Umsinde Emoyeni Wind Energy Facility, Western Cape and Northern Cape

for

Emoyeni Wind Farm Project (Pty) Ltd

Visual Impact Assessment

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Prepared for

Arcus Consultancy Services

ARCUS

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EXECUTIVE SUMMARY

Umsinde wind energy facility (WEF) consisting of 2 phases, with up to 98 wind turbines in each phase, is proposed in the Karoo near the town of Murraysburg. The site is located on the border between the Western and Northern Cape Provinces in a generally sheep farming area. A number of other wind energy facilities are proposed in the general area, including Ishwati Emoyeni to the west.

The study area is mountainous in places with a few low peaks ranging from 1600 to 1700m in altitude. Farmsteads are far apart, mostly located near seasonal watercourses. In terms of guest farms, Badsfontein is 16km, Brandkraal 23km and Ratelfontein 32km from the proposed WEF. The area is renowned for its wide open spaces, serenity, quiet and starry skies at night, the rural landscape being relatively intact and free of visual intrusions, such as powerlines.

Each of the WEF phases would have a substation with a 132kV transmission line linking to the Ishwati Emoyeni WEF, and eventually to the Eskom Gamma Substation to the west.

Scenic landscape features have been mapped, along with selected viewpoints and view corridors. These have in turn been combined with viewsheds and distance radii to establish the visibility and visual exposure of the area in relation to the WEF. The proposed WEF has then been over-laid on a composite visual informants map to determine potential visual impacts, as well as areas in need of possible mitigation and/or refinement of the site layout plan.

A standard methodology to determine potential visual impacts was provided by Arcus, with a summary of the rating method included below. The rating of potential visual impacts was further assisted by means of visual simulations of the 2 phases in the form of photomontages, (see Figures 14 to 18).

Phase 1 : Visual Impacts (without and with Mitigation)

Impact	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Phase 1: Wind turbines	High	Definite	**HIGH**	–ve	High
With Mitigation	Medium	Probable	**MEDIUM**	–ve	Medium
Phase 1: Powerlines, infrastructure	High	Definite	**HIGH**	–ve	High
With Mitigation:	Medium	Probable	**MEDIUM**	–ve	Medium
Phase 1: Construction	Low	Probable	**LOW**	–ve	Medium
With Mitigation:	Low	Probable	**LOW**	–ve	Medium

Phase 2 : Visual Impacts (without and with Mitigation)

Impact	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Phase 2: Wind turbines	High	Definite	**HIGH**	–ve	High
With Mitigation	Medium	Probable	**MEDIUM**	–ve	Medium
Phase 2: Powerlines, infrastructure	Medium	Probable	**MEDIUM**	–ve	medium
With Mitigation:	Low	Probable	**LOW**	–ve	Medium
Phase 2: Construction	Low	Probable	**LOW**	–ve	Medium
With Mitigation:	Low	Probable	**LOW**	–ve	Medium

Given the scale of the proposed WEF, as well as the height of the wind turbines, a significant transformation of the study area can be expected, and this resulted in high potential visual impact significance for both phases before mitigation.

Wind energy facilities of this nature are difficult to mitigate visually, the most important measures being the elimination or relocation, as well as micro-siting, of certain wind turbines.

Recommended mitigation for both turbines and the transmission line in the current layout are indicated in Fig. 13, as well as in Tables 8 and 9.

The 38km transmission powerline in Phase 1 also resulted in a high visual impact significance rating, but this could potentially be mitigated to medium significance by means of careful alignment to avoid scenic features and sensitive receptors.

The construction phase of the WEF project, being short-term, was considered to have a low visual impact significance, but still requires the implementation of a number of mitigation measures, as outlined in Tables 8 and 9.

The conclusion of the Visual Assessment Report is that the visual impacts relating to the project could be mitigated to some extent by making adjustments to the layout plans for both Phases 1 and 2, (see Fig. 13). To this end the mitigations in Tables 8 and 9, and the recommended buffers in Table 1 should be used as a guide.

Furthermore, careful alignment of the 132kV transmission powerline is required to avoid scenic resources and sensitive receptors. It is recommended therefore that revised layouts for the wind turbines and transmission line be made available as part of the EIA process.

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1 Visual Specialists and Expertise

The visual baseline study was prepared by the following:

Bernard Oberholzer, Landscape Architect / Environmental Planner, and Principal at BOLA, and Quinton Lawson, Architect, and Partner at MLB Architects / Urban Designers.

Bernard Oberholzer has a Bachelor of Architecture (UCT) and Master of Landscape Architecture (U. of Pennsylvania), and has more than 20 years experience in undertaking visual impact assessments. He has presented papers on *Visual and Aesthetic Assessment Techniques*, and is the author of *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes,* prepared for the Dept. of Environmental and Development Planning, Provincial Government of the Western Cape, 2005.

Quinton Lawson has a Bachelor of Architecture Degree (Natal) and has more than 10 years experience in visual assessments, specializing in 3D modeling and visual simulations. He has previously lectured on visual simulation techniques in the Master of Landscape Architecture Programme at UCT.

The authors have been involved in visual assessments for a wide range of residential, industrial and renewable energy projects. They prepared the 'Landscape Assessment Report' for the *National Wind and Solar PV Strategic Environmental Assessment (SEA)*, in association with the CSIR, for the Department of Environmental Affairs in 2014.

2 Specialist Declaration

See attachment A.

3 Purpose and Scope of the Study

A Visual Baseline Study was previously prepared as part of the Environmental Scoping Phase. The current Visual Impact Assessment (VIA) forms part of the EIA phase of the proposed wind energy facility (WEF) near Murraysburg.

The VIA identifies possible visual impacts and risks associated with the project and provides recommended mitigations to minimise visual impacts. Descriptions of the project and the receiving environment are included for completeness.

The term 'visual' used in this report is taken in its broadest meaning to include visual, scenic, aesthetic and amenity values represented by the natural and the cultural landscape, which can be described as the area's 'sense of place'.

4 Study Methodology

The *Guideline for Involving Visual and Aesthetic Specialists* (Oberholzer, 2005), issued by the Provincial Government of the Western Cape, was used as a guide in the preparation of the VIA. A full Level 4 visual study is being followed, given the nature of the proposed development and the receiving environment.

The VIA study method includes the following:

- Mapping of the study area location and its landscape context;
- Mapping of the projected viewsheds and distance radii of the proposed WEF and grid connection powerlines to determine the possible zone of visual influence;
- Identification of important viewpoints and view corridors, and a photographic survey from selected viewpoints, taking into account possible sensitive receptors;
- Identification of landscape characteristics, including topographical and geological features, vegetation cover, land use, cultural landscapes and cultivated lands, settlements and farmsteads;

- Identification and mapping of visual / landscape constraints, including buffers, for the proposed WEF and powerlines, with an indication of significance and overall sensitivity;
- As assessment of potential visual impacts (and benefits), together with significance ratings, of the proposed WEF development;
- Formulation of possible mitigations and recommendations to minimise potential adverse visual impacts.

5 Policy and Legislative Context

The National Environmental Management Act (Act No. 107 of 1998) (NEMA) and the Regulations in terms of Chapter 5 of NEMA and NEMA EIA Regulations (2014), identifies the proposed wind energy facility as a listed activity requiring a scoping study and EIA.

The National Heritage Resources Act (NHRA) (Act No. 25 of 1999): The NHRA and associated provincial regulations provide legislative protection for natural, cultural and scenic resources, as well as for archaeological and paleontological sites within the study area. This report deals with visual considerations, including landscape and scenic resources.

Setbacks for wind turbines are indicated in Table 1 below based on the Provincial Government of the Western Cape (PGWC, 2006) guidelines, and on more recent guidelines developed by the Authors with the CSIR (2014). (The buffers are nominal and subject to viewsheds).

Table 1: Recommended Buffers

Landscape features/criteria	**PGWC Guidelines (2006)**	**Recommended visual buffer guidelines (2014)**
Project area boundary	-	270m (subject to turbine specification).
Ephemeral streams/ tributaries	-	250m
Perennial rivers, wetland features	500m	500m
Major ridgelines, peaks and scarps	500m	As per visual informants map, subject to micro-siting. (500m recommended for peaks).
Local roads	500m	500m
Local district gravel roads	review if scenic	1 to 3km (can be less if outside the viewshed).
R63 arterial route	review if scenic	1 to 3km (can be less if outside the viewshed).
Farmsteads (inside the project site)	400m (noise)	800m
Farmsteads (outside the project site)	400m (noise)	2 to 4km (can be less if outside the viewshed).
Private nature reserves/ game farms/ guest farms/ resorts	500m	2 to 5km (can be less if outside the viewshed).

6 Description of the Proposed WEF Project

The proposed Umsinde Emoyeni WEF would consist of 2 phases of development with approximately 98 wind turbines in each phase, (147 MW capacity for each phase).

The construction of the wind turbines would require a visible concrete pad approximately 20m in diameter, as well as a hardstand area large enough for a temporary laydown area, crane and turning circle for a large vehicle.

A gravel access road up to 9m wide would be required to each turbine for safe movement of vehicles during construction. These would be reduced to about 6m width during the operation phase.

Aggregate for the construction of roads may be sourced from within the development site, and/or imported as required.

Additional temporary laydown areas of up to 150m by 60m will be required for equipment and component storage during the construction phase.

Connecting powerlines from each turbine to the site substation would be mainly underground in the reserve of the site access roads.

Each phase would require an on-site substation. In addition, operations and maintenance (O&M) buildings with parking would be required. A detailed schedule of facilities is included in Table 2 below.

A proposed new 132kV overhead transmission line would need to be constructed between the on-site substations and the planned Ishwati Emoyeni WEF about 38km to the west. The route for the power lines would include a servitude corridor of up to 73m width. The final design of the support structures / pylons is not yet known.

A detailed list of facilities relating to the proposed WEF is given in Table 2 below, and in the indicative 3D models in Fig. 8.

Table 2: Description of Energy Facilities at the Umsinde Emoyeni Site

Facility	**Footprint**	**Height**	**Comments**
Total site area WEF area:	58100 ha Phase 1: 5 484ha Phase 2: 9 668ha	n/a n/a	Leased areas. Development areas may be smaller.
No. of wind turbines: Phase 1 Phase 2	1.5 to 4.5MW max. 98 turbines max. 98 turbines	Hub ht. up to 140m Rotor diam. up to 130m (depending on final selection of turbine type)	Each phase 140MW (contracted capacity of up to 140 MW, and an installed capacity of up to 147 MW) Off-white / grey
Electrical turbine transformer.	$4m^2$ (2x2m) each turbine.	2.5 m	Colour: Off-white / grey
Turbine pad. Hardstanding area / crane pad.	Approx. $400m^2$ Approx. 60 x 30m	n/a n/a	Visible concrete pad after construction. Compacted gravel hardstanding.
Internal access tracks: Phase 1 Phase 2	 79.99km 118.88km	 n/a	Max. 9m wide during construction. 6m wide during operation. Gravel surface.
Electrical substation	200 x 250 m substation	Single storey buildings Gantries approx. 10m	Earth-colour building and roof finish.
Wind measuring masts	5 x 80 m met masts remain on site post construction at each phase.		Mast type: monopole or lattice with guy-lines.
Transmission lines: 132kV line between on-site substation and Ishwati Emoyeni WEF.	 38.5km	 Up to 40m height.	33 or 66kV internal lines are mainly underground. Monopole or lattice pylon.
Operations and maintenance buildings (O&M building) and possible visitor/education centre.	150 x 80 m	Single storey	Earth-colour plastered and painted masonry buildings or steel portal frame structures. No reflective finishes.
Fuel storage			Unknown
Security fencing	n/a	2 m	Possibly around substation and O&M buildings.
Security Lighting Navigation lights	n/a For selected turbine nacelles as per CAA	 At hub height.	At substation and O&M buildings. Flashing red light on selected turbines only (to CAA requirements).
Construction Phase:			
Lay down area, construction camp and batching plant	150 x 60 m (for each phase)	Single storey	Temporary gravel hard standing and prefab structures. No on-site construction accommodation.
Borrow pits	Not established	n/a	From development site and/or imported from the district.

7 Alternatives

A full description of alternatives is given in Section 2.8 of the Final Scoping Report, (Arcus, Dec. 2014). These include the 'No Development Scenario', the site selection process, design evolution and technology alternatives. The Umsinde Emoyeni project was selected based on consideration of a range of potential sites, to be taken forward to the full feasibility stage, including the EIA process.

8 Description of the Study Area

Relevant landscape features of the receiving environment include the following:

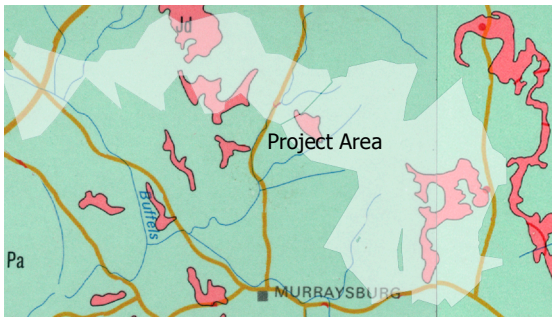
Location (Figure 1)

The proposed WEF is located near the Karoo town of Murraysburg in the Western Cape Province, with part of the site spilling over the border into the Northern Cape Province. The project site, which covers about 93038ha, (93km^2) is accessed via the R63 tarred road, which passes through the southern portion of the project area, and local gravel roads. Graaff-Reinet and the Camdeboo National Park lie some 60km to the south-east on the R63.

The connection to the N1 National Road is 40km north-west of Murraysburg. The project area for the grid connection powerline to the Eskom Gamma substation lies between the project site and the N1, also being the project area for the proposed Ishwati Emoyeni WEF.

Geology

The geology of the area is characterised by the mudstones and sandstones of the Beaufort Group (Pa in green on the diagram) creating a fairly mountainous to gently undulating landscape, typical of the Karoo. The dolerite dykes and sills (Jd in red), which intruded the Beaufort sedimentary formations, are more resistant to erosion, creating the scenic ridges and koppies of the area, which in turn are more visually sensitive.



Geological Survey, 1984. 1:1 000 000

Physical Landscape

The topography is a reflection of the geology of the area, with flattish plains often interspersed by flat-topped dolerite koppies. The western portion of the project area, including the grid connection parcel, is more low-lying, ranging from about 1200 to 1400m elevation. The eastern portion is slightly higher at 1500 to 1700m elevation, these higher areas being more exposed to wind, and at the same time more visually exposed. The landscape is dissected by a number of seasonal rivers and tributaries.

Vegetation

The vegetation of the plains is classified as 'Eastern Upper Karoo', consisting of white grasses (*Aristida* and *Eragrostis*), interspersed with low hardy shrubs and succulents. The higher lying dolerite koppies are classified as 'Upper Karoo Hardeveld' with sparse dwarf Karoo scrub and drought-tolerant grasses. (Mucina and Rutherford, 2006). Slightly taller thicket occurs along drainage courses where the vegetation is still intact. Exotic trees, including gums, poplars and pines have typically been planted around the farmsteads for shade and wind protection. The exotic copses and shelterbelts provide some visual screening for the farmsteads.

Land Use

The relatively low rainfall and sparse vegetation limit the agricultural potential to mainly extensive grazing, the area being noted for Marino sheep wool and mohair, as well as 'Karoo lamb'.

Lucerne is grown in alluvial valleys where irrigation is available. The farms tend to be large in area in order to be viable for sheep farming, with farmsteads being on average 5 to 10km apart. Some of the farms provide guest accommodation, such as Ratelfontein to the north, which is a large game farm, and Badsfontein to the west. Recreation / tourism includes hunting, horse-riding and 4x4 trails on some of the farms.

There are no National Parks or known nature reserves in the immediate surrounding areas. There are also no large settlements, and except for gravel roads and farm dams, there is little infrastructure within the WEF and grid connection project areas. The farming town of Murraysburg is about 7km from the edge of the project site, and Richmond is about 30km away.

There were no existing powerlines visible from any of the viewpoints, except for low-voltage lines serving the farms. A small airfield is indicated on the map at Vleiplaats, 7km to the east of Murraysburg on the R63, and another landing strip 2km south of Murraysburg.

Visual Significance

The study area forms part of the Great Karoo, an area renowned for its wide open spaces, serenity, quiet and starry skies at night, qualities which attract both local and overseas visitors. The dolerite koppies, scarps and rock outcrops are attractive scenic features, being also visually sensitive. The rural character of the study area is noticeably intact and free of visual intrusions, such as powerlines.

Opportunities and Constraints

A high ridgeline outside the eastern boundary of the project area would provide a useful visual barrier for areas to the east of the proposed WEF. Other smaller ridges and koppies would also provide some visual screening.

Sensitive receptors, which would need to be considered, include Murraysburg, an historic settlement with a number of noteworthy buildings, commuters and visitors using the R63, an important arterial route linking Graaff-Reinet and Murraysburg with the N1, the two gravel roads connecting the R63 with Richmond, as well as game farms and guest farms, such as Ratelfontein, Badsfontein and Brandkraal.

9 Visual Sensitivity (see Fig. 9)

Given that the rural character of the development site and surroundings is largely intact, the area would potentially be sensitive to new industrial type elements in the landscape, such as wind turbines, substations and powerlines.

The area surrounding the proposed development site is a sparsely populated sheep farming district, although some of these include guest farms. The proposed WEF would not be visible or only marginally visible from the largest settlement, Murraysburg, about 21km to the south-west. A number of farmsteads in the surroundings range from just over a kilometre to more than 30km distance from the proposed WEF.

Besides the farmsteads the area is mainly viewed by residents and visitors from the R63 Provincial Road and a number of district roads, which can be perceived as view corridors.

Visually sensitive landscape or scenic resources are indicated on Fig. 9 These include prominent topographic features in the area, particularly mountain peaks, ridgelines, scarps and steep slopes. Perennial and seasonal water courses also have scenic value in a dry and fairly uniform landscape.

10 Assumptions and Uncertainties

Positions of the wind turbines, access roads, substations and connecting powerlines have been made available for the visual assessment. The actual wind turbine to be used has not been selected and will be part of a tender process. The route for the transmission line for each of the

phases has been indicated. The actual design of the pylon type has, however, not yet been determined. The location and size of borrow pits is not known at this stage.

11 Potential Visual Impacts

Potential visual impacts have been identified in the table below, and assessed in the sections that follow.

Table 3: Potential Visual Impacts

Source	Pathway	Receptor
The large number and scale of proposed wind turbines (up to 98 turbines in each of the 2 phases) reaching up to 140m in height. The potential flicker effect of the rotors in the early morning and evening. The potential effect of red navigation lights at night on certain wind turbines. The potential effect of noise from the wind turbines.	The potential visual intrusion of the wind turbines on the skyline and on scenic resources, such as the characteristic dolerite koppies and ridges. Potential visual disturbance caused by the flicker-effect. Potential visual intrusion of the red lights on the Karoo night sky. Potential disturbance to the valued quiet of the Karoo.	Residents of Murraysburg and outlying farms, game farms and guest farms, commuters on the R63 and district gravel roads, and visitors and tourists to the area.
The proposed related infrastructure, such as powerlines, access roads, substation and O&M buildings.	Potential visual intrusion of the industrial infrastructure on the Karoo's rural 'sense of place'.	As above, both within the viewsheds, as well as in the general area.
The potential effect of activities during the construction phase of the proposed WEF project.	Potential intrusion caused by heavy construction vehicles and cranes, stockpiling of materials, construction camps and excavations, including dust and noise.	Residents, visitors and road users in proximity to the overall project area.

12 Visual Assessment Criteria

The visual assessment would be based on a number of quantitative and qualitative criteria to determine potential visual impacts, as well as their relative significance. The criteria are listed below:

Visibility (Figures 2 and 3)

Visibility is determined by distance between the energy facilities and the viewer. Distance radii are used to quantify visibility of the proposed facilities, assuming up to 140m high turbines. Degrees of visibility are listed below, but may be subject to foreground topography and trees and the number of turbines that are visible. Visibility of the turbines is also indicated in Fig. 7.

High visibility:	Prominent feature within the observer's viewframe 0-2.5km
Mod-high visibility:	Relatively prominent within observer's viewframe 2.5-5km
Moderate visibility:	Only prominent with clear visibility as part of the wider landscape 5-15km
Marginal visibility:	Seen in very clear visibility as a minor element in the landscape 15-30km+

Potential visibility of the proposed Umsinde Emoyeni WEF from selected viewpoints is given in the table below, and in the photographic montages, (Figures 14 to 18). The scattered nature of the farmsteads and settlements result in a wide range of visibility ratings.

Table 4: Potential Visibility

View-point	Location	Coordinates	Distance	Phase	Visibility
VP1	Essex	32.0262S, 24.1343E	19.11km	1	Not Visible
VP2	Marino	32.0008S, 24.0994E	14.30km	1	Not Visible
VP3	Poortjie	31.9825S, 24.0600E	10.87km	1	Moderate
VP4	Witteklip	31.9014S, 24.0702E	2.48km	1	High
VP5	Rhenosterfontein	31.7482S, 24.0921E	6.01km	2	Moderate
VP6	Avontuur	31.6701S, 24.0614E	10.20km	2	Not Visible
VP7	Philipskraal	31.7712S, 24.0484E	1.26km	2	High
VP8	Vleiplaats	31.9818S, 23.8395E	19.94km	1	Marginal
VP9	Badsfontein gate	31.8016S, 23.7373E	16.77km	2	Marginal
VP10	Badsfontein opstal	31.7935S, 23.7433E	16.21km	2	Marginal
VP11	Badsfontein dam	31.7949S, 23.7455E	15.92km	2	Moderate
VP12	Elandspoort	31.6164S, 23.7734E	26.70km	2	Not Visible
VP13	Ratelfontein ridge	31.6162S, 23.6745E	33.94km	2	Not Visible
VP14	Ratelfontein east	31.6269S, 23.6833E	32.28km	2	Marginal
VP15	Ratelfontein saddle	31.6262S, 23.6769E	32.88km	2	Marginal
VP16	Rooisandheuwel	31.6885S, 23.7959E	17.69km	2	Marginal
VP17	Snyderskraal	31.8500S, 23.7432E	16.42km	2	Marginal
VP18	Brookfield	31.8882S, 23.7233E	20.07km	2	Marginal
VP19	Murraysburg town	31.9627S, 23.7711E	21.43km	2	Not Visible
VP20	Brandkraal	31.9638S, 23.7406E	23.84km	2	Marginal

Visual Exposure (Figures 4, 5 and 6)

Visual exposure is determined by the viewshed, being the geographic area within which the project would be visible, the boundary tending to follow ridgelines and high points in the landscape. Some areas within the viewshed fall within a view shadow, and would therefore not be affected by the proposed energy facilities. Viewsheds have been prepared for each of the 2 phases of the WEF and for the grid connection corridor. The viewsheds indicate potentially less visual exposure to the east because of a line of ridges.

Visual Sensitivity (Figures 9 and 10)

Visual sensitivity is determined by topographic features, steep slopes, rivers, scenic routes, cultural landscapes, and tourist facilities such as guest farms. These, together with the setbacks indicated in Table 1, have been mapped on the Visual Informants Maps, to assess the implications for the WEF.

Landscape Integrity

Visual quality is enhanced by the scenic or rural quality and intactness of the landscape, as well as lack of other visual intrusions. The Karoo landscape of the study area is at present generally intact with few visual intrusions. The proposed WEF therefore has potential significance in terms of altering the rural landscape.

Cultural Landscape

Besides natural attributes, landscapes have a cultural value, enhanced by the presence of palaeontological and archaeological sites, historical settlements, farmsteads and cultivated lands. The mapping of these would be informed by the heritage specialist study.

Visual Absorption Capacity

This is the potential of the landscape to screen the project. The study area has a few ridges and koppies, which will tend to have a screening effect at the broader scale, but is otherwise relatively open and visually exposed in terms of the more immediate surroundings, and therefore locally has a relatively low visual absorption capacity.

Cumulative Visual Impact

This is the accumulation of visual impacts in the area, particularly in relation to other existing or proposed energy projects and industrial-type facilities in the immediate area, (see Fig. 1). The proposed Umsindwe Emoyeni project would consist of 2 phases, resulting in a total of some 196 proposed wind turbines, which could have a major visual effect on the local area. In addition, the proposed Ishwati Emoyeni WEF (80 proposed turbines) adjacent to the project site, would increase the cumulative visual effect.

Seen together these WEF projects, along with their associated substations and powerlines, could have a significant visual effect on the visual character and scenic resources of the area.

The Victoria West WEF (30 wind turbines), the Noblesfontein WEF, (under construction), and the approved Modderfontein WEF, are all to the west of the N1, about 50km away, and would not be visible from the Umsinde Emoyeni project area.

Visual Impact Assessment

The criteria above are considered in combination to determine the potential visual impact 'intensity' as indicated in Tables 5a and 5b.

The significance of the potential visual impacts are assessed through a number of steps in Tables 6 and 7. The impacts are then re-assessed both without and with essential mitigations in Tables 8 and 9.

13 Visual Assessment Methodology

The visual impact assessment ratings used in the tables below are based on the methodology provided by Arcus (2015). This involves a number of steps to determine levels of impact significance, as described below:

INSIGNIFICANT: the potential impact is negligible and **will not** have an influence on the decision regarding the proposed activity.

VERY LOW: the potential impact is very small and **should not** have any meaningful influence on the decision regarding the proposed activity.

LOW: the potential impact **may not** have any meaningful influence on the decision regarding the proposed activity.

MEDIUM: the potential impact **should** influence the decision regarding the proposed activity.

HIGH: the potential impact **will** affect a decision regarding the proposed activity.

VERY HIGH: The proposed activity should only be approved under special circumstances.

The **significance** of an impact is defined as a combination of the **consequence** of the impact occurring and the **probability** that the impact will occur.

Table 5a : Intensity of Potential Visual Impacts (Phase 1)

Criteria	Comments	Phase 1 wind turbines	Phase 1 infrastructure / powerlines	Phase 1 construction activities
Visibility of facilities Distance from selected viewpoints (Table 3)	Large number of turbines. Viewing distance is a mitigating factor in some cases. Powerlines visible from sensitive receptors. Construction activities are an aggravating factor.	High (4)	High (4)	High (4)
Visual exposure Zone of visual influence or view catchment	Most visual exposure is to the south and west, but less to the north and east because of surrounding ridges. Sensitive receptors within powerline viewshed.	Medium (3)	High (4)	Medium (3)
Visual sensitivity Effect on landscape features and scenic resources	Includes topographic features, skyline ridges, steep slopes, road corridors and farmsteads. General remoteness is a mitigating factor.	High (4)	High (4)	High (4)
Landscape integrity Effect on rural/ natural character of the area	Largely intact natural / rural landscape would be affected by industrial type wind energy development.	Very high (5)	High (4)	Very high (5)
Visual absorption capacity (VAC)	Surrounding ridges provide some visual enclosure / absorption, but vegetation is low / sparse.	Medium (3)	Medium (3)	Medium (3)
Overall visual impact intensity	Combination of the characteristics above.	**High (19)**	**High (19)**	**High (19)**

Table 4b : Intensity of Potential Visual Impacts (Phase 2)

Criteria	Comments	Phase 2 wind turbines	Phase 2 infrastructure / powerlines	Phase 2 construction activities
Visibility of facilities Distance from selected viewpoints (Table 3)	Large number of turbines. Viewing distance is a mitigating factor in some cases, but nearer to sensitive receptors. Powerline for Phase 2 only a short length. Construction activities are an aggravating factor.	Very high (5)	Medium (3)	Very high (5)
Visual exposure Zone of visual influence or view catchment	Most visual exposure is to the south and west, but less to the north and east because of surrounding ridges. Sensitive receptors within powerline viewshed.	High (4)	Medium (3)	High (4)
Visual sensitivity Effect on landscape features, scenic resources	Includes topographic features, skyline ridges, steep slopes, road corridors and farmsteads. General remoteness is a mitigating factor.	High (4)	Medium (3)	High (4)
Landscape integrity Effect on rural/ natural character of the area	Largely intact natural / rural landscape would be affected by industrial type development.	Very high (5)	Medium (3)	Very high (5)
Visual absorption capacity (VAC)	Surrounding ridges provide some visual enclosure / absorption, but vegetation is low / sparse.	Medium (3)	Medium (3)	Medium (3)
Overall visual impact intensity	Combination of the characteristics above.	**Very high (21)**	**Medium (15)**	**Very high (21)**

Rating values: Very low (1), Low (2), Medium (3), High (4), and Very high (5).
Overall values: Very low (1-5), Low (6-10), Medium (11-15), High (15-20), Very high (21+)

Table 6a : Visual Impacts (Phase 1): Wind turbines

Rating	Definition of Rating	Score
A. *Extent* *– the area over which the impact will be experienced*		
Local	Confined to study area (approx. 30km radius)	1
B. ***Intensity*** *– the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
High	Visual or scenic characteristics of the area are severely altered	3
C. ***Duration*** *– the timeframe over which the impact will be experienced and its reversibility*		
Long-term	More than 15 years. (Impact could be reversed at decommissioning stage)	3
Consequence	A+B+C (7)	High
Probability	Likelihood of the impact occurring (>90%)	Definite
Significance	High consequence + Definite	HIGH
Status	Negative or positive	-ve
Confidence	Based on photomontages	High

Table 6b : Visual Impacts (Phase 1): Powerlines / Infrastructure

Rating	Definition of Rating	Score
A. *Extent* *– the area over which the impact will be experienced*		
Local	Confined to study area (approx. 20km radius)	1
B. ***Intensity*** *– the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
High	Visual or scenic characteristics severely altered	3
C. ***Duration*** *– the timeframe over which the impact will be experienced and its reversibility*		
Long-term	More than 15 years. (Impact could be reversed at decommissioning stage)	3
Consequence	A+B+C (7)	High
Probability	Likelihood of the impact occurring (>90%)	Definite
Significance	High consequence + Definite	HIGH
Status	Negative or positive	-ve
Confidence	Based on photomontages	High

Table 6c : Visual Impacts (Phase 1): Construction Phase of WEF

Rating	Definition of Rating	Score
A. *Extent* *– the area over which the impact will be experienced*		
Local	Confined to study area (approx. 30km radius)	1
B. ***Intensity*** *– the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
High	Visual or scenic characteristics of the area are severely altered	3
C. ***Duration*** *– the timeframe over which the impact will be experienced and its reversibility*		
Short-term	Less than 2 years.	1
Consequence	A+B+C (5)	Low
Probability	Likelihood of the impact occurring (70-90%)	Probable
Significance	Low consequence + Probable	LOW
Status	Negative or positive	-ve
Confidence	Based on photomontages	Medium

Table 7a : Visual Impacts (Phase 2): Wind turbines

Rating	Definition of Rating	Score
A. *Extent* *– the area over which the impact will be experienced*		
Local	Confined to study area (approx. 30km radius)	1
B. ***Intensity*** *– the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
High	Visual or scenic characteristics of the area are severely altered	3
C. ***Duration*** *– the timeframe over which the impact will be experienced and its reversibility*		
Long-term	More than 15 years. (Impact could be reversed at decommissioning stage)	3
Consequence	A+B+C (7)	High
Probability	Likelihood of the impact occurring (>90%)	Definite
Significance	High consequence + Definite	HIGH
Status	Negative or positive	-ve
Confidence	Based on photomontages	High

Table 7b : Visual Impacts (Phase 2): Powerlines / Infrastructure

Rating	Definition of Rating	Score
A. *Extent* *– the area over which the impact will be experienced*		
Local	Confined to study area (approx. 20km radius)	1
B. ***Intensity*** *– the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
Medium	Visual or scenic characteristics of the area are moderately altered	2
C. ***Duration*** *– the timeframe over which the impact will be experienced and its reversibility*		
Long-term	More than 15 years. (Impact could be reversed at decommissioning stage)	3
Consequence	A+B+C (6)	Medium
Probability	Likelihood of the impact occurring (>90%)	Definite
Significance	High consequence + Definite	MEDIUM
Status	Negative or positive	-ve
Confidence	Based on photomontages	High

Table 7c : Visual Impacts (Phase 2): Construction Phase of WEF

Rating	Definition of Rating	Score
A. *Extent* *– the area over which the impact will be experienced*		
Local	Confined to study area (approx. 30km radius)	1
B. ***Intensity*** *– the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources*		
High	Visual or scenic characteristics of the area are severely altered	3
C. ***Duration*** *– the timeframe over which the impact will be experienced and its reversibility*		
Short-term	Less than 2 years.	1
Consequence	A+B+C (5)	Low
Probability	Likelihood of the impact occurring (70-90%)	Probable
Significance	Low consequence + Probable	LOW
Status	Negative or positive	-ve
Confidence	Based on photomontages	Medium

Table 8a : Visual Impacts with mitigations (Phase 1): Wind turbines

	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	High 3	Long-term 3	**High** 7	Definite	**HIGH**	**– ve**	High
Essential mitigation measures: (See Fig. 13) a) Visually sensitive peaks, major ridgelines and scarp edges, including 500m buffers, to be avoided, because of silhouette effect on the skyline over large distances. Peaks marked in yellow on Fig. 10 are important topographic features to be avoided in particular. b) Slopes steeper than 1:5 gradient to be avoided. c) Cultural landscapes or valuable cultivated land, particularly along alluvial river terraces to be avoided. d) Stream features, including 250m buffers, to be avoided. e) Buffers around settlements, farmsteads and roads, as indicated in Table 1 to be observed.								
With mitigation	Local 1	Medium 2	Long-term 3	**Medium 6**	probable	**MEDIUM**	**– ve**	Medium

Table 8b : Visual Impacts with mitigations (Phase 1): Powerlines / Infrastructure

	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	High 3	Long-term 3	**High** 7	Definite	**HIGH**	**– ve**	High
Essential mitigation measures: a) Powerlines to avoid Visually sensitive peaks, major ridgelines, scarp edges and slopes steeper than 1:5 gradient. b) Internal connecting powerlines to be below ground where possible, particularly on visually exposed ridges. (in areas of shallow bedrock, powerlines could be covered with overburden). c) Substations to be sited in unobtrusive, low-lying areas, away from roads and habitations, and screened by berms and/or tree-planting where feasible. d) Operations and maintenance buildings and parking areas to be located in an unobtrusive area and consolidated to avoid sprawl of buildings in the open landscape. e) Access roads to be in sympathy with the contours, avoid steep 1:5 slopes and drainage courses, and kept as narrow as possible.								
With mitigation	Local 1	Medium 2	Long-term 3	**Medium 6**	probable	**MEDIUM**	**– ve**	Medium

Table 8c : Visual Impacts with mitigations (Phase 1): Construction

	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	High 3	Short-term 1	**Low** 5	Probable	**LOW**	**– ve**	Medium
Essential mitigation measures: a) Access and haul roads to use existing farm tracks as far as possible. b) Construction camp, stockpiles and lay-down area to be located out of sight of district roads, possibly in the vicinity of the proposed substation and O&M buildings. c) Disturbed areas rather than pristine or intact land to preferably be used for the construction camp. Construction camp and laydown areas to be limited in area to only that which is essential. d) Measures to control wastes and litter to be included in the contract specification documents. e) Provision to be made for rehabilitation/ re-vegetation of areas damaged by construction activities.								
With mitigation	Local 1	High 3	Short-term 1	**Low 5**	probable	**LOW**	**– ve**	Medium

Table 9a : Visual Impacts with mitigations (Phase 2): Wind turbines

	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Very high 3	Long-term 3	**High** 7	Definite	**HIGH**	**– ve**	High
Essential mitigation measures: (See Fig. 13). a) Visually sensitive peaks, major ridgelines and scarp edges, including 500m buffers, to be avoided, because of silhouette effect on the skyline. Peaks marked in yellow on Fig. 10 are important topographic features to be avoided in particular. b) Slopes steeper than 1:5 gradient to be avoided. c) Cultural landscapes or valuable cultivated land, particularly along alluvial river terraces to be avoided. d) Stream features, including 250m buffers, to be avoided. e) Buffers around settlements, farmsteads and roads, as indicated in Table 1 to be observed.								
With mitigation	Local 1	Medium 2	Long-term 3	**Medium 6**	probable	**MEDIUM**	**– ve**	Medium

Table 9b : Visual Impacts with mitigations (Phase 2): Powerlines / Infrastructure

	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Medium 2	Long-term 3	**Medium** 6	Definite	**MEDIUM**	**– ve**	High
Essential mitigation measures: a) Powerlines to avoid Visually sensitive peaks, major ridgelines, scarp edges and slopes steeper than 1:5 gradient. b) Internal connecting powerlines to be below ground where possible, particularly on visually exposed ridges. (in areas of shallow bedrock, powerlines could be covered with overburden). c) Substations to be sited in unobtrusive, low-lying areas, away from roads and habitations, and screened by berms and/or tree-planting where feasible. d) Operations and maintenance buildings and parking areas to be located in an unobtrusive area and consolidated to avoid sprawl of buildings in the open landscape. e) Access roads to be in sympathy with the contours, avoid steep 1:5 slopes and drainage courses, and kept as narrow as possible.								
With mitigation	Local 1	Low 1	Long-term 3	**Low 5**	probable	**LOW**	**– ve**	Medium

Table 9c : Visual Impacts with mitigations (Phase 2): Construction

	Extent	***Intensity***	***Duration***	***Consequence***	***Probability***	***Significance***	***Status***	***Confidence***
Without mitigation	Local 1	Very high 3	Short-term 1	**Low** 5	Probable	**LOW**	**– ve**	Medium
Essential mitigation measures: a) Access and haul roads to use existing farm tracks as far as possible. b) Construction camp, stockpiles and lay-down area to be located out of sight of district roads, possibly in the vicinity of the proposed substation and O&M buildings. c) Disturbed areas rather than pristine or intact land to preferably be used for the construction camp. Construction camp and laydown areas to be limited in area to only that which is essential. d) Measures to control wastes and litter to be included in the contract specification documents. e) Provision to be made for rehabilitation/ re-vegetation of areas damaged by construction activities.								
With mitigation	Local 1	High 3	Short-term 1	**Low 5**	probable	**LOW**	**– ve**	Medium

14 Findings and Conclusions

Phase 1:

Using the assessment methodology described above, it was determined that the visual impact significance of the Phase 1 WEF would be high before mitigation, given the large number of wind turbines (up to 98 turbines) and the large size of turbines.

It is difficult to mitigate the visual effect of a wind energy facility of this size, except by eliminating or relocating some of the turbines, mainly those indicated in Fig. 13. In some cases only micro-siting may be required. Buffers around topographic features, settlements and roads are recommended and these are indicated on Figures 9 and 10. Provided these mitigations are implemented, the visual impact significance could potentially be reduced to medium.

The proposed transmission line between the site and the planned Ishwati Emoyeni WEF is presently indicated in a straight 38km alignment. This could potentially have a high visual impact significance, but with mitigation could be reduced to medium significance if scenic resources and sensitive receptors are avoided. However a more detailed alignment would need to be provided. Associated infrastructure, such as access roads, substation and maintenance buildings could also be mitigated and would have a similar medium significance rating.

The construction phase of the WEF and associated infrastructure would be short-term (<2 years) and would potentially have a low visual significance rating.

Phase 2:

The visual impact significance of Phase 2 would be higher in intensity than Phase 1 because of the location of wind turbines on the Trouberg and other prominent ridges, and because the proposed WEF would be more visible from a range of viewpoints as can be seen in the photomontages, (Figures 14 to 18). The significance could potentially be reduced from high to medium through similar mitigations to those in Phase 1, where indicated in Fig. 13.

The branch transmission line from the substation to the Phase 1 transmission line is relatively short, and together with associated infrastructure, can be mitigated to result in a low visual impact significance. The construction phase for Phase 2 would also have a low significance, being short-term.

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Attachment A

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference	DEA/EIA
Number: Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

Umsinde Emoyeni Wind Energy Facility, Western and Northern Cape

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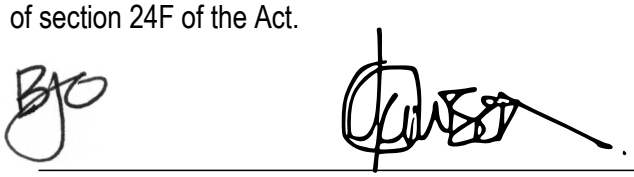
4.2 The specialist appointed in terms of the Regulations_

We, Bernard Oberholzer and Quinton Lawson, declare that --

General declaration:

We act as the independent specialist in this application;
We will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
We declare that there are no circumstances that may compromise my objectivity in performing such work;
We have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
We will comply with the Act, Regulations and all other applicable legislation;
We have no, and will not engage in, conflicting interests in the undertaking of the activity;
We undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
all the particulars furnished by me in this form are true and correct; and
We realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signatures of the specialists:

BOLA and MLB Architects

Name of company (if applicable):

15 September 2015

Date: