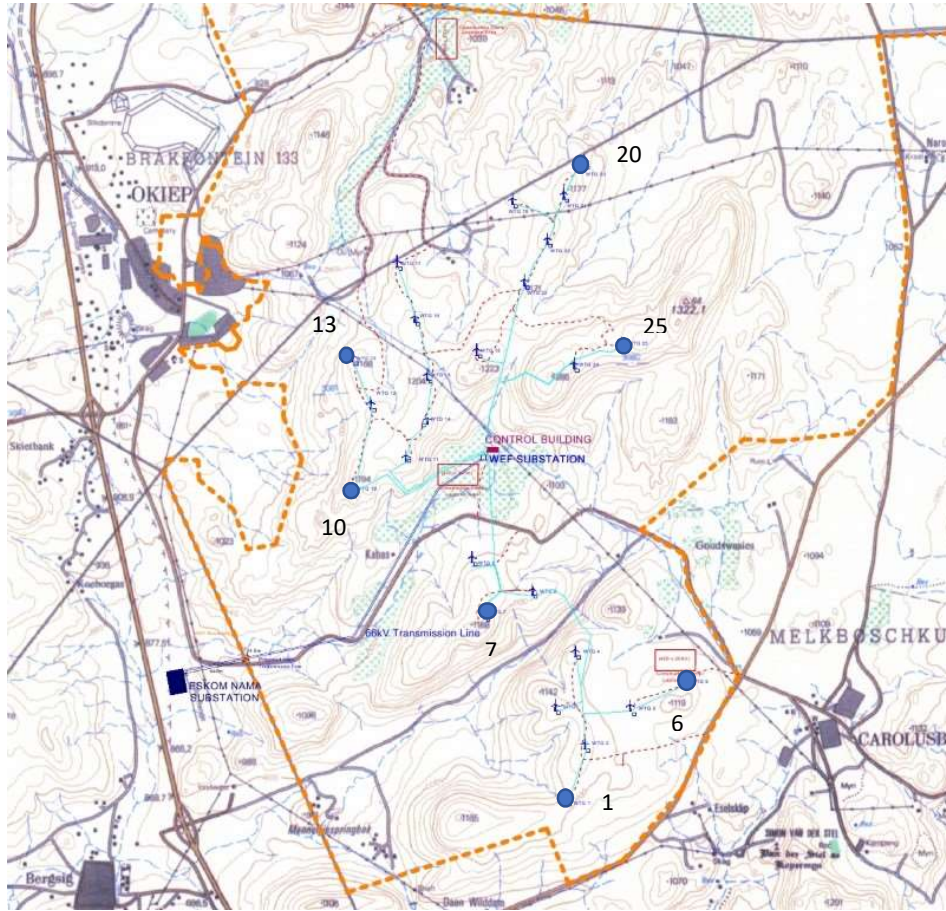
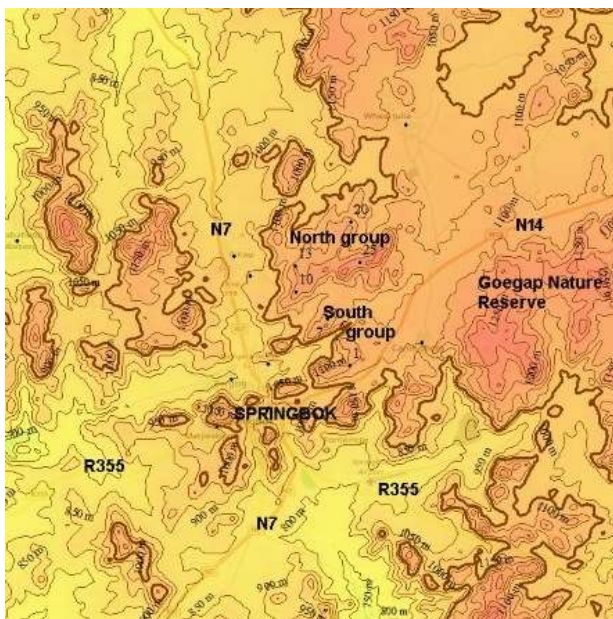


Figure 2.3 an excerpt from the layout plan prepared by Mulilo Renewable Energy dated April 2016 and illustrating the proposed location of 25 WTG. The site boundary, orange dashed line; proposed turbines, blue; transmission network, light blue; roadways are red. Three red oblongs are the construction camp/laydown areas; the proposed WEF substation is in the centre of the site and Nama substation to which the power would be evacuated is the solid blue square close to the N7. Source: Mulilo/Holland



Certain turbines are picked out in blue circles, they represent the north group and the south group in the visual envelope graphics in Figures 2.5 and 2.6.

Figure 2.4, the topography of the development site with contours at 50m, indicating the ruggedness of the terrain. The layout has been divided into two, for clarity of analysis. Source G Mapper/Hansen

2.2 Section 4 'Visual Impact Assessment'

The following changes to the original section content are relevant and firstly concern the amended visual envelopes:

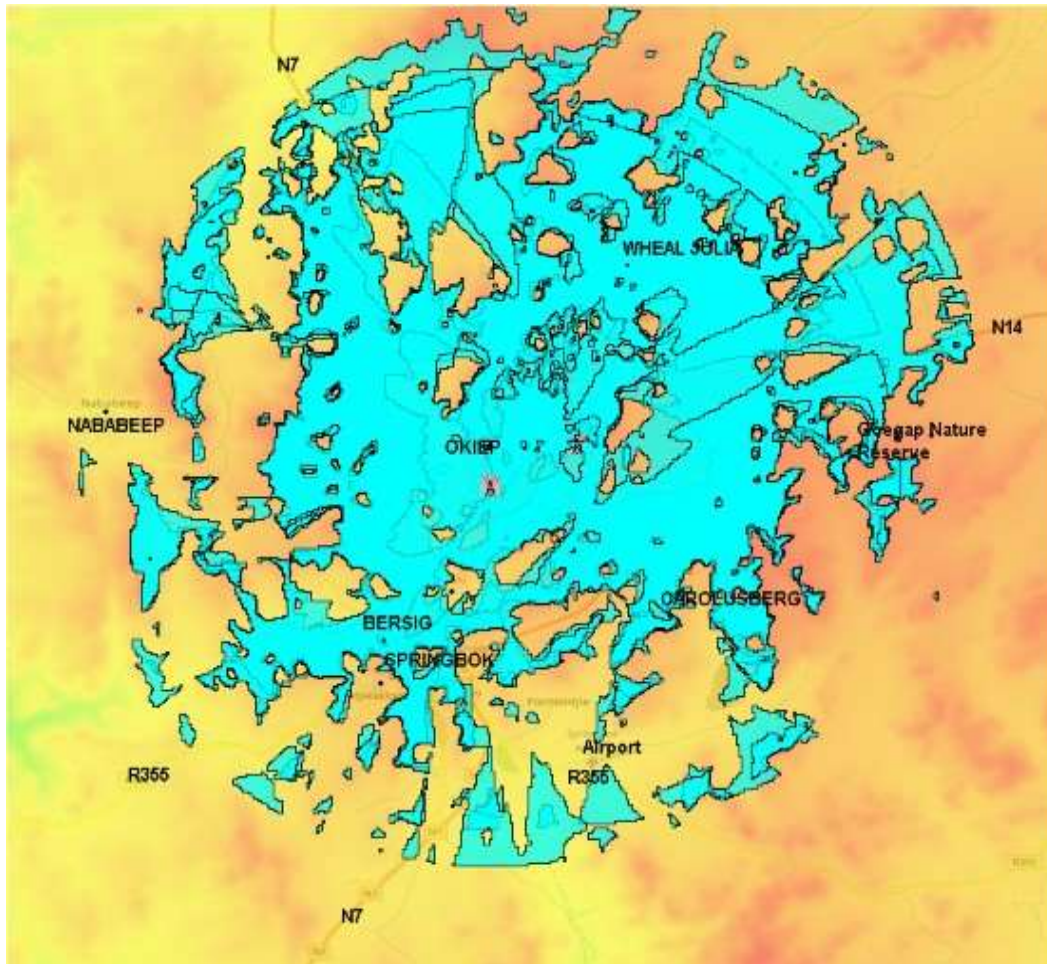


Figure 2.5 image generated by digital terrain mapping to assess the overall visibility of the turbines in the 'north' group. Lower ground is represented by the green colour, higher ground by orange. The viewshed for each turbine is shown in blue and they overlap with one another.

A representative sample of four turbines was identified based on the criterion of 'most likely to be visible to a population centre'. The geographic locations were fixed by their co-ordinates, the viewshed tool set to **200m** high. Turbine height would be 220m, and setting the height at less ensures that some visible part of the rotor blades would be seen. The **view radius** was set to 12km, though the turbines would be visible beyond that; within 12km could be considered the focus of the view.

Most of the **population** centres are coloured over in 'blue' and that indicates that they would be visually aware of part, or all, of the turbine group. There is an exception in Matjieskloof, a small place to the west of Springbok. Extensive lengths of the N7, the N14 and the R355 would be similarly affected.

The population centres and to a lesser degree, the roads, occupy lower elevations; the turbines would be on the undulating hill land which is on average about 250m higher. Therefore, as people move around, some turbines will always be visible despite any shielding from intervening hill land.

The turbines in *the Proposed Amended Option* are fewer in number, (max. 25nr), but 77% higher; their visual impact would be greater than for those in *the Authorised Project* due to scale.

Metadata for the selected turbines

Turbine nr	Base elevation	% of the sampled area, visually impacted upon
20	1,132.2m	41%
13	1,147.6m	42%
25	1,230m	49% one of the highest locations and the most visible
10	1,176m	45%

Conclusion: the average of these turbines is less than 50% of the sampled area affected visually, and this would be due to the ruggedness of the terrain

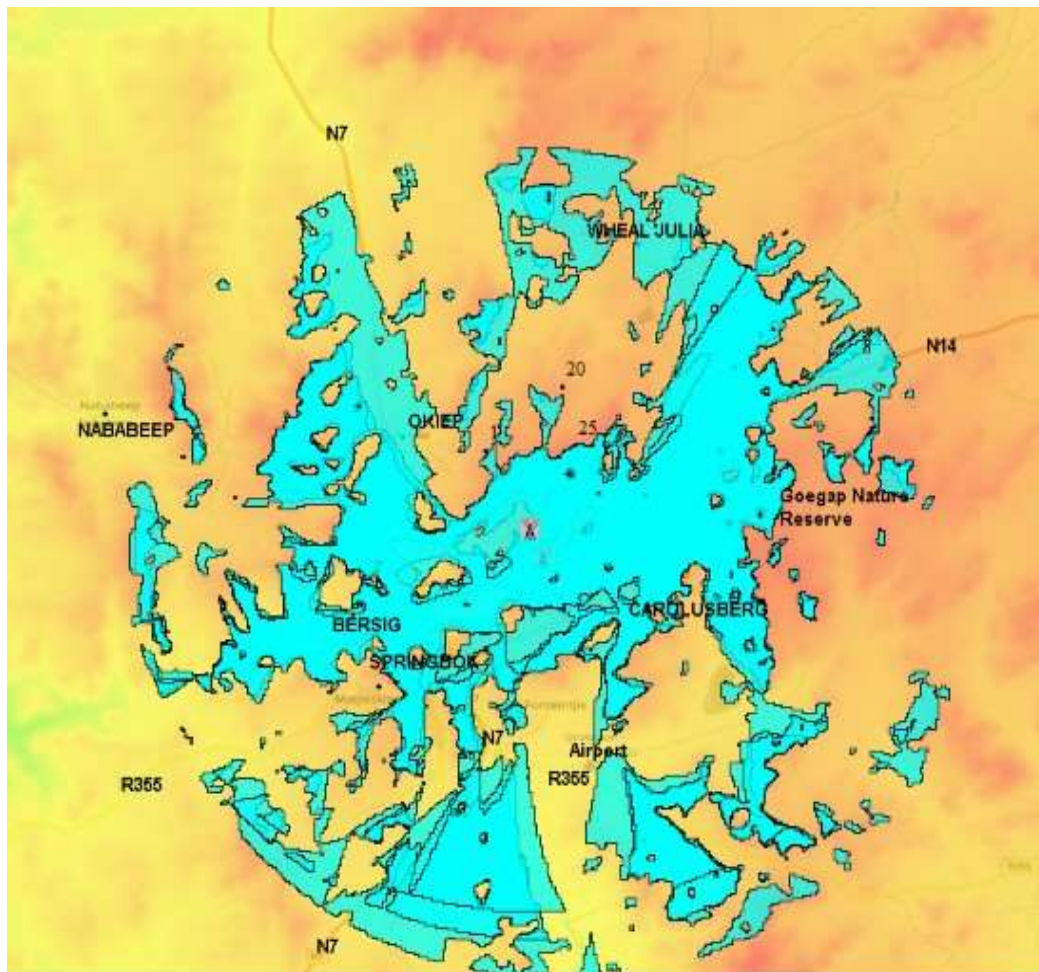


Figure 2.6 image generated by digital terrain mapping to assess the overall visibility of the turbines in the 'south' group. Lower ground is represented by the green colour, higher ground by orange. The viewshed for each turbine is shown in blue and they overlap with one another.

A representative sample of three turbines was identified based on the criterion of 'most likely to be visible to a population centre'. The geographic locations were fixed by their co-ordinates, the viewshed tool set to **200m** high. Turbine height would be 220m, and setting the height at less ensures that some visible part of the rotor blades would be seen. The **view radius** was set to 12km, though the turbines would be visible beyond that; within 12km could be considered the focus of the view.

Most of the **population** centres are coloured over in 'blue' and that indicates that they would be visually aware of part, or all, of the turbine group. There are exceptions in Matjieskloof, a small place to the west of Springbok, southern parts of Springbok, and also part of Okiep. Extensive lengths of the N7, the N14 and the R355 would be similarly affected.

The population centres and to a lesser degree, the roads, occupy lower elevations; the turbines would be on the undulating hill land which is on average about 250m higher. Therefore, as people move around some turbines will always be visible despite any shielding from intervening hill land.

The turbines in *the Proposed Amended Option* are fewer in number, (max. 25nr), but 77% higher; their visual impact would be greater than for those in *the Authorised Project*.

Metadata for the selected turbines

Turbine nr	Base elevation	% of the sampled area, visually impacted upon
1	1,100m	35,5%
6	1,077m	29.6% one of the lowest locations and the least visible
7	1,146m	38.7%

Conclusion: the average of these turbines is less than 40% of the sampled area affected visually, and this would be due to the ruggedness of the terrain

2.2.1 Localities from which the development would be seen are centres of population and transport corridors:

Centres of population will be in a similar spatial relationship with the proposed turbines in the *Authorised Project* and the *Proposed Amended Option*. In summary:

- Springbok: the nearest three WTGs in the south group would be between 3.8 to 4.2km away
- Bersig (north of Springbok): the south group of WTG would be 4.1 to 4.5km away
- Mannetjiespringbok (east of Bersig): the south group would be 2.8km away
- Matjieskloof (west of Springbok): south group about 6.6km away

Okiep: the nearest three WTG are no.s 10, 12 13, and would be 1.8 and 1.9km away from the suburb of Valhoek, SE of the main town, and 1.9 to 2.4km away from Okiep; no.s 11,14,15, 16, 17 would be between 2.3 and 2.7km away from the town.

Concordia and Wheal Julie: both small centres of population are close together, Wheal Julie is closer to the WEF. Four WTG (no.s 19, 20, 21, 22) would be between 5.1 and 5.5km away

Carolusberg: Three WTGs no.s 2, 5 and 6, would be 1.3 to 2.3km away

Nababeep the nearest WTGs would be 10.7km away.

2.4.2 Transport corridors:

Users of transport corridors will be in a similar spatial relationship with the proposed turbines in *Authorised Project* and *Proposed Amended Option*. In summary:

N7: for receptors travelling north or south, from north of Okiep to south of Springbok, the WEF would be visible enough to change the character of the view. Tourists would be affected.

N14: for receptors travelling east or west, into or out of Springbok, the WEF would be visible enough to change the character of the view. Tourist traffic could be affected.

Receptors using the road between Okiep and Concordia would be visually aware of the WEF.

Receptors using the R355, from the SE; it links the aerodrome, the golf course, through into the centre of Springbok and out to the west and Matjieskloof and beyond, would be visually aware of the WEF.

The Goegap Nature Reserve, lying on the south side of the N14, and close to Carolusberg, would be visually impacted upon, proposed turbines would be within 2.5km and result in a noticeable visual impact.

2.4.3 Table 2.2: Comparison of Impacts discussed in the original Report

Nature of Impacts	Authorised Project	Proposed Amended Option
Extent of the Visual Impact	Sub regional	Sub regional
Duration of Impact	Long term	Long term
Intensity or Magnitude	High reducing with distance to medium	High reducing with distance to medium-high
Probability	Definite	Definite
Degree of Confidence	High	High
Visual Exposure	High	High
Zones of Visual Influence or Theoretical Visibility	Varied from low to high with proximity	Varied from low to high with proximity
Visual Absorption Capacity	Low	Low
Compatibility with Surrounding Landscape	Incompatible	Incompatible
Potential Cumulative Visual Impacts	Possible	Possible
Significance of the Visual Impact	High	High
Mitigation	Construction access, roads, footings, buildings, transmission masts, layout, materials and finishes	Construction access, roads, footings, buildings, transmission masts, layout, materials and finishes
Significance after Mitigation	Moderate High	Moderate High

2.5 Section 5 'Mitigation Measures'

No change to the original section content.

2.6 Impact Tables for Proposed Amended Option

Table 2.1 Construction Phase

Nature: Impact of initial site works, construction camps, site set up, laying services, ground works		
	<i>Without mitigation</i>	<i>With mitigation</i>
<i>Extent</i>	Local	Local
<i>Duration</i>	Short -term	Short-term
<i>Magnitude</i>	Moderate	Medium-Low

Probability	Probable	Probable
Significance	Medium	Medium-Low
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be avoided, managed or mitigated?	Yes	
Mitigation: Establish screening structures to shield construction works from sensitive receptors; good traffic and site management. Keeping construction period as short as reasonable		
Cumulative impacts: None		
Residual Impacts: Some limited but permanent ground contamination could occur.		

Table 2.2 Construction Phase

Nature: Impact of construction of access roads, hauling and delivery of construction materials		
	Without mitigation	With mitigation
Extent	Local	Local
Duration	Short -term	Short-term
Magnitude	Moderate	Medium-Low
Probability	Probable	Probable
Significance	Medium	Low
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be avoided, managed or mitigated?	Yes	
Mitigation: good traffic management, no delivery of materials and components during unsocial hours		
Cumulative impacts: None		
Residual Impacts: None		

Table 2.3 Operation Phase

Nature: Impact on receptors living and working locally of the change in site character from rural upland to industry; impact on road users		
	Without mitigation	With mitigation
Extent	Local, regional	Local, regional
Duration	Long -term	Long-term
Magnitude	High	High
Probability	Probable	Probable
Significance	High	High
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be avoided, managed or mitigated?	To a limited degree	

Mitigation: as per Alternative 1 (i.e. the authorised project), and relating to roadways, footings, transmission masts, and layout.
Cumulative impacts: other alternative energy proposals may be applied for in the future
Residual Impacts: From the concrete foundations

Table 2.4 Operation Phase

Nature: Impact of the colours, finishes, heights of the infrastructure		
	Without mitigation	With mitigation
Extent	Local, regional	Local, regional
Duration	Long -term	Long-term
Magnitude	High	High
Probability	Probable	Probable
Significance	High	High
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be avoided, managed or mitigated?	To a limited degree	
Mitigation: as per the Authorised project, and relating to reducing visual clutter, establish buildings in locations not visible to majority of receptors, material and finishes of infrastructure elements.		
Cumulative impacts: None		
Residual Impacts: From the concrete foundations		

2.7 Section 6 'Conclusions and Recommendations'

Alternative 1 (i.e. the authorised project) was discussed as follows:

- The scheme as a whole was described as visually strong, complex and cluttered in the landscape
- The clutter was regarded as intrusive in the scale of the local landscape
- It was noted that, for receptors on the N7 travelling south, this area could function as a 'gateway' to South Africa
- The scheme could have a positive effect and be regarded as a landmark
- To mitigate the impact upon the sites of industrial archaeology it is proposed that interpretation information is offered to compare industrial infrastructure in the 17th to 19th centuries with that of the 21st century. That could define the historical timeline and some greater understanding of industrial progress.

Recommendations were that if mitigation measures were undertaken and an environmental management plan instituted, the development could proceed.

3.0 CONCLUSIONS RECOMMENDATIONS

4.1 Change of Land Use and Landscape Character

The award of Environmental Authorisation in 2011 to the scheme referred to as *Authorised Project* accepts the principle that a WEF of 37 WTG, 124m high may be established on this site. The change of land use and landscape character is accepted. The landform setting is of a scale to absorb this development.

4.2 Proposed Amended Option

Proposed Amended Option, if 25 turbines would be constructed, offers 30% fewer turbines, 77% greater in scale, along with similar infrastructure elements as before. If 12 turbines would be constructed, the layout would offer 66% fewer turbines, 77% greater in scale.

4.3 Comparison of Visual Components

Proposed Amended Option provides turbines that would be 77% more dominant in the landscape, because they have greater mass and would be easier to see.

Proposed Amended Option offers a scheme where visual clutter has been reduced and the visual scale increased.

Proposed Amended Option provides a WEF that could become an effective gateway and landmark, and would appear more high tech in appearance which may be eventually seen elsewhere in South Africa, in appropriate locations. The WEF would have a high significance rating, (which is a combination of intensity, extent and duration ratings), and the degree of that high rating would be somewhat greater than for the previously authorised project due to the increased height and rotor length.

The height of the hills and the elevation of the roads and adjacent settlements all vary considerably but an average general height difference is taken to be a nominal 250m, (there are exceptions), between the average ground levels of receptors and the average ground levels of the turbines. Turbines of 220m high, could appear from many views to be almost as high as the hills and could appear to dominate and to conflict with their scale. For that reason, (potential visual impact and aesthetics), it is advised that a scheme with fewer turbines is preferred; the scheme layout of 25 turbines would have a lower impact than the Authorised Project layout of 37 turbines.

The locations chosen for the 12 turbines, based on visual constraints alone, would be: 4, 7, 8, 9, and 18 to 25, inclusive.

4.4 Conclusion

Proposed Amended Option with 25 turbines is acceptable from a visual standpoint.

4.5 Recommendation

Proposed Amended Option could proceed if mitigation measures would be undertaken (as per the visual impact mitigation measures for the authorised project) and an environmental management plan instituted.

ADDENDUM: TERMS OF REFERENCE PREPARED BY HOLLAND ASSOCIATES

3. Terms of Reference

- Compile an addendum to your specialist report addressing the following:
 - The implications of the proposed amendments, if any, in terms of the potential impacts within your area of expertise;
 - A re-assessment of the significance (before and after mitigation) of the identified impact(s) in light of the proposed amendments (as required in terms of the 2014 EIA Regulations), for the construction, operational and decommissioning (where relevant) phases, including consideration of the following:
 - Cumulative impacts;
 - The nature, significance and consequence of the impact;
 - The extent and duration of the impact;
 - The probability of the impact occurring;
 - The degree to which the impact can be reversed;
 - The degree to which the impact may cause irreplaceable loss of resources;
 - The degree to which the impact can be avoided, managed or mitigated;
 - The addendum to your report must include an impact summary table outlining the findings of the re-assessment in terms of the abovementioned assessment criteria.
 - A statement as to whether or not the proposed amendments will result in a change to the significance of the impact(s) assessed in the original EIA for the proposed project (within your area of expertise), and if so, how the significance would change.
 - An outline of the potential advantages and disadvantages of the proposed amendments in terms of potential impacts (within your area of expertise)
 - Provide confirmation as to whether or not the proposed amendments will require any changes or additions to the mitigation measures recommended in your original specialist report. If so, provide a detailed description of the recommended measures to ensure avoidance, management and mitigation of impacts associated with the proposed amendments.
- Should any comments be raised during the Public Participation Process for the Application for Amendment of the EA relating to your area of expertise, provide responses to such comments raised (as part of the Comments and Response Report for the amendment application). Such comments would be provided to you, on conclusion of the 30 day public comment period.