

Combined Environmental Impact Assessment for the proposed Ishwati Emoyeni  
Wind Energy Facility and Supporting Eskom Transmission and Eskom  
Distribution Grid Connection Infrastructure near Murraysburg, Western Cape

# FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

## Environmental Applications:

Ishwati Emoyeni Wind Energy Facility  
Eskom Transmission Grid Connection Infrastructure  
Eskom Distribution Grid Connection Infrastructure

## DEA Reference Numbers:

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*Prepared by:*  
CSIR

Sarah Watson, Samantha Naidoo & Ismail Banoo

## *Contact:*

Samantha Naidoo

*E-mail:* [SNaidoo5@csir.co.za](mailto:SNaidoo5@csir.co.za)

*Tel:* 031 242 2397

*Fax:* 031 261 2509

*Postal address:* PO Box 17001, Congella, 4013

Website for information on this EIA process:

[http://www.csir.co.za/eia/Ishwati\\_emoyeni](http://www.csir.co.za/eia/Ishwati_emoyeni)

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## Introduction

Special Energy Project (Pty) Ltd (hereafter referred to as “SEP”) - a Special Purpose Vehicle (SPV) of Windlab Developments South Africa (Pty) Ltd (hereafter referred to as “WDSA”) - a subsidiary of Windlab Systems (Pty) Ltd - propose the establishment of the Ishwati Emoyeni Wind Energy Facility and associated onsite infrastructure near Murraysburg in the Western Cape.

The project was originally proposed and advertised to the public as the ‘Bakenskop Wind Energy Facility’, named after the Bakenskop Mountain which is situated east of the centre of the proposed project area. However since announcing the project in August 2012, SEP elected to change the name of the proposed wind energy facility from the ‘Bakenskop Wind Energy Facility’ to the ‘Ishwati Emoyeni Wind Energy Facility’. ‘Ishwati’ refers to the plant *Boophone disticha*, also known as the Cape Poison Bulb in English, while ‘Emoyeni’ is a Xhosa word which means ‘in the wind’. This change in project name was proposed as a means of aligning the Ishwati Emoyeni Wind Energy Facility with a suite of other wind energy projects which complement WDSA’s project portfolio. An amended Application Form for Environmental Authorisation reflecting the change in project name was submitted to the national Department of Environmental Affairs (DEA) in February 2013. DEA acknowledged receipt of the amended Application Form and accepted the proposed change on 7 March 2013. The proposed project will therefore be referred to as the ‘Ishwati Emoyeni Wind Energy Facility’ for the remainder of the EIA process.

The Ishwati Emoyeni Wind Energy Facility was originally proposed to comprise of up to 190 individual wind turbines with a generation capacity of up to 3 MW each, and a total generation capacity of up to 280 MW. This figure was proposed in accordance with the Department of Energy’s (DoE’s) Renewable Energy Independent Power Producers Procurement Programme’s (REIPPPP) bid requirements which state that wind energy projects may have a maximum contracted generation capacity of 140 MW each. The establishment of a 280 MW wind energy facility would therefore have allowed for the registration of two 140 MW wind energy projects in accordance with the REIPPPP. Following the release of the Draft Scoping Report however, SEP revised the proposed project by reducing the number of proposed turbines to a total of 115, taking into account onsite constraints specified in the bird and bat monitoring reports compiled for the projects. Subsequently, the number of turbines comprising the proposed wind energy facility has been further reduced to 80 individual wind turbines with a generation capacity of up to 3.3 MW each. In addition, the total generation capacity of the project had been reduced to no more than 200 MW at the time of release of the Draft EIA Report, in consideration for the environmental constraints already identified and not 280 MW as was originally proposed. However, following release of the Draft EIA Report, correspondence from the national DEA dated 30 January 2014 was received indicating that all wind farm project applications being submitted to DEA for environmental authorisation, with the intention of being bid in the 4<sup>th</sup> bidding Window of the REIPPPP Programme, should not exceed a total generation capacity of 140MW. WDSA amended the project description slightly to ensure compliance with DEA’s requirement. The total generation capacity of the



project was therefore reduced from 200 MW to 140 MW (147 MW installed capacity), and the capacity range of the 80 individual wind turbines was changed from 1.5 MW-3.3MW to 1.8MW-3.3MW. Please note that according to the REIPPPP, the installed capacity may exceed the contracted capacity by up to five percent. The positioning of the powerlines, were amended according to the new location of the on-site substation. Access roads and internal road network (existing and proposed new roads) were more consistently added to the project description throughout the report. These amendments have been thoroughly assessed in the specialist studies forming part of this Final EIA Report. All maps in this Final EIA Report have also been updated in line with the new layouts. The current project description proposed by SEP comprising of 80 wind turbines is based on a worst case scenario and reflects the maximum number of wind turbines which may be implemented when making use of the smallest sized wind turbine within SEP's range of potential turbine technologies currently under consideration (e.g. a 1.8 MW model). Apart from the changes proposed subsequent to release of the Draft EIA Report, which include the generation capacity of a single wind turbine, the access road and internal road network layout, distribution powerline size and positioning of the on-site substation, the remainder of the project will remain as described in the Draft EIA Report.

Eskom Holdings SOC Limited proposes obtaining Environmental Authorisation from the Department of Environmental Affairs (DEA) for Eskom Transmission and Eskom Distribution Grid Connection Infrastructure projects. Grid connection infrastructure required for the proposed Ishwati Emoyeni Wind Energy project to connect to the national grid and includes the establishment of a 73 m wide servitude and the construction of three double circuit 132 kV high voltage distribution lines from the Ishwati Emoyeni Wind Energy Facility's proposed onsite substation to Eskom's Gamma Substation, the construction of a 400/132 kV substation yard including a 400 to 132 kV transformer and busbar at Gamma Substation and a 400kV turn-in consisting of a 55m wide servitude from the Gamma substation or yard to the nearby 400kV transmission powerlines.

Special Energy Project (Pty) Ltd is a Special Purpose Vehicle (SPV) established under Windlab Developments South Africa (Pty) Ltd ("WDSA"), which is a wholly-owned subsidiary of Windlab Systems (Pty) Ltd ("Windlab"). Windlab is an international wind energy development company which was established in 2003 through the commercialisation of wind mapping technology developed by Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO). Making use of wind mapping technology and a suite of world-leading atmospheric modelling and wind energy prospecting tools such as WindScape™ and RaptorNL™, Windlab is able to successfully identify, secure and develop commercial wind farm sites. Windlab has a growing project portfolio of over 7000 MW in varying stages of development and implementation with projects in the United States of America, Australia and Africa.

The CSIR has been appointed by Windlab (on behalf of Special Energy Project (Pty) Ltd) to undertake a combined Scoping and EIA process for the proposed Ishwati Emoyeni Wind Energy Facility and associated Eskom Grid Connection Infrastructure. The EIA process is intended to determine the biophysical, social and economic impacts associated with undertaking the proposed activity.

## Need for the Project

The Province of the Western Cape is currently facing considerable constraints in the availability and stability of electricity supply. This is a consequence of South Africa's electricity generation and supply system being overstretched; and that the Province is reliant on the import of power for the majority of their power needs. The Western Cape's maximum electricity demand of approximately 3500 to 3900 MW cannot be met by the transmission line connecting the Western Cape to the national grid. Accordingly, pressure on local generation capacity, most notably the Koeberg Nuclear Power Station (2 units with combined maximum capacity of 1800 MW), is such that if one reactor at Koeberg is offline, the entire province experiences supply shortages. Accordingly, the need has been identified to generate additional





power in the province. This project is aimed at overcoming rolling blackouts anticipated by the Medium Term Risk Mitigation Plan for electricity in South Africa from 2011 to 2016 if non-Eskom power generation projects are not realised.

Traditional coal-based electricity generation currently contributes approximately 90% of South Africa's supply. Given Eskom's 16% annual price increase the generation of power from wind is now considered cheaper than the generation of power from new coal-fired power stations such as Medupi and Kusile. While the cost of electricity generated by wind power averaged 89 c/kWh in Round 2 of the REIPPPP, the cost of electricity generated by Medupi and Kusile was reported by Eskom to be 97 c/kWh, while a study from the University of Pretoria put this figure at 120 c/kWh. Wind energy is currently one of the cheapest forms of new energy generation in South Africa and globally. This indicates the economic need to develop wind energy facilities in South Africa.

The development of wind energy is also important for South Africa to reduce its overall environmental footprint from power generation (including externality costs), and thereby to steer the country on a pathway towards sustainability. Coal-based power generation is a major global source of carbon dioxide emissions, which contributes to global warming. Coal power also leads to releases of harmful emissions such as oxides of sulphur and nitrogen. If implemented the proposed Ishwati Emoyeni Wind Energy Facility could reduce future carbon emissions by approximately 500 000 tonnes per year (calculated as 2.5 GWh power generation per installed MW, with an emissions factor of 1 tonne CO<sub>2</sub>/MW).

Wind generation also avoids the water consumption associated with generation of power from coal, which is important given that South Africa is an arid country with severe water constraints. Eskom currently uses approximately 2% of South Africa's total fresh water resources to produce power largely from wet-cooled coal power stations. These power stations typically use approximately 10 000 m<sup>3</sup> of fresh water per MW per annum (Eskom presentation, Water Security Africa, 18-20 May 2009). Accelerated climate change has the potential to impact on the availability and quantity of water in South Africa, with decreases in summer rainfall

predicted in the interior and increasing instances of droughts and floods. This creates a risk for water-dependent power generation. By comparison, wind energy has no direct water consumption, which reduces the demand on South Africa's already over-stretched water resources while also avoiding the risks of drought on our ability to generate power.

Nationally, South Africa intends to roll out renewable energy generation in line with the Integrated Resource Plan (IRP) through the REIPPPP which is aligned with the national Strategic Infrastructure Programme. The Western Cape Province also aims to change the province's current energy mix to contain 15% renewable energy sources by 2014 (White Paper on Sustainable Energy, Western Cape, 2008). The Western Cape wind regime is anticipated to provide at least a 30% capacity factor (i.e. wind energy facilities will generate 30% of the amount of energy they would generate if running at their full capacity all the time). If this renewable energy target was to be met entirely by wind energy, this would require an installed capacity of 1 150 to 1 300 MW (when assuming a 65% demand factor with a 30% wind capacity factor). The Ishwati Emoyeni Wind Energy Facility would contribute significantly to this target.

## Environmental Assessment Process

The EIA process is prescribed by the EIA Regulations which were promulgated under Chapter 5 of the National Environmental Management Act (No. 107 of 1998) ("NEMA") and published in Government Notice R543, 544, 545 and 546 on 18 June 2010. According to the EIA Regulations the implementation of the proposed Ishwati Emoyeni Wind Energy Facility and Eskom Transmission and Distribution Grid Connection Infrastructure requires a full Scoping and Environmental Impact Assessment (EIA). Given the strategic importance of energy, the project requires authorisation from the national Department of Environmental Affairs (DEA). Public involvement forms an important component of this process, by assisting in the identification of issues and alternatives to be evaluated. The Scoping Phase of the EIA refers to the process of determining the spatial and

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temporal boundaries for the EIA. In broad terms, this involves three important activities:

- Confirming the process to be followed and opportunities for stakeholder engagement;
- Clarifying the project scope and alternatives to be covered; and
- Identifying the key issues to be addressed in the impact assessment phase and the approach to be followed in addressing these issues.

As part of the EIA process registered Interested and Affected Parties are invited to review and provide comment on this Final EIA Report. This report is available for public review at the Murraysburg, Victoria West and Ntsikelelo Tida (Richmond) public libraries. An electronic version of this report is available on the internet at:

[www.csir.co.za/eia/ishwati\\_emoyeni](http://www.csir.co.za/eia/ishwati_emoyeni)

**This report has now been submitted to the Department of Environmental Affairs (DEA) for decision-making and is available for commenting for a 21-day period from the date of release. All comments and responses should be submitted to the DEA Case Officer and copied to the CSIR EAP at the details below by 22 April 2014.**

Comments may be submitted to the following addresses:

## DEA Case Officer:

Thabile Sangweni  
Department of Environmental Affairs  
Private Bag X447, Pretoria, 0001

*Tel:* 012 395 1761

*Fax:* 012 320 7539

*Email:* [TSangweni@environment.gov.za](mailto:TSangweni@environment.gov.za)

## CSIR EAP:

Samantha Naidoo  
CSIR  
P.O. Box 17001, Congella, 4013

*Tel:* 031 242 2397

*Fax:* 031 261 2509

*Email:* [SNaidoo5@csir.co.za](mailto:SNaidoo5@csir.co.za)

## Project Description

The proposed Ishwati Emoyeni site is situated approximately 21 km north/north-west of the town of Murraysburg in the West Cape Province. The project area comprises 11 agricultural properties and is approximately 24 400 Ha in extent.

The development of the wind energy facility will create employment opportunities during the construction and operational phases of development. However the total number of employment opportunities to be created by the project is currently unknown, as this is dependent on the turbine technology selected for implementation, the turbine supplier, and the final number of turbines to be implemented.

The most significant number of jobs will be created during the construction phase of the project. Construction activities will require skilled, semi-skilled and unskilled labour. During the operational phase of development staff will be required for the management, monitoring and maintenance of the facility.

The Ishwati Emoyeni Wind Energy Facility and its associated onsite infrastructure will comprise the following:

### Wind turbines

- The implementation of the proposed project will result in the establishment of up to 80 individual wind turbines with an approximate capacity of between 1.8 and 3.3 MW each. The turbines will have a maximum hub height of up to 120 m and a maximum rotor diameter of up to



130 m. The tip height (i.e. the maximum height when the tip of the rotor blade is at its highest point above the ground) will not exceed 180 m (the maximum tip height is based on a turbine model with a hub height of 117 m with a rotor diameter of 126 m).

- Each wind turbine will be supported by a concrete foundation up to approximately 20 m x 20 m in extent and up to 3 m deep.
- In the event that the turbine technology selected for implementation does not incorporate transformers into the turbine tower or nacelle, each wind turbine may also require that a transformer of up to 5 m x 5 m be installed within the hard standing area.
- At this stage of the project planning, the exact turbine technology has not been selected. SEP are currently considering a number of potential wind turbine suppliers, however a preferred technology provider will only be selected after further wind analysis and once a detailed tender process has been completed.

## Hard standing areas

- A hard standing area of up to 45 m x 25 m will be established next to each wind turbine. These hard standing areas will be utilised by cranes during the construction (and also possible maintenance) processes. Hard standing areas will be rehabilitated to their previous natural state once construction has been completed.
- Up to 3 additional laydown areas of approximately 150 m x 60 m will be required during the construction phase. These areas will be compacted and levelled to be used as blade lay down areas and for the initial storage of wind turbine components. These laydown areas will also accommodate cranes required for tower/turbine assembly.

## Connection to the grid

- Energy generated by the Ishwati Emoyeni Wind Energy Facility will be fed via cabling to an onsite 33/132 kV substation. Where practical this cabling will be routed underground.

- It is proposed that the onsite substation will make use of a 33 to 132 kV transformer to “step-up” the electricity generated by the proposed project from 33 kV to 132 kV, thus enabling it to be fed into the national Eskom Distribution network (which has a rating of up to 132 kV).
- The onsite substation will be constructed with a high voltage (HV) yard and will occupy an area of land approximately 250 m x 200 m in extent.

## Roads

- Access to the proposed Ishwati Emoyeni Wind Energy Facility is obtained via unnamed gravel roads. Where required, existing public roads may need to be upgraded along the proposed equipment transport route to allow for the transportation and delivery of wind turbine components and other associated infrastructure components.
- A gravel surface road will be required from the nearest public road onto the site and an internal site road network will also be required to provide access to each of the individual turbine locations.
- During construction the majority of internal access roads will need to be up to 6 m wide, however, in some limited locations, they may need to be up to 9 m wide.
- During operation the internal access roads can be reduced to 3 – 4 m in width.

The proposed Eskom Transmission and Eskom Distribution Grid Connection Infrastructure will comprise the following:

## 400/132 kV Substation Yard

- A 400/132 kV substation yard will be constructed at Eskom’s Gamma Substation. Information and details regarding the transformers is currently unknown. This information would need to be determined by Eskom at a later stage once more detailed planning takes place. It is anticipated however that the substation yard will comprise a 400 to 132 kV transformer and busbar. This will allow for incoming electricity from the Ishwati Emoyeni Wind Energy Facility



to be transformed from 132 kV to 400 kV to enable it to be fed into the Eskom Transmission network.

#### 400 kV Transmission Line Turn-in

- The length and details of the proposed 400 kV Transmission line turn-in is currently unknown. These will only be determined once additional information and more detailed planning takes place. The 400 kV turn-in line would however require that a servitude with a width of 55 m be established.

#### 132 kV Distribution Powerlines and Servitude

- Three double circuit 132 kV high voltage powerlines; to be constructed in phases, have been proposed. The proposed powerlines will be routed within a common 73 m wide servitude. It must be noted however, that only one of the 132 kV double circuit powerlines proposed as part of the Eskom Distribution Grid Connection Infrastructure will be constructed as part of the Ishwati Emoyeni Wind Energy Facility. The remaining two 132 kV double circuit powerlines will be constructed if demand by future developments within the surrounding area increases.
- The 73 m wide servitude would need to be established and cleared of vegetation to ensure that the minimum required clearance is achieved.
- Tower types available for 132 kV power lines include lattice structures, concrete monopole structures, steel monopole structures, wood pole structures, guyed steel monopole structures and steel H structures. Double circuit towers are towers which accommodate the routing of two powerlines on the same/single structure. Double circuit towers may either route powerlines as horizontal circuits (where the two powerlines run level horizontally alongside one another) or as vertical circuits (where powerlines run above and below one another). Due to their configuration, vertical circuit towers are generally taller than horizontal circuit towers, and are perceived to have a greater visual impact on the surrounding area. The

type of tower structure selected for implementation would therefore need to be determined by Eskom, and would be based on the outcomes of the EIA process and additional onsite investigations.

## Site Layout Plan

SEP has adopted a precautionary approach to the determination of a preliminary site layout plan for the proposed Ishwati Emoyeni Wind Energy Facility and associated Eskom grid connection infrastructure. The preliminary layout depicted in the Final EIA Report is iterative in nature and has already undergone a number of revisions to date following the specialists recommendations. The layout presented in this Final EIA Report therefore represents an updated layout from that which was contained in Draft EIA Report, which in turn represented an updated layout from that which was contained in the Final Scoping Report, and that which was presented in the Draft Scoping Report and a preliminary Site Screening Assessment conducted by Savannah Environmental (Pty) Ltd (2012).

The current layout presented in this Final EIA Report takes into consideration constraint areas which have been identified as part of the pre-construction Bird and Bat Monitoring Studies currently being conducted on site, and identified terrestrial ecology, visual, noise, freshwater, ecosystems, heritage, socio-economic and land-use, soil and agricultural potential sensitivities identified as part of the independent specialist studies completed during the Impact Assessment phase of EIA.

Due to its iterative nature, the site layout will continue to evolve throughout the remainder of the EIA process and subsequent detailed project design and planning processes as additional information becomes available. It is expected that following the completion of the EIA process, during the detail design phase and upon completion of additional technical studies (e.g. geotechnical investigations) that additional changes to the site layout will occur.

A final site layout plan depicting the location of the individual turbines and associated



infrastructure will be developed during the micro-siting process, and this would need to be approved by the relevant authorities prior to any construction commencing on site.

## Impact Assessment

The main impacts of the proposed project are summarized below:

### Terrestrial ecology

There are a number of sensitive habitats present onsite. The plateau area where the majority of the infrastructure would be located is however not considered highly sensitive. Sensitive faunal species are potentially present on-site (but not confirmed on site). However, impacts resulting from the development on these species are not considered significant.

Some parts of the site are categorised as Critical Biodiversity Areas (CBAs), however no turbines would be placed within the CBAs and direct impacts on these areas would be minimal. There may however be some turbines located along the margins of Ecological Support Areas (ESAs) associated with the steep slopes of the site.

Key impacts likely to be associated with the development include impact on vegetation and listed plant species; alien plant invasion, soil erosion; faunal impacts; and loss of landscape connectivity; and cumulative impacts of other wind energy facilities planned in the nearby area on CBAs and ecological processes.

For both the power line servitude and the off-site substation the likely impact of their development is predicted to be **local** in nature and of **low long-term significance**. In terms of the wind energy facility itself, provided that the avoidance and mitigation measures identified in this report are effectively implemented, the likely impact of the development would be **local** in nature and of **low long-term significance**.

The key mitigation measures identified in the Terrestrial Ecology Impact Assessment include:

- Careful preconstruction micro siting of the infrastructure of the development, in particular the location of stream and river crossings, turbine locations and access routes through sensitive habitats.
- Preconstruction walk-through of the development footprint to locate species and habitats of conservation concern that should either be avoided or translocated prior to construction.
- Stringent construction-phase monitoring of activities at the site to ensure that mitigation measures are adhered to and that impacts such as erosion and alien plant invasion are arrested before that become serious impacts that may be difficult to control.
- Minimising the footprint of the development as much as possible.
- Development of a final layout of the facility which strives to avoid impact to sensitive habitats and species of conservation concern.

### Avifauna - birds

Four bird species emerged as being at high risk and an additional three species were classified as being at medium risk.

Potential impacts resulting from construction of the proposed projects include habitat destruction and disturbance of birds during the construction and decommissioning phases; disturbance and displacement of birds during the operational phase; collision and electrocution of birds on power lines and turbines during the operational phase; and cumulative effect on birds in the broader area.

Key impacts of the proposed projects on birds are rated as **medium to low negative significance**. This rating can however be reduced to **low significance** with the proposed mitigation measures in place.

The key mitigation measures identified in the Avifauna Impact Assessment include:

- Avoid placing infrastructure in the identified high and medium sensitivity zones as identified by this report. More flexibility is possible in the medium sensitivity areas than in the high sensitivity.





- All on site reticulation electrical lines should be buried, unless absolutely impractical in which case the routing should be approved by the avifaunal specialist.
- Conduct an avifaunal walk through of all power line routes and the wind turbine siting prior to construction.
- Conduct at least three years of post-construction monitoring on site as described in the specialist's report.
- A strategic assessment of the cumulative impact of multiple projects in this broader area should be conducted as soon as possible and should incorporate data and findings from each facility's post construction monitoring.

## Bats

Thirteen bat species potentially occur in the study area. Of these thirteen species, five were detected on site, and four other species were detected within 3 to 25 km of the site. Bats were most active at monitoring locations situated relatively close (< 1 km) to permanent water, woody vegetation/trees and rocky ridges. Bat activity peaked during autumn (March and April), spring (late-August through October) and early summer (November and December), and generally for 2 to 3 hours after sunset.

Potential impacts on bats include roost disturbance or destruction; Fragmentation of foraging habitat, displacement of bats and bat fatalities due to collision or barotrauma and cumulative effects by other wind energy facilities planned in the nearby area.

Key potential impacts associated with the proposed project had overall significance ratings ranging from High to Medium without mitigation, and **Medium to Low** with mitigation.

The following key mitigation measures have been identified:

- Keep turbines and their rotor sweep areas, and as far as practically possible (strong motivation required for reasons of non-compliance), all powerlines, new roads, the sub-station and other infrastructure out of all **High** sensitive areas.
- Minimise artificial lighting in the WEF at night.

- Minimise the voltage and electromagnetic radiation of powerlines and other infrastructure.
- Space turbines at least 3 Turbine Diameters apart from blade tip to blade tip.
- Maximise turbine hub height and minimise rotor diameter.
- An Environmental Control Officer (ECO) must be appointed to supervise all construction activities. This ECO must be adequately trained in being able to recognise sensitive habitats for bats and how to guide the development process to reduce harmful impacts. If necessary, a bat specialist must provide training to such an ECO.
- Implement comprehensive long-term post-construction bat monitoring, as per the latest South African Operational Monitoring Guidelines at the time of operational monitoring. to adapt mitigation measures if necessary.

## Soil and agricultural potential

The proposed wind farm is located on a mountainous plateau in the central Karoo. The agricultural capability of the site is extremely limited, and land capability over most of the site is classified as class 7 – non-arable, low potential grazing land. Part of the site is classified as class 8, the lowest land capability class, which is non-utilisable wilderness land. Limitations to the land capability include aridity and lack of available water, shallow, rocky soils and mountainous terrain.

All impacts were assessed as having a **low significance**. This was mainly due to:

1. The very low agricultural production potential of the land.
2. Farming on the site is very low intensity and so a loss of small portions of land has very little impact.
3. The actual footprint of the facility and therefore the area of land that will be directly impacted being extremely small. Although there is no final layout proposed for this development at this stage, the footprint of wind farms of this scale is typically in the region of or less than 1% of the surface area. The rest of the land can continue to be used for agriculture as before.



The key mitigation measures include:

- Minimize footprint of disturbance.
- Confine vehicle access on roads only
- Strip and stockpile topsoil from all areas where soil will be disturbed.
- After cessation of disturbance, re-spread topsoil over the surface.
- Dispose of any sub-surface, clay spoils from excavations where they will not impact on land that supports vegetation, or where they can be effectively covered with topsoil.
- Implement an effective system of run-off control and prevents potential down slope erosion.
- Impose strict speed limits on all construction vehicles along this section of road.
- Spray this section of road with water during times of high traffic if significant dust is observed.

## Visual

The Ishwati Emoyeni Wind Energy Facility is likely to have a **high visibility** due to the height of the wind turbines and their locality on an elevated plateau. The three key sensitive visual receptors to the Ishwati Emoyeni Wind Energy Facility include visitors on two surrounding eco-tourism and game farms, residents of surrounding farms who are mainly part of the project, and Motorists on the R63.

The project complies with the mitigation measures proposed by the visual specialist who identified an exclusion zone for turbine construction based on the Provincial Government of the Western Cape's Department of Environmental Affairs and Development Planning (DEA&DP) guideline "Strategic Initiative to Introduce Commercial Land Based Wind Energy Development to the Western Cape" of 2006. These no go areas represent a 500m setback from the main ridgelines to reduce the most significant visual impact caused by the project and therefore reflect the purpose of the guidelines to limit the visual impact encountered by sensitive viewers in the area.

The visual impact of the proposed Ishwati Emoyeni Wind Energy Facility will however remain **high** because of the location of the viewpoints for tourists of particularly the

Ratelfontein Private Game Reserve positioned on the highest ridge north of the project. Also the Badsfontein Country House situated south of the proposed project area will still visually notice the turbines. This impact can however not be further mitigated as part of the development design to a lower significance.

The following key mitigation measures have been identified:

- Laydown areas and stockyards should be located in low visibility areas (e.g. valleys between ridges) and existing vegetation should be used to screen them from views where possible.
- Developer to adhere to the guidelines, particularly excluding areas within 500m of ridgelines along the northern boundary of Badsfontein farm.
- Motion sensitive lighting can be used for security purposes.
- Turbine towers and structures should have a non-reflective finish.
- For the powerlines, lattice towers/pylons are preferred to solid towers since they create lower visual contrast with natural landscape features and since there are already similar structures in the landscape.
- Please note that the impact on views from Ratelfontein Private Game Reserve cannot be mitigated.

## Noise

The impact of low frequency noise and infra sound will be negligible and there is no evidence to suggest that adverse health effects will occur as the sound power levels generated in the low frequency range are high enough to cause physiological effects.

The site is situated in a farming community, and as a result only a limited amount of homesteads are located in the vicinity where the turbines will be erected. Homesteads were identified as NSAs in terms of Human Sensitive Receptors located in the vicinity where the turbines will be erected.

The overall noise impact on the identified noise sensitive areas with recommended mitigation are expected to be **negative** and of **Low** significance. The impact of noise generated on the Natural Environmental Receptors (fauna,



including rodents, bats, birds, commercial livestock and a variety of buck) is likely to be **negative** and of a **moderate to high** intensity in the construction phase (impact of local extent and short-term duration) and **low to moderate** intensity (impact of local extent and long-term duration) in the operational phase.

The following key mitigation measures during construction phase have been identified:

- All construction operations should only occur during daylight hours if possible.
- No construction piling should occur at night. Piling should only occur during the hottest part of the day to take advantage of unstable atmospheric conditions. Ensure that the construction staff is given “noise sensitivity” training such as:
  - Potential sources of noise on construction sites;
  - Local noise sensitive areas;
  - Critical times of the day to minimise noise pollution; and
  - Actions to be taken to minimise noise pollution.
- Ambient noise monitoring is recommended at all noise sensitive areas once the turbines are erected. This is to determine if the noise rating limits are not being exceeded.

## Heritage: Palaeontology, Archaeology and Cultural-historical features

A range of archaeological sites were recorded within the proposed project area. The majority of the resources can be described as being of **low to medium significance**, but a number of **rock engravings** discovered on widespread dolerite pavements on the site may be of **higher significance** and required mitigation (by avoiding these sites in the development design). Similarly, a few **stone artefact scatters** of **high significance** were recorded and these should be avoided during construction. Overall the proposed project is anticipated to have a **medium** (negative) impact significant rating on heritage (without mitigation) which was reduced to a **low** (negative) significant rating with mitigation.

The following key mitigation measures have been identified:

- Avoid sensitive areas that have been identified as certain stone artefact scatters and all identified rock engraving sites;
- Micro-site turbine footings, and moderate deviations in service trenches and road alignments to mitigate the impact on open pre-colonial and colonial sites;
- Adjust turbine locations to avoid impacts to historic buildings and structures;
- Adequately record wagon tracks, kraals, etc. before they are destroyed; and
- If human remains are uncovered during construction, then all work in that area must stop immediately and the area must be cordoned off. Heritage Western Cape (HWC) must be notified immediately to arrange for a forensic inspection.
- No anticipated cumulative impacts on archaeology if recommended mitigation is undertaken.

Potentially fossiliferous rock units within the proposed project area include Late Permian sediments of the Adelaide Subgroup (Teekloof and Balfour Formations) as well as geologically recent Quaternary valley sediments. Potential impacts of the proposed project on Palaeontology include: impact of bedrock excavations on potential fossil-bearing Adelaide Subgroup strata during the construction phase of the turbines and associated electrical grid connection, the new access roads and the proposed substation; impact of excavations on superficial deposits; and impact of operational activities on potential fossil-bearing Adelaide Subgroup strata and superficial sediments. The significance rating of key potential impacts on palaeontology **range from High to Low without mitigation, to Low with mitigation.**

The following key mitigation measures have been identified:

- Placing the substation facility away from Adelaide Subgroup bedrock and rather on dolerite bedrock.
- Monitoring by a specialist before and during the construction phase of the development if excavations are to be conducted into fresh bedrock.
- Monitoring by a specialist before and during the construction phase of the development if excavations are to be conducted into superficial sediments.



- There will be no significant cumulative impacts on the palaeontology of the area caused by existing and proposed developments of the same technology in a 50 km radius, provided that the recommended mitigation is adhered to.

## Freshwater ecology impacts

From an aquatic vegetation point of view the proposed project area is dominated by species associated with the Nama Karoo vegetation ecosystem. No natural wetland areas were identified within the study area, and only river, streams and alluvial rivers were observed.

While the Present Ecological State is considered important for the study area system, (i.e. largely natural and moderately modified), the impact significance for all the impacts will be reduced to **low with mitigation**. Such an assessment rating is based on the assumption that once the project layout has been finalised, the required Water Use License Application (WULA) Process is initiated. The existing road access that will require upgrading and the new access roads will introduce several water crossings which will require WULAs.

Thus far the project design has applied all possible mitigation by avoiding turbine construction within the vicinity (at least 32m) of any watercourses on site and no infrastructure and turbines 500m around wetlands, as identified as buffer areas by the freshwater and bat specialists.

Some key mitigation measures include:

- All hard standing areas should be excluded from the riverine and buffer areas.
- All transmission towers and substations should be located outside of the delineated riverine systems and their indicated buffer areas. During operations, erosion should be monitored.
- To minimise the number of Water Use License Applications and further reduce potential impacts on the aquatic environment, any of the proposed structures for both the WEF and transmission line should be located outside of the 1:100 floodline as far as possible.

- Where unavoidable beds or banks of channels will be crossed, and these will require erosion protection (e.g. gabions and Reno mattress) to prevent erosion.
- The construction camp and necessary ablution facilities meant for construction workers must be beyond the 1:100 year floodline.
- The effectiveness of any storm water control measures must be monitored during the operational phase

## Socio-economic

The project has the potential to have a **significantly positive impact** on economic activity in the local area and region given the size of the new spending injection and community ownership associated with it and the clear need for economic opportunities in the area. Whilst increasing economic activity, the project would also result in the increased diversification of the local economy which is currently dominated by agriculture. This diversification should enhance the overall robustness of the economy by making it less susceptible to shocks/risks that may affect its primary sectors.

With respect to risks and negative impacts, these would primarily arise at a **local** scale and are significantly more difficult to assess accurately given high levels of uncertainty and the impact of personal perception of the impact of the project. Risks to tourism would be most prominent close to the site and should have a **medium to high** significance with mitigation measures recommended by the visual, noise and ecological specialists.

Some recommended mitigation measures include:

- Interact and engage extensively with the local community and its representatives to allow for the fair and transparent application of the Department of Energy's requirements for local benefit enhancement.
- Maintain visual setbacks from ridges as recommended by the visual specialist study (which was informed by the DEA&DP guidelines)
- Establish a Monitoring Forum (MF) for the project which includes key stakeholders





- Develop a Code of Conduct for the project in consultation with representatives from the MF.
- Closely manage and monitor the movement of workers on and off the site.
- A fire management plan should be drawn up prior to construction in agreement with neighbouring land owners.
- Outline procedures for managing and storing waste on site in the EMP
- Set up a monitoring programme in collaboration with neighbouring land owners that is specifically designed to provide clarity on impacts and risks.

## No-go option

The “no go” option was investigated during the EIA. If the project does not proceed, the following opportunities will be lost:

- Lost employment opportunities for local work force during the construction and operational phases of development.
- Lost income for workers from the surrounding local areas which is anticipated to amount to approximately R78 to R220 million over the course of the project
- Lost opportunity to contribute up to approximately 200 MW of additional generative capacity of green energy to the South Africa, with zero CO<sub>2</sub> emissions and very limited water consumption requirements. The proposed Ishwati Emoyeni Wind Energy Facility project could offset over 400 000 tonnes of CO<sub>2</sub> per year, or 80 000 000 tonnes of CO<sub>2</sub> over the lifetime (20 years) of the project<sup>1,2</sup>. Additional power to the local grid will continue to be provided via Eskom, with power generation approximately 90% coal-based with associated high levels of CO<sub>2</sub> emissions and water consumption.

Conversely, if the project does not proceed, the negative impacts described above could be avoided.

## Overall evaluation by the Environmental Assessment Practitioner

No negative impacts have been identified that, in the opinion of the Environmental Assessment Practitioner, should be considered “fatal flaws” from an environmental perspective, and thereby necessitate substantial re-design or termination of the project. Given South Africa’s need for additional electricity generation and efforts to decrease the country’s proportional dependency on coal-based power, renewable energy has been identified as a national priority. Furthermore, the project presents economic benefits for the local area (through economic development required by the REIPPPP process) as well as the wider Western Cape. Taking into consideration the findings of the EIA process for the proposed projects, it is the opinion of the Environmental Assessment Practitioner that the benefits associated with the projects outweigh the costs, and that the projects will make a positive contribution to steering South Africa on a pathway towards sustainable development. Provided that the specified mitigation measures are applied effectively, it is proposed that the projects receive environmental authorization in terms of the EIA Regulations promulgated under the National Environmental Management Act (NEMA).

<sup>1</sup> <http://www.iea.org/co2highlights/>

<sup>2</sup> [http://www.sunearthtools.com/dp/tools/CO2-emissions-calculator.php?lang=de#txtCO2\\_3](http://www.sunearthtools.com/dp/tools/CO2-emissions-calculator.php?lang=de#txtCO2_3)