Environmental Impact Assessment for the proposed Ubuntu Wind Energy Project near Jeffrey's Bay, Eastern Cape: Final Environmental Impact Assessment Report

# Chapter 2: Project Description

# Contents



# Figures



# CHAPTER 2. PROJECT DESCRIPTION

*This chapter is based on information provided by WKN-Windcurrent. A description of the site location is provided in Chapter 3.*

WKN-Windcurrent SA (Pty) Ltd is proposing to construct a wind energy facility near Jeffrey's Bay in the Kouga Municipal area of the Eastern Cape Province. The proposed project, referred to as the Ubuntu Wind Energy Project, will be undertaken in two phases and will utilise wind turbines with a combined generation capacity of 100 MW. A 100 MW wind project could produce enough electricity to power approximately 175 000[1] typical Eastern Cape households for a year.

## 2.1 OBJECTIVES OF THE PROJECT

At a national scale, renewable energy (in particular, wind energy) has the potential to play an important role in meeting South Africa's energy demand through diversifying the sources of power generation whilst reducing the country's carbon footprint from coal power generation. Currently, approximately 93 % of South Africa's power generation is derived from coal and 5 % from nuclear energy, whilst the remainder is produced by a combination of hydro-electric, pumped storage and biomass. The heavily energy-intensive South African economy makes the country one of the highest emitters of greenhouse gasses in Africa, and it stands above the OECD1 region average in energy sector emissions. South Africa produces more than 40% of Africa's fossil fuel-related carbon dioxide ($CO_2$) emissions, and is responsible for 1.5% of the world's total (ranking it 13th in the world in 2006).

A 100 MW wind farm would offset over 200 000 tonnes of $CO_2$ per year or 4 000 000 tonnes of $CO_2$ over a 20 year project lifetime (source: $CO_2$ Emissions from Fuel Combustion (2010 Edition), IEA, Paris: 835 grams $CO_2$ per kWh electricity produced in South Africa). Wind farms have a relative short lead time and could therefore be quickly deployed to meet South Africa's power need.

The project will also make a significant contribution to meeting provincial power supply requirements. The Eastern Cape Province is reliant on electricity supply from other provinces, and is currently limited by both generation and transmission capacity. This situation is restricting the significant industrial and rural development potential of the province, for example, at the major metropolitan centres such as Port Elizabeth.

[1] Where a typical Eastern Cape household uses 1500 kwh per annum. In South Africa, usage ranges from less than a 1000 kwh per year to over 8000 kwh per year.

At a local scale this wind energy project will contribute to improved energy stability and security of supply. In the Kouga area secondary agricultural processing companies and both small and commercial scale farmers experience an intermittent and sometimes unreliable supply of electricity. In the towns of Jeffrey's Bay and Humansdorp the power supply is struggling to meet the local demand. These towns are most severely affected by power failures as they consume more than 75% of the Kouga municipal energy supply. Furthermore, due to the length of the Eskom power lines from the power stations (e.g. in Mpumalanga) to the Kouga area, and the inherent characteristics of the Kouga network, the towns suffer from periodic power quality issues and voltage instabilities. Given these challenges, one of the objectives of the project is to help stabilise energy supply to the Jeffrey's Bay, Patensie, Hankey and Humansdorp area. The local economy, and in particular emerging entrepreneurs, will benefit from a more stable and reliable energy supply in the area.

## 2.2 SITE SELECTION

In the pre-feasibility stage of the project (2008-2009) sites were considered in the wider Eastern Cape region, leading to the selection of the Kouga area for more detailed studies and wind monitoring for the project. The Kouga region was seen as an ideal area for this project due to the following factors:

- The wind regime in the area appears favourable (see Figure 2.1).
- Existing Eskom power lines are in close proximity to the proposed site.
- Initial investigation suggests there are few additional constraints to the development in the immediate area.
- There is a need for additional energy capacity to support and stimulate economic growth.
- The network within the Kouga area can benefit from a localized power plant to stabilize the grid.

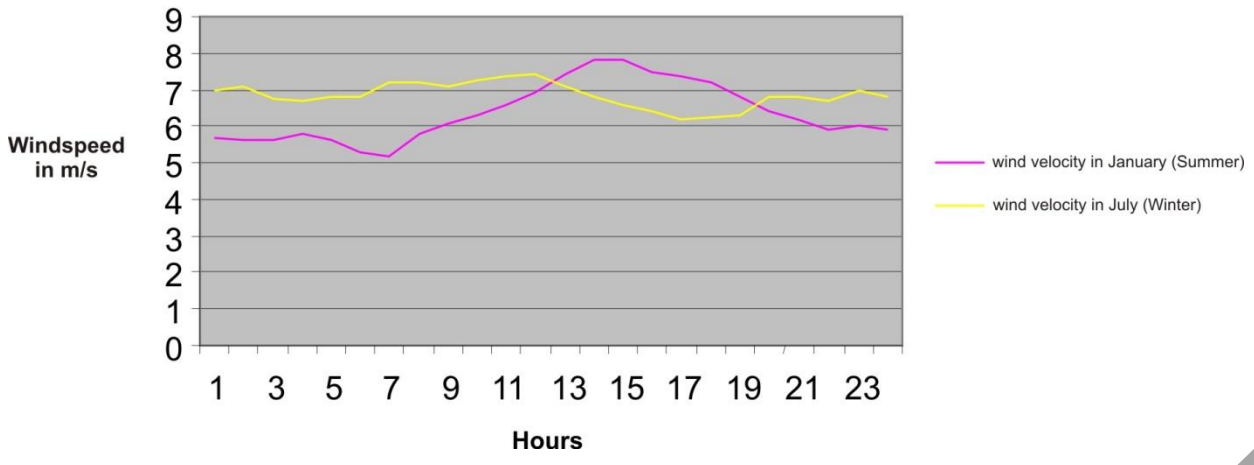


**Figure 2.1: Provisional wind profile for the Kouga site showing daily and seasonal variation**

## 2.3 OVERVIEW OF THE PROJECT

The objective of the project is to generate electricity to feed into the national grid by installing a wind farm with a maximum capacity of 100 MW. While the total capacity of this project is capped at 100 MW, the capacity of each phase is dependent on progress with other projects in the region and may be amended during the EIA process. The key components of the project are described below:

**Wind monitoring mast**

To guide project design and further investment decisions and to gather the necessary site specific wind data, WKN-Windcurrent has erected a wind monitoring mast (see photo of actual mast in Figure 1.2 of Chapter 1). Figure 2.2 is a diagrammatic representation of the mast that is installed to collect wind data for a period of approximately 12 - 24 months. The proposed erection of the mast was covered by a separate Basic Assessment process conducted by CSIR on behalf of WKN-Windcurrent in 2010 (DEA Reference number: 12/12/20/1753). This mast is 80 m high with securing stays on three sides extending approximately 65 m from the base. The mast has anemometers at heights of 25 m, 50 m and 80m. When the 12-24 month monitoring period is complete the mast can be dismantled and re-used elsewhere

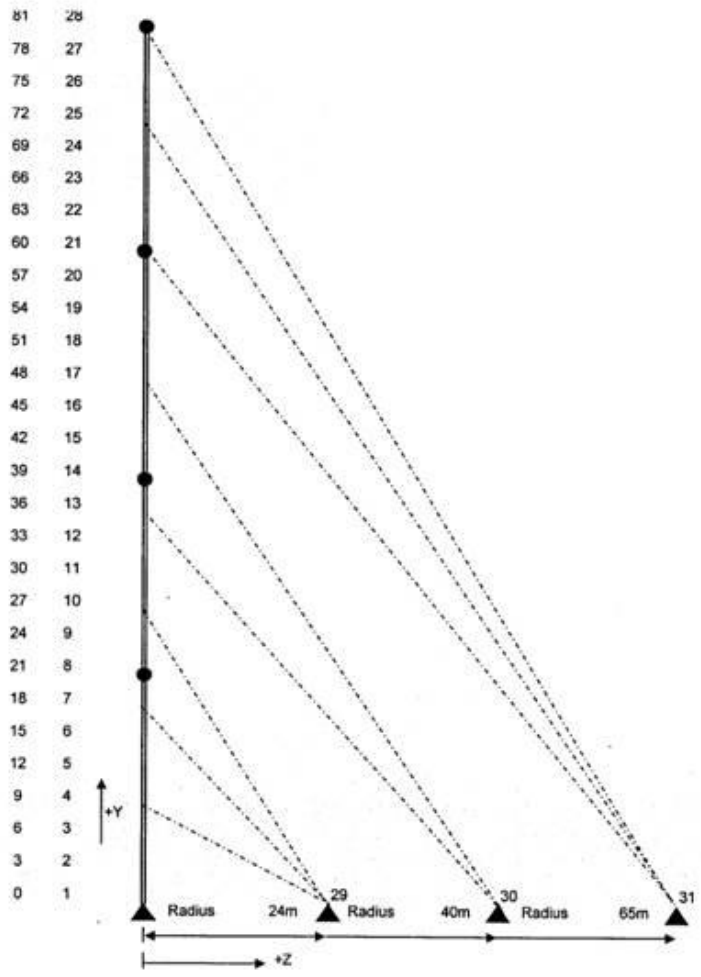


**Figure 2.2: Example of the 80 m wind monitoring mast erected on Farm Zuurbron**

**Wind turbines**

1. 31 to 50 turbines (the actual number will be dependent on the capacity of the turbines selected in the range between 2 and 3.2 MW), with an expected hub height from 80 m to 105 m and a blade diameter from 90 m to 117 m.
2. Turbines will be supported on foundations dimensioned to the geotechnical properties, for example reinforced concrete spread foundations of approximately 20 m by 20 m and 3 m in depth.
3. Electrical transformers will be placed beside or in (the nacelle) of each turbine.
4. Hard standing areas will be established adjacent to each turbine for use by cranes during construction and retained for maintenance use throughout life span of the project.
5. A maximum of three additional wind monitoring masts of up to 100 m in height may be installed.
6. Gravel roads, approximately 5 m wide, will be necessary to provide access to each turbine site, with the intent being to upgrade existing roads as far as possible.

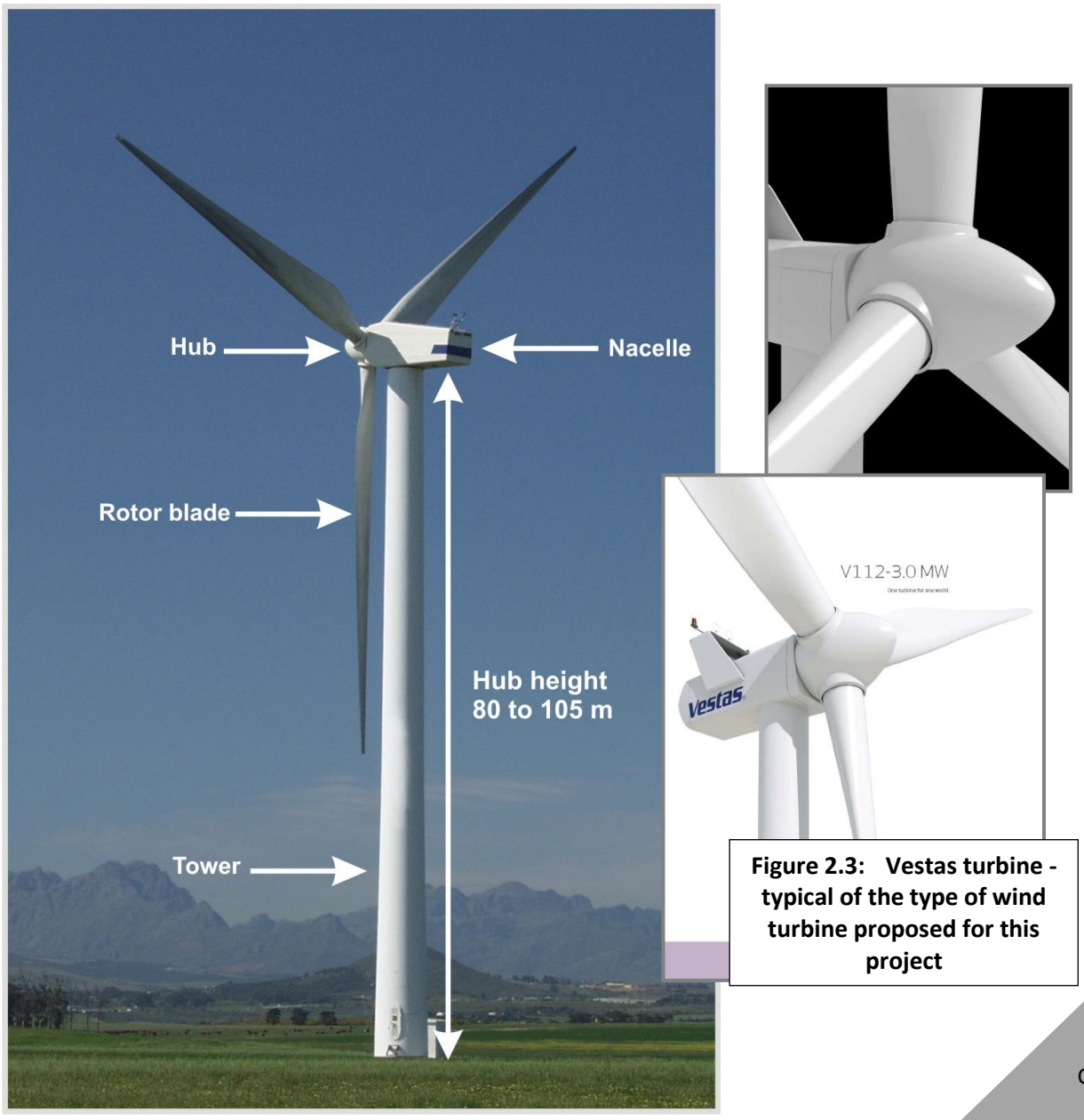


**Figure 2.3: Vestas turbine - typical of the type of wind turbine proposed for this project**

**Electrical connections**

1. The wind turbines will be typically connected to each other and to the substation using medium voltage cables which will, in most cases, be buried approximately 1 m below ground, except where a technical assessment of the proposed design suggests that above ground lines are appropriate. The final internal underground cabling design will not traverse any sensitive areas as identified by the environmental specialists. The impact through trenches for the underground cabling can thus be minimised by decreasing the total lengths needed.
2. A new sub-station (maximum size of 100m by 100m) and transformer to the 132 kV Eskom grid will be constructed on Farm Vlakteplaas. The substation will preferably be located close to the 132 kV line.
3. The connection from the substation to the Eskom grid line is a stretch of over head line supported on an intermediate pole(s), depending on the location of the substation relative to the 132 kV line.

**Other infrastructure**

1. Operations and maintenance building: A single storey building, maximum 5000 $m^2$, with warehouse / workshop space and access, office and telecoms space and security and ablution facilities as required. This preferably should be situated preferably close to the substation.
2. Fencing as required.

**Temporary activities during construction**

1. A lay down area is necessary for the assembly of the turbine components, beside an access route, of maximum area 10,000 $m^2$ – this hard standing area could be temporary or if the landowner prefers, left for long-term use.
2. The overall site compound for all contractors would be a maximum of 5000 $m^2$.
3. Existing borrow pits will be used as far as possible for road upgrades. The size of these pits will be dependent on the terrain and need for granular fill material for use in construction.
4. At the end of construction these borrow pits will be backfilled as much as possible using surplus excavated material from the foundations.

The construction will be undertaken in three distinct components:

- Civil construction;
- Electrical installation and wind turbine erection; and
- Commissioning.

The construction and commissioning phases are expected to require a total period of 8 to 15 months.

The operational life span of the wind turbines is expected to be 20 years. Turbine life can be extended beyond 20 years through regular maintenance and/or upgrades in technology.

The final choice of the type of turbines will be based on ease of erection, availability and suitability to the wind regime, amongst other criteria.

Wind turbines can be operated in parallel with farming activities. Internationally it is common practice for farming to continue whilst wind turbines are in operation leading to greater efficiency

of land use and no loss of economic activity, but an added passive income for the landowner. Internationally, wind turbines and related components take up between 2% and 5% of the surface area of the wind farm, allowing other activities such as farming to continue on the land. Farms Zuurbron and Vlakteplaas have a combined area of approximately 4 200 ha. The proposed wind turbines will be situated on the northern half of Vlakteplaas and eastern half of Zuurbron. After construction, the turbine mast footprints (including new roads, hard standing areas for cranes and turbine foundations) will cover approximately 15 ha which comprises approximately 0.36% of the total area.