Environmental Impact Assessment for the proposed Banna Ba Pifhu Wind Energy Project near Humansdorp, Eastern Cape: Final Environmental Impact Assessment Report

Chapter 2:

Project Description

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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 project near Humansdorp in the Kouga Municipal area of the Eastern Cape Province. The proposed project, referred to as the Banna Ba Pifhu Wind Energy Project, will have a generation capacity of maximum 30.6 MW. A 30.6 MW wind energy project could produce enough electricity to power approximately 53 550[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 30.6 MW wind farm would offset over 61 200 tonnes of CO_2 per year or 1 224 000 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.

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

[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.

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 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; and
- The network within the Kouga area can benefit from a localized power plant to stabilize the grid.

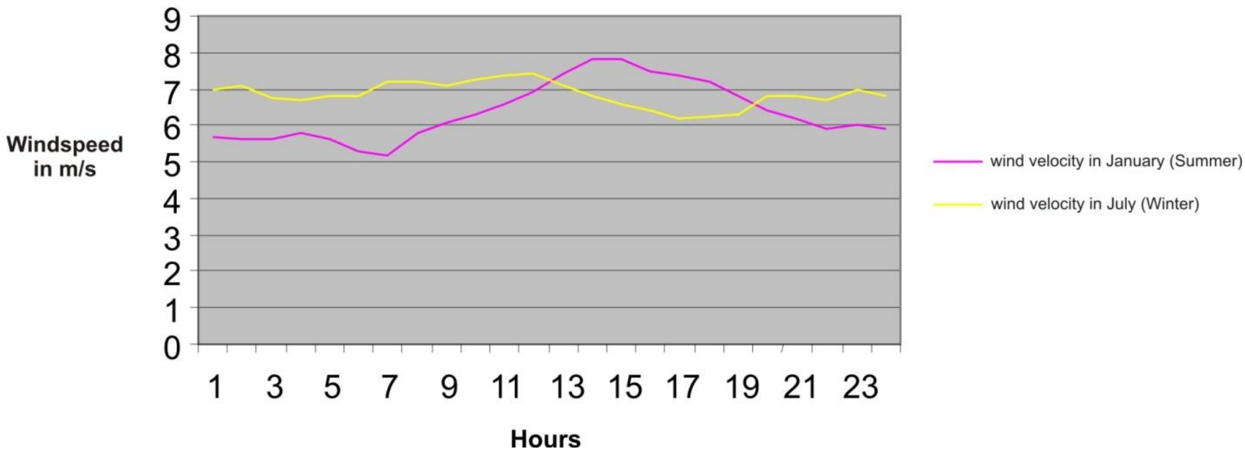

Figure 2.1: Provisional wind profile for the Kouga site showing daily and seasonal variation.

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 30.6 MW. 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 two wind monitoring masts on site (Figure 2.2) to collect wind data for a period of approximately 12 - 24 months. The proposed masts are approximately 100 m high with securing stays on three sides. The masts have anemometers at different heights. When the 12-24 month monitoring period is complete the masts can be dismantled and re-used elsewhere.

Figure 2.2/

Figure 2.2: One of the 100 m wind monitoring masts which is erected on Farm Broadlands.

Wind turbines

1. Nine to seventeen turbines will be erected (the actual number will be dependent on the capacity of the turbines selected in the range between 1.8 and 3.2 MW). The turbines will have 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 at a maximum depth of 3 m.
1. Electrical transformers will be placed beside each turbine or in the nacelle of each turbine.
2. Hard standing areas will be established adjacent to each turbine for use by cranes during construction and retained for maintenance use throughout the life span of the project.
3. 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/

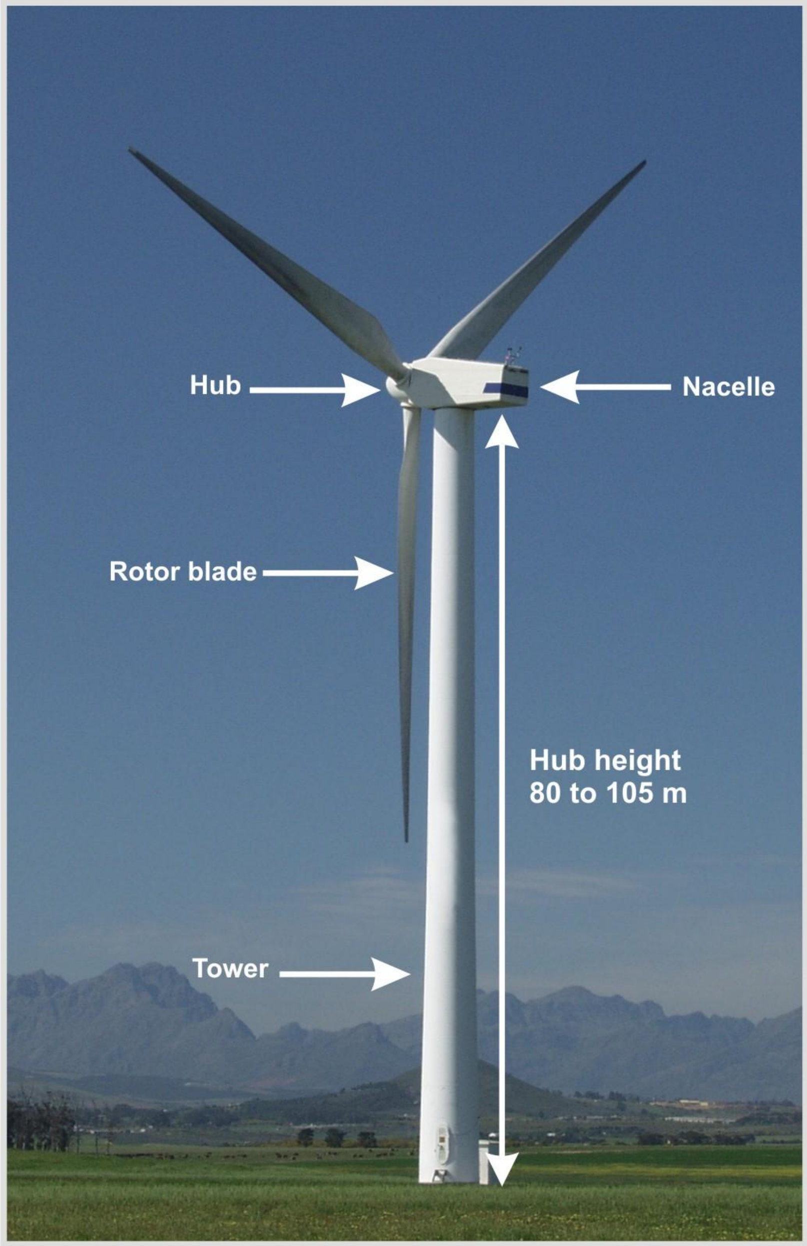

Figure 2.3: Vestas turbine - typical of the type of wind turbine proposed for this project.

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 substation will be built on site to connect to the distribution or transmission system (maximum size of 100 m by 100 m). It is proposed to connect the wind farm substation to the existing 66 kV Melkhout / St. Francis overhead powerline, which passes through the site.
3. The connection from the new substation to the Eskom grid line would be via underground cabling or a stretch of over head line supported on an intermediate pole(s), depending on the location of the substation relative to the 66 kV line.

Other infrastructure

1. Operations and maintenance building: An existing vacant building on the farm will be utilised as a storage/ maintenance and control/operations facility for the wind energy project. New buildings will not be erected.
2. Fencing as required.

Temporary activities during construction

1. A lay down area (alongside an access route) of maximum area 10 000 m^2 is necessary for the assembly of the turbine components– this hard standing area could be temporary or if the landowner prefers, left for long-term use.
2. The overall site compound for contractors would be approximately 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.

These 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. The farm covers approximately 1138 hectares. A number of mitigation measures have been implemented to significantly mitigate the impacts of the wind farm development on agricultural resources and productivity. These are listed in the agricultural report (Chapter 14). The most significant of these involve the layout of the wind farm. After mitigation, the loss of agricultural land was determined as only 8.38 hectares for the preferred alternative comprising 30.6 MW, which represents a mere 0.7 % of the land surface of the farm. All the identified impacts on agricultural resources and productivity were considered to be of low significance after mitigation. Current cattle farming activities would continue beneath and around the turbines.

WKN Windcurrent wishes to diversify the use of renewable energy resources by erecting a solar and a wind energy facility on the same project area. In addition to the application for a proposed wind farm, WKN Windcurrent also submitted an application to DEA for the erection of a 4.5 MW photovoltaic (PV) solar power project on portion 15 of farm 689 and portion 1 of farm 868 (DEA reference number: 12/12/20/2236). The closest turbine will be located 389 m from the PV facility (Figure 2.4).The PV project comprises a Basic Assessment. The Final Basic Assessment Report has been submitted to DEA for decision-making in December 2011 (CSIR Ref No: Stel General: 9291). A decision from DEA is currently pending.

A layout plan has been prepared for the proposed project, showing the locations of the turbines as well as supporting infrastructure such as roads relative to features such as riparian areas and the 1:100 year floodline (Figure 2.5).

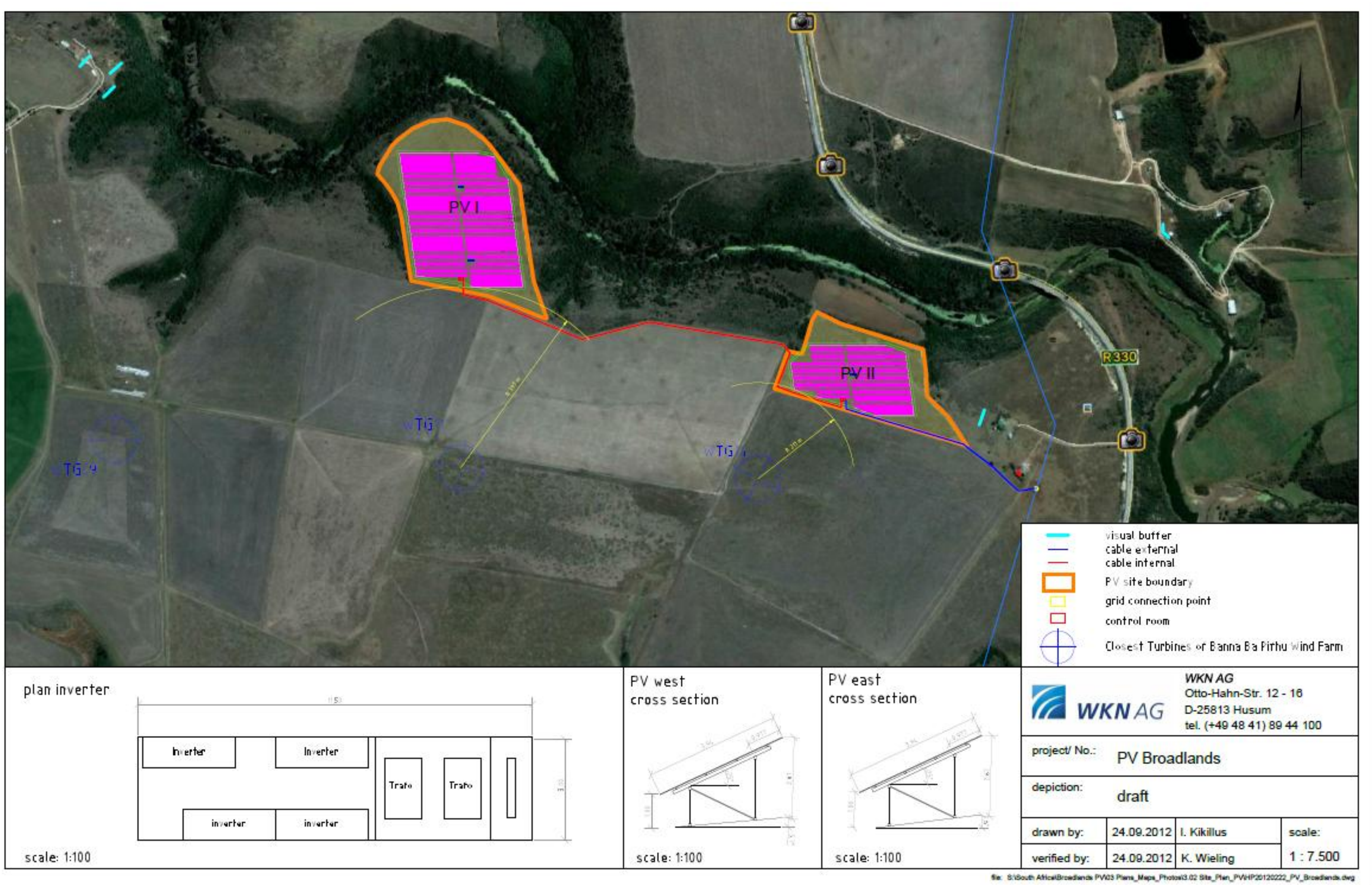

Figure 2.4 : Layout of the proposed PV facilities and the distance of the closest wind turbines that form part of the Banna Ba Pifhu wind energy project.

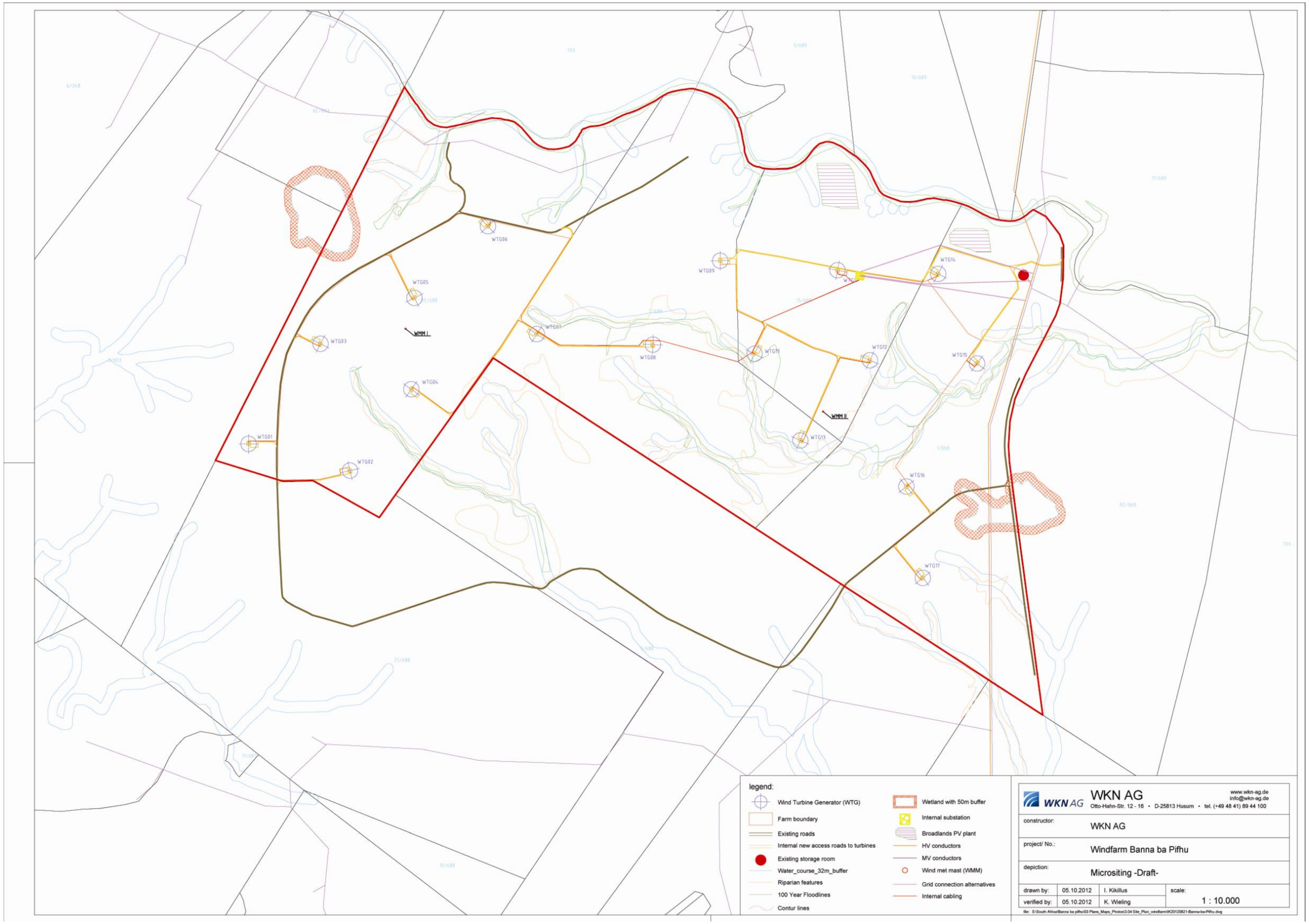

Figure 2.5 : Layout of the location of the turbines as well supporting infrastructure such as roads relative to features such as riparian areas and the 1:100 year floodline.